

PhD thesis

Emotional Development Scale (EDS), Marschack Interaction Method (MIM) and Neuroaffective Mentalizing Interview (NMI) as Basis for Effect Evaluation in Family Intervention

Contents

PhD thesis	3
Title	3
Introduction.....	3
Problem statement	4
Motivation for Ph.D. thesis.....	5
Methodological and theoretical considerations	6
Theoretical perspectives in relation to NADP:	
Research Design	9
Study plan and timeline	11
Dissemination of the product and research findings	12
References.....	12

PhD thesis

Title

Emotional Development Scale (EDS), Marschak Interaction Method (MIM) and Neuroaffective Mentalizing Interview (NMI) as Basis for Effect Evaluation in Family Intervention

Introduction

In Denmark, huge amounts are allocated on the national budget every year to support children's development, e.g. through family intervention. Where the emphasis, for example in the regional educational-psychological advisory services, has been on assessing children's cognitive resources and difficulties in order to identify the optimal school placement and the child's need for remedial support, there is now a growing need to assess children's emotional resources and challenges, and their parent's capacity to support this development. Today, a far greater number of children are referred to the regional educational-psychological advisory services and to child psychiatric services due to emotional dysfunctions. Since the late 1800s, there has been a strong focus on assessing children's cognitive development, and since the early 1900s, there has been a dedicated effort to define and measure intelligence. Today, we have well-documented knowledge about human cognitive development processes and the cognitive neural structures underlying specific cognitive capacities (see e.g. Purves et al. 2001). Today, there is a wide range of validated neuropsychological assessment methods for uncovering cognitive resources and difficulties, see e.g. Crawford et al. 1992; Lezak et al. 2012, Riccio et al. 2012; Strauss et al. 2006. The design of IQ tests led to the development of psychometrics, which has made intelligence measurable and quantifiable and has enabled us to develop assessment methods aimed at identifying children's intellectual developmental level in both general and specific terms (Karpatschhof 2011). The same effort has not been devoted to measuring emotional development. Today there is a considerable ongoing effort to help children thrive emotionally, including through family therapy, but until now, no consistent assessment methods have been found to evaluate the effects of these types of intervention.

Due to the lack of published research that operationalizes the progression of emotional capacities, synchronization processes between parents and children, and a clinical-friendly way of assessing the parents' mentalizing capacities, we also lack empiric findings concerning how these capacities are linked together, and we lack evidence-based assessment methods. Therefore, we need theoretical as well as empirical knowledge about the development of the affective structures, which begins before the child develops language and sophisticated cognitive capacities. We need a theoretical and empirical understanding of how the development of the child's affective structures are interrelated with the parent's and child's capacity to synchronize with each other, which builds into the parent's capacity to mentalize. This knowledge should be rooted in an understanding of the progressive nature of development, where each stage builds on the previous stage, and of the risk of developmental dysfunctions that this implies, due to either environmental factors or neurological setbacks.

During the past three decades, both researchers and clinicians have shown considerable interest in integrating various directions within personality psychology, developmental psychology, trauma

theory, attachment theory and neuroaffective research with a view to enabling a more holistic understanding of psychological well-being and suffering and a bio-psychosocial model for emotional development and developmental setbacks. In the United States, this has resulted in a theoretical integration labelled *interpersonal neurobiology*, exemplified by selected works by Schore: 1994, 2003a, 2003b, Siegel: 1999, Cozolino: 2002 and others. In Denmark, for the past two decades, I have contributed with a similar theoretical integration, which is based more on developmental psychology, which I call *neuroaffective developmental psychology* (NADP), exemplified by selected titles, Hart: 2006a, (English version 2008); 2006b (English version 2010); 2011, which aim to assess children's emotional developmental level and examine how these developmental levels may be disturbed by constitutional or environmental factors and/or their mutual interaction. Recent years have shown a growing need for a theoretical understanding of emotional development and emotional dysfunctions.

In relation to children's and adolescents' emotional developmental capacities and dysregulation, the American child psychiatrist Bruce Perry is currently developing an assessment method, which he calls the *Neurosequential Model of Therapeutics (NMT)*. This method aims to structure and assess the child's primary emotional difficulties and resources based on the latest neuroaffective knowledge (Perry 2006, 2009; Perry & Hambrick 2008; Perry & Dobson 2013). I have initiated the development of the psychological assessment method/test Emotional Development Scale (EDS) based on *neuroaffective developmental psychology* (NADP). While the NMT offers a research-based alternative to the categorical diagnostics system, the *Emotional Development Scale (EDS)* is intended as a theoretically based emotional developmental psychology assessment method aimed at identifying the psychological intervention that is best suited to promoting the child's emotional development and self-regulation capacities.

In relation to structured interactions between parents and children there is now a growing focus on developing psychological interaction methods that can become evidence-based. In the 1960s Ann Marschak was the first to develop a structured method to examine the quality of the interactions between a parent and a child. Based on a set of nine activities she developed four dimensions used to evaluate the interaction: structure, engagement, nurture and challenge. During the last decade, various pilot projects have aimed to develop a psychometric standardization of the MIM, e.g. in Finland by Saara Salo. In Salo's study, the scoring system used in the MIM has been elaborated with input from neuroaffective theory and developed into a psychometric evaluation method, and is named Assessment of Emotional Interaction Style (EIS). In this study this scoring system has been further developed and structured to be accommodated with the EDS, and is named Marschak Interaction Psychometrics (MIP).

Mentalizing capacity, a concept developed by Peter Fonagy, has received considerable attention over the past decade. This theoretical understanding has served as a basis for the development of mentalization-based therapy as well as ways to assess adults' mentalizing capacity. Over the past two decades, a method assessing the mentalizing capacity of adults has been developed based on the two semi-structured interviews Adult Attachment Interview (AAI) developed by Mary Main and the Parent Development Interview (PDI) developed by Arietta Slade in combination with the scoring system Reflective Functioning Scale (RF) developed by Fonagy, Target and Steele (1998). In this study, together with three psychologists, I have developed a clinical-friendly version consisting of a structured interview with psychometric measures that combine neuroaffective and mentalizing theory with the purpose of measuring parents' mentalizing capacity.

Problem statement

- 1) Can the standardized Emotional Development Scale (EDS), which is based on neuroaffective developmental psychology (NADP), be used as an assessment method for 4-12-year-old children to identify a) emotional developmental age, b) degree of psychological vulnerability, c) regressive tendencies and d) self-protection strategies used in various situations?
- 2) What are the psychometric properties of Emotional Development Scale (EDS), and what is the correlation between 4-12 year-old children's progress of mental development as rated on the EDS, the intersubjectivity between the parent and child as rated with the Marschak Interaction Method (MIM) and the parent's mentalizing capacity as rated on the Neuroaffective Mentalizing Interview (NMI)
- 3) Can the Emotional Development Scale (EDS) in combination with the Marschak Interaction Method (MIM) and the Neuroaffective Mentalizing Interview (NMI) be used as an effect evaluation tool to measure change over time for the outcome of a family intervention and emotional development in the child?
- 4) How can the empirical material derived from testing the Emotional Development Scale (EDS) for 4-12-year-old children be used to modify and fine-tune the theory behind neuroaffective developmental psychology (NADP)?

Motivation for PhD thesis

As mentioned above, a growing number of children are referred to Danish regional educational-psychological advisory services and child psychiatric services due to emotional difficulties. There is, thus, a mismatch between the number of children referred for emotional difficulties and the lack of theoretical awareness and methods for identifying what emotional regulation requires, the impact of emotional development and the importance of the primary caregiver and other important adults in supporting the child's emotional development. The lack of theoretical understanding has made it difficult to develop adequate assessment measurements to clarify what support the child needs to achieve emotional development. This situation has motivated me to develop a validated theory for understanding human emotional development, developmental disorders and dysregulation based on attachment and developmental psychology and, based on this understanding, to develop assessment methods capable of assessing the individual child's emotional developmental level and emotional resources and difficulties. Another key aim of this project has been to develop psychometric standards for a structured interaction method as well as a clinical-friendly way to assess parents' mentalizing capacities by means of psychometric measures. Only within the past three decades has neurophysiological research based on sophisticated brain imaging techniques made it possible to study affective neural structures; this in turn is now making it possible to engage in empirical research of assessment methods developed through this theoretical understanding. The theoretical integration can be exemplified by e.g. Damasio, 1998, 1999; Davidson et al. 1990; 2000a; 2000b; Thatcher 1996; van der Kolk 1987).

The intended PhD project is seen as highly relevant, as the development of a well-founded validated theoretical integration of children's emotional development and emotional dysregulation leading to symptoms such as attention deficits, impulsivity, dysphoria, difficulties with social communication and interaction etc. and related assessment methods would make it possible, based on the child's current emotional function, to identify optimal psychological intervention, e.g. through family therapy, for promoting the child's emotional and personality development. For example, the

assessment would be able to indicate what psychotherapeutic intervention the child can benefit from, how the parents can support the child's development and/or where the child needs compensational support from others. The assessment should also be able to indicate ways for the child to develop self-regulating skills in interactions with well-regulated others, internalize these interactions and thus integrate them into his/her personality.

Methodological and theoretical considerations

Theoretical perspectives in relation to NADP:

NADP rests on the understanding that as humans, we develop our emotional capacities, our personality and our ability to engage in social relationships through interactions with other humans. I have been developing this theoretical foundation since the early 1990s, and it is described in a number of publications: Hart 2006a (English 2008), 2006b (English 2010), 2011, 2012; Hart & Schwartz 2013; Hart & Bentzen, M. 2013 (English version 2015).

NADP is based on the neurologist John Hughlings Jackson's (1835-1911) idea that over millions of years of evolution newer, higher-order centres in the nervous system have developed on top of lower-seated, older sections, and on neurologist Paul MacLean's (1970, 1990) description of the human brain as a hierarchy of functional levels, where the structures that develop early in life progressively, through separate developmental stages, become subordinate to later developing structures, thus increasing the complexity of the brain. MacLean introduced a model that he called 'the triune brain', which depicts the human brain as a three-tiered structure with closely interconnected levels. In NADP, MacLean's three tiers are called the autonomic sensing structure, the limbic emotional structure and the prefrontal mentalizing structure (Hart 2006a). For our epigenetic potential to be realized, humans require attachment-based stimulation through synchronization on the autonomic sensing level, affective attunement on the emotional limbic level and dialogical communication on the prefrontal mentalizing level, which deals with emotions, relationships and self-concept. This understanding and these three levels form the structural framework of NADP and serves as the theoretical foundation for the EDS.

Research-based knowledge about the human brain's emotion-regulating structures stems from studies of attachment in developmental psychology, exemplified by selected titles by e.g. Stern (1977, 1985, 1995, 2004); Trevarthen (1989, 1993, 1998); Tronick (1989) (Tronick et al. 1982), which argue that basic affect regulation develops from birth in a close interaction between caregiver and child. The development of synchronization and emotional attunement processes within the first year of life as a foundation for the attachment pattern and for emotional development was documented by Sander, exemplified by selected titles: 1969, 1977, 1988, and Tronick: Tronick & Gianino 1986; Tronick & Cohn 1989; Tronick & Weinberg 1997. In addition, there has been intensive research into the connection between neuroaffective processes and developmental psychology (cf. Perry 1997, 1999; Perry et al. 1995), e.g. concerning the role of relationships for the maturation and development of the human nervous system and the regulation difficulties that result when the nervous system fails to receive adequate stimulation through intersubjectivity. A growing body of research is providing insights into the neural basis for arousal-regulating, hedonic, affective, attention and impulse-controlling processes at the autonomic-sensing level, which are regulated by and develop on the basis of intersubjective interactions. This includes Porges's (1997, 1998) research into the need to balance the autonomic nervous system as a precondition for regulating

affect and attention and Panksepp's (1998, 2000, 2011) research into the basic neural emotional circuits in humans. The further development of the MIM can thus be applied in combination with aspects from the EDS to assess the child's arousal-regulating and affect-attuning functions.

John Bowlby developed attachment theory in the 1950s and 1960s, and the research he carried out in cooperation with the American psychologist Mary Ainsworth contributes to our understanding of the development of various types of secure or insecure attachment patterns in humans. Attachment research (exemplified by Fonagy et al. 2007) has shown that these patterns impact the child's basic affect regulation capacity and his/her development of mentalization and a reflective capacity. Recent studies have found that the development of attachment patterns is based on the synchronization capacity of the autonomic structures and on the somewhat later development of the so-called categorical emotions, which are expressed through facial mimicry, and which have been described by Paul Ekman (Ekman & Oster 1979; Ekman et al. 1980, 1983), among others. Further, the synchronization capacity depends on altercentric participation, as documented by Stein Bråten (1993, 1998), which means that the infant has the capacity to engage in social interactions by attending to the other, as if the child's orientation focus and perspective were centred in the other. Finally, synchronization depends on protoconversations, as documented by Stern (1985, 2004), Beebe (Beebe & Stern 1977; Beebe & Lachmann 1988, 1994, 2003), Trevarthen (1979; Aitken & Trevarthen 1997) and others, referring to the infant's capacity to focus on the other's face and voice and to respond to the other's smiles and expressions in a mutual interaction where the infant smiles and is encouraged to respond to the other's contributions with babbling and gestures. This synchronization capacity stimulates the neural areas related to the limbic emotional level and enable the development and refinement of social interactions. The MIM and the EDS are used to assess the child's limbic categorical emotions, altercentric participation, capacity for protoconversation, capacity for social interactions etc.

Bowlby and Ainsworth's attachment research has subsequently been integrated with later research, exemplified by selected titles by e.g. Main: 1985 et al, 1993, 1999 and Fonagy: 1999, 2006, 2009, of whom the latter has linked the attachment capacity with the development of the human capacity for mentalization. According to the Fonagy group and other attachment researchers (e.g. Fonagy et al. 1991; 2002) mentalization develops through intersubjective communication, developing into an intrapsychological capacity that only emerges fully in the context of a secure attachment relationship, which concerns the prefrontal level. The prefrontal cortex is hugely complex and immensely important for the preservation of emotional stability. This area enables us to control our own behaviour and emotions by inhibiting impulses and taking over control from reflexive/instinctive systems and limbic structures. The parents' mentalizing capacity enables the parents to create a secure attachment pattern with their child. With the NMI it is possible to assess the parents' mentalizing capacity and their capacity for having stable inner representations of their child, which is a necessary condition for them to support the child's emotional development. The EDS is used to assess the child's impulse inhibition functions, symbolization capacity and mentalization capacity.

Self-protection strategies

In the United States, since the 1980s, trauma researchers including Bessel van der Kolk, Ruth Lanius, Ellert Nijenhuis and Onno van der Hart, exemplified by selected titles: van der Kolk 1994, 1996; van der Kolk & Fisler 1994; van der; Kolk & McFarlane 1996; Lanius, Vermetten & Pain 2010; Nijenhuis & den Boer 2007; van der Hart, Nijenhuis & Steele, K. 2006, have studied how severe trauma affects the human nervous system. Among other findings, they have shown how the

psychological system relies on self-protection strategies to handle situations that are associated with anxiety. In NADP (Hart 2006b, 2011), self-protection strategies are viewed as part of the personality structure, which develops in the relationship with the caregiver to allow the infant to protect and preserve both him/herself and the relationship. An emotionally well-regulated child is capable of flexible self-regulation in an ongoing interaction with the possibilities and potential dangers presented by the child's social environment at any given moment. However, the nervous system may also be stuck or flutter erratically from one self-protection strategy to another, because the infant is unable to self-regulate and either find or receive support for achieving emotional balance. Self-protection strategies are autonomic, non-volitional strategies, capable of functioning independently of the context where they developed. Self-protection strategies mature successively, and like emotional capacities, they develop in a hierarchical sequence. As is the case with emotional capacities, the earliest developed self-protection strategies are preserved but are gradually superseded by more mature variants.

Self-protection strategies serve different purposes on the three levels of the brain. On the autonomic sensing level, the self-protection strategies aim to secure organismic survival based on reaction formations such as fight, flight or 'freeze' (blocked motor functions). On the limbic emotional level, the self-protection strategies aim to preserve the relationship with primary caregivers as much as possible with reaction formations such as external attribution, where others are either idealized or attributed feelings of hate or hostility (splitting), or withdrawal, where the person relies on internal attribution, turning the hate or hostility against him/herself. On the prefrontal mentalizing level, the self-protection strategies aim to preserve the integrity of the self, with reaction formations including the inhibition of emotional impulses that are implicitly perceived to be inappropriate in the family or cultural setting and are therefore suppressed and replaced by excessive shame, guilt and moral complexes, obsessions, compulsions etc. If a more mature strategy fails to offer the necessary protection, the nervous system will regress, seeking self-protection on a lower level. The EDS assesses which self-protection strategies are activated on which level, and how much psychological stress it takes to trigger them. If the child's emotional regulation and synchronization capacities are immature, it is possible to correlate EDS findings with MIM findings to assess the child's specific resources and vulnerabilities.

The EDS scoring system

The Emotional Development Scale rests on the understanding described above, viewing emotional neural structures as hierarchically organized and developing progressively. If the nervous system is exposed to stressors that the child has not yet developed the necessary capacities to handle, the child may activate regressive and potentially dysfunctional self-protection strategies. Relying on these self-protection strategies for an extended period will lead to psychological imbalances that are dysfunctional in the long term. This understanding forms the framework of the EDS scoring system, and together with psychotherapist Marianne Bentzen (Hart 2011 and Hart & Bentzen 2013) I have developed a model that forms the basic structure for the tasks, the structured interview and the scoring system used in the EDS. The model is based on the concept of *neuroaffective compasses* and consists of a compass for each of the three levels: the autonomic compass, the limbic compass and the prefrontal compass. The self-protection strategies are addressed on the three levels, as described above (the model and the preliminary operationalization of the scoring system are enclosed as appendices). Based on this model, the EDS can be used to assess whether emotional difficulties stem from inadequately developed emotional capacities, temporary stress exposure that leads to regression and/or being stuck in or fluttering among various self-protection strategies.

The MIM scoring system

The MIM scoring system also rests on the understanding described above. Taking into account that the development of attachment patterns is based on synchronization capacity, synchronization capacity depends on reciprocal participation. Synchronization capacity stimulates the neural areas related to autonomic and limbic brain functions, which enables the development and refinement of social interactions. It has hence been necessary to develop a psychometric scoring system that measures synchronization capacity within different dimensions and which also identifies the types of relational stressors the child is exposed to that may activate regressive and potentially dysfunctional self-protection strategies. As the MIM is a structured method to observe intersubjectivity, and the four dimensions are suitable for recognizing different aspects of synchronicity, Saara Salo developed a scoring system elaborated with input from neuroaffective theory (EIS), and in this study this scoring system has been further developed and structured to be accommodated with the EDS and is named Marschak Interaction Psychometrics (MIP).

The NMI scoring system

Based on research by Fonagy, P, Target, M., Steele, H., & Steele, M. (1998)

Fonagy, P., & Ghinai, R. (2008), Ha, C., Sharp, C., Ensink, K., Fonagy, P., Cirino, P. (2013), the reflective functioning scale was developed, based on the semi-structured interviews the Adult Attachment Interview (AAI) developed by Mary Main, and the Parent Development Interview developed by Arietta Slade. Using a long semi-structured interview has generally proved clinically challenging, and it has been necessary to develop a more clinical-friendly version consisting of a structured interview with psychometric measures for assessing adults'/parents' mentalizing capacity. Over the past year, three other clinical psychologists (Anne Blom Corlin, Jesper Birck and Knud Hellborn) and I, two of us certified in the RF-scale, have developed a short structured interview and a scale scoring system combining the RF-scale with the neuroaffective compasses.

Research design

Preparation

The purpose of the empirical study is to develop, validate, inter-correlate and evidence-base attachment-based and neuroaffective assessment methods with the goal of determining what sort of intervention is needed to support a child's emotional, personal and social development. As emotional development takes place in a relational context it is considered necessary to correlate the child's emotional development level with parent/child interaction skills and with the parents' mentalizing capacity. As relational and emotional assessment methods based on emotional development are in their infancy, it has been necessary to develop the EDS parallel with this research project. The following describes the development of the EDS, paralleled with the development of the NMI and psychometric scoring criteria for the MIM.

The development of the EDS began in spring 2012, when a group of certified psychologists were invited to take part in developing the EDS for children aged 4-12 years. Prior to this, the psychology publisher Hogrefe Psykologisk Forlag A/S had agreed to take part in developing the test. In the summer of 2014, the project teams reported that the material was ready, and the teams were consequently dissolved in January 2015. Following this, the task set and the structured interview have undergone subsequent revisions and modifications. In autumn 2014, the first pre-test of the task set and the structured interview were conducted by ten psychologists with about 30 normally functioning 4-12-year-old children. Following this, the task set and the structured interview were further revised based on the ten psychologists' feedback. The process of structuring and refining the

task set and interview took place in late summer 2015, after which time Hogrefe Psykologisk Forlag A/S prepared test materials, registration forms etc. The first pilot was carried out on about one hundred children in autumn 2015. Based on the results from the pilot test, the next step is standardization based on data from approximately 400 children aged 4-12 years, evenly balanced with regard to age. The group includes 80 % children without a diagnosis, 10 % children diagnosed with infantile autism and 10 % children with other diagnoses, e.g. ADHD and reactive attachment disorder. This test and data collection process takes place in autumn 2016. The data from the pilot test is going to be analysed for reliability, validity and standardization and also undergo a confirmatory factor analysis. The statistical analysis is going to be translated into a scoring system that can be analysed and interpreted in relation to the neuroaffective compasses. The EDS consists of a performance test of 15 items and a structured assessment guide for the tester divided into two different aspects, one regarding predisposing, perpetuating and protective factors in the child's life and the other regarding the child's emotional development. The structured assessment guide elaborates on the test psychologist's scorings, identifying divergences and/or contributing with knowledge that can only come from everyday observations of the child. The emotional development is evaluated within the three developmental levels: the autonomic, limbic and prefrontal domains. In the autonomic domain, the child's capacity for sensory integration, arousal regulation and synchronization is challenged; in the limbic domain, the child's capacity for displaying and perceiving limbic categorical emotions, for altercentric participation and for affective attunement is challenged; and in the prefrontal domain, the child's capacity for impulse inhibition, symbolization and mentalization is challenged. The EDS is both a part of the research design, and used in the control study.

Design

This study uses mainly a design that analyses reliability, validity and correlation of the EDS, the MIM and the NMI, and their psychometric properties. The EDS, the MIM and the NMI are correlated with two evidence-based questionnaires, the Parent Stress index (PSI) and Parent-Child Relationship Inventory (PCRI). The five assessment methods are correlated before and after a random family intervention. The tests are also correlated with the results after a six-month period. The data consists of data analyzed on the basis of video recordings, performance tests, a structured evaluation, a structured interview and standardized questionnaires.

The purpose of the assessment is to determine a child's emotional capacity, the quality of the intersubjectivity between parent and child, the parent's mentalizing capacity and the correlation between the child's emotional capacity, the intersubjectivity and the parent's mentalizing capacity with the overall purpose of effect evaluation of intervention methods.

Data collection methods

The subjects in this study are 40 children, aged 4-12 along with one of their parents, who had been referred to a day family treatment centre. None of the children aged 4-12 or their parents were excluded due to any kind of abuse and/or psychological disorders or diagnoses, as these issues are not considered a hindrance for correlating the empirical findings.

Included are eight day family treatment centres from various parts of Denmark. Two psychologists from each family centre are in charge of recruiting the children and parents based on the inclusion and exclusion criteria described below. The same psychologists are also in charge of the testing. The children and parents are recruited at the beginning of their stay at the day family treatment centre as a part of their initial assessment period. The staff consists of family therapists, trained educators, social workers and psychologists, and together they determine which families to invite.

The researcher does not take part in approving the families in order to blind the study as much as possible. After the psychologists' approval, the parent is introduced to the study in an informal meeting. The parent signs an informed consent form and a consent form concerning the use of video recording in the test situation. The children are introduced to the study in a manner appropriate to their age.

The experimental design randomly assigns 40 children and one parent each to the assessment before and after a six-month period of family treatment.

To ensure interrater-reliability, one of the two testers (psychologists) at each family centre makes a video recording of the EDS performance test, the MIM, and the NMI and makes the scoring. The other tester (psychologist) watches the video and makes a scoring without knowing the scores from the first tester. The results from the first test period are sent to the researcher. To ensure re-test reliability within 1-7 weeks the first tester makes a retest of the performance test of the EDS before the intervention is implemented. After a period of six months the testing is repeated with the same scoring procedure. When the second test period is completed the results are sent to the researcher.

The first test period is September to November 2016; the second test period is March to May 2017. The test materials are sent to the attending testers (psychologists) in August 2016, and a workshop to instruct the testers is conducted for the participating testers (psychologists) on 26th August and 2nd September.

Study plan and timeline

The PhD project is expected to last two years, beginning in January 2016 to be completed in January 2018.

January-August 2016

Preparation of the research study

Completion of the first article:

Neuroaffective Developmental Psychology and the development of three assessment methods: the Emotional Development Scale, the Marschak Interaction Psychometrics and the Neuroaffective Mentalizing Interview.

September-November 2016:

Initiating the research study and completing the first part of the empirical research.

December 2016-May 2017:

Finalizing the research study and completing the second part of the empirical research.

Analyzing the data from the first part of the empirical design

June-September 2017:

Analyzing the data from the second part of the empirical design

Completion of the second article:

Can psychometric measures of emotional development, intersubjectivity between child and parent correlated with the parent's mentalizing capacity be considered an evidence-based method of effect evaluation of family therapy?

October 2017-January 2018:

Completion of the PhD project

Completion of the third article:

How has the validation of the Emotional Development Scale affected Neuroaffective Developmental Psychology?

Dissemination of the product and research findings

As the project aims to involve international researchers and clinical psychologists, and as the PhD project is intended to be published in international journals, the thesis will be written in English.

The PhD thesis will be article-based, consisting of three articles, a summary, discussion and conclusion. The findings from the study will be submitted to recognized peer-reviewed international psychology and psychiatry journals. Specifically, the list of intended journals includes *Child Development*, *Development and Psychopathology*, *Journal of Child Psychology and Psychiatry*, *Clinical Psychology Review*, *Journal of Personality and Social Psychology*, *Developmental Psychology*. In addition, the findings will be submitted for publication in relevant Danish journals, including *Pædagogisk Psykologisk Tidsskrift* and *Nordisk Psykologi* as well as *Kognition & Pædagogik* and *Tidsskrift for Dansk Musikterapi* in order to disseminate the findings to psychologists and music therapists who use neuroaffective theory in practice and who work with psychological testing of children.

References

- Aitken, K.J. & Trevarthen, C. (1997) Self-other Organization in Human Psychological Development. *Development and Psychopathology*, 9(4): 653-677.
- Beebe, B. & Lachmann, F.M. (1988) The Contribution of Mother-infant Mutual Influence to the Origins of Self and Object Representations. *Psychoanalytic Psychology*, 5(4): 305-337.
- Beebe, B. & Lachmann, F.M. (1994) Representation and Internalization in Infancy: Three Principles of Salience. *Psychoanalytic Psychology*, 11(2):127-165.
- Beebe, B. & Lachmann, F.M. (2003) The Relational Turn in Psychoanalysis: A Dyadic Systems View from Infant Research. *Contemporary Psychoanalysis*, 39(3): 379- 409.
- Beebe, B. & Stern, D. (1977) Engagement-disengagement and Early Object Experiences. In: N. Freedman & S. Grand (eds.) *Communicative Structures and Psychic Structures*. New York: Plenum.
- Bråten, S. (1993) The Virtual Other in Infants' Minds and Social Feelings. In: A.H. Wold (ed.) *The Dialogical Alternative*. Oslo: Scandinavian University Press.
- Bråten, S. (1998) *Kommunikasjon og samspill fra fødsel til alderdom*. Oslo: Tano Aschehoug.
- Cozolino, L. J. (2002) *The Neuroscience of psychotherapy. Building and rebuilding the human brain*. New York & London: W.W. Norton & Company.
- Crawford, J.R., Parker, D.M., McKinlay, W.M. (eds.) (1992) *A handbook of neuropsychological assessment*. Hove: Lawrence Erlbaum Associates.
- Damasio, A.R. (1998) Emotion in the perspective of an integrated nervous system. *Brain Research Reviews*, 26: 83-86.
- Damasio, A.R. (1999) *The feeling of what happens: Body, emotion and the making of consciousness*. London: William Heinemann.
- Davidson, R.J., Ekman, P., Saron, C.D., Senulis, J.A. & Friesen, W.V. (1990) Approach-withdrawal and cerebral asymmetry: Emotional expression and brain physiology I. *Journal of Personality and Social Psychology*, 58 (2): 330-341.
- Davidson, R.J. & Slagter, H.A. (2000a) Probing emotion in the developing brain: Functional neuroimaging in the assessment of the neural substrates of emotion in normal and disordered children and adolescents. *Mental Retardation and Developmental Disabilities Research Reviews*, 6: 166-170. New York: Wiley-Liss.
- Davidson, R.J., Putnam, K.M. & Larson, C.L. (2000b) Dysfunction in the neural circuitry of emotion regulation. A possible prelude to violence. *Science*, 289: 591-594.
- Ekman, P. & Oster, H. (1979) Facial Expression of Emotion. *Annual Review of Psychology*, 30: 527-554.
- Ekman, P., Friesen, W. & Ancoli, S. (1980) Facial Signs of Emotional Experience. *Journal of Personality and Social Psychology*, 38: 568-582.

- Psychology*, 39(6): 1125-1134.
- Ekman, P., Levenson, R. & Friesen, W. (1983) Autonomic Nervous System Activity Distinguishes Among Emotions. *Science*, 221(4616): 1208-1210.
- Fonagy, P. (1999) *Transgenerational Consistencies of Attachment: A New Theory*. Paper to the Developmental and Psychoanalytic Discussion Group, American Psychoanalytic Association Meeting, Washington, DC, 13 May 1999 (available online at dspp.com/papers/fonagy2.htm).
- Fonagy, P. (2009) The Mentalization Approach to Social Development. In: F. Busch (ed.) *Mentalization: Theoretical Considerations, Research Findings, and Clinical Implications*. New York: Analytic Press. 642
- Fonagy, P., Steele, M., Steele, H., Moran, G.S. & Higgitt, A. (1991) The Capacity for Understanding Mental States: The Reflective Self in Parent and Child and its Significance for Security of Attachment. *Infant Mental Health Journal*, 12(3): 201- 218.
- Fonagy, P, Target, M., Steele, H., & Steele, M. (1998) Reflective-Functioning Manual. Version 5.
- Fonagy, P., Gergely, G., Jurist, E.L. & Target, M. (2002) *Affect regulation, Mentalization and the Development of the Self*. New York: Other Press.
- Fonagy, P., Gergely, G. & Target, M. (2007) The Parent-infant Dyad and the Construction of the Subjective Self. *Journal of Child Psychology and Psychiatry*, 48(3- 4): 288-328.
- Fonagy, P., & Ghinai, R. (2008) A self-report measure of mentalizing: Development and preliminary test of the reliability and validity of the Reflective Function Questionnaire (RFQ): Unpublished manuscript.
- Ha, C., Sharp, C., Ensink, K., Fonagy, P., Cirino, P. (2013). The measurement of reflective functioning adolescents with and without borderline traits. *Journal of Adolescence*, 36,
- Hart, S. (2006a) *Hjerne, samhørighed, personlighed*. Copenhagen: Hans Reitzels Forlag. English version (2008): Brain, Attachment, Personality. London: Karnac Books.
- Hart, S. (2006b) *Betydningen af samhørighed*. Copenhagen: Hans Reitzels Forlag. English version (2010): The Impact of Attachment. New York: Norton.
- Hart, S. (Ed.) (2011) *Dissociationsfænomener*. Copenhagen: Hans Reitzels Forlag.
- Hart, S. (Ed.) (2012) *Neuroaffektiv psykoterapi med voksne*. Copenhagen: Hans Reitzels Forlag.
- Hart, S. & Schwartz, R. (2013) *Barnet og dets relationelle miljø – om tilknytningsbaseret undersøgelsesmetodik*. Copenhagen: Hans Reitzels Forlag.
- Hart, S. & Bentzen, M. (2013): *Jagten på de nonspecifikke faktorer i psykoterapi med børn*. Copenhagen: Hans Reitzels Forlag. English version (2015): Through Windows of Opportunity: A Neuroaffective Approach to Child Psychotherapy. London: Karnac.
- Karpatschof, B. (2011) Psykisk målbarhed. In: B. Karpatschof & B. Katzenelson (eds.). *Klassisk og moderne psykologisk teori* (eds.) . Copenhagen: Hans Reitzels Forlag.
- Lanius,R., Vermetten, E. & Pain, C. (2010) *The Impact of Early Life Trauma on Health and Disease: The Hidden Epidemic*. Cambridge, UK: Cambridge University Press.
- Lezak, M. D., Howieson, D.B., Bigler, E.D., Tranel, D. (2012). *Neuropsychological Assessment* (Fifth ed.). Oxford: Oxford University Press.
- MacLean, P. D. (1970) The triune brain, emotion, and scientific bias. In: F. O. Schmitt (ed.). *The Neurosciences Second Study Program*, pp. 336-349. New York: The Rockefeller University Press.
- MacLean, P.D. (1990) *The triune brain in evolution: Role in paleocerebral functions*. New York: Plenum.
- Main, M. (1993) Discourse, Prediction, and Recent Studies in Attachment: Implications for Psychoanalysis. *Journal of the American Psychoanalytic Association, Suppl. on Research in Psychoanalysis*, 61: 209-243.
- Main, M. (1999) Epilogue. Attachment Theory: Eighteen Points with Suggestions for Future Studies. In: J. Cassidy & P. R. Shaver (eds.) *Handbook of Attachment: Theory, Research and Clinical Applications*. New York: Guilford Press.
- Main, M., Kaplan, N. & Cassidy, J. (1985) Security in Infancy, Childhood and Adulthood: A Move to the Level of Representation. In: I. Bretherton & E. Waters (eds.) *Growing Points of Attachment Theory and Research. Monographs of the Society for Research in Child Development*, 50(1-2)(209): 66-104.
- Nijenhuis, E.R.S., den Boer, J.A. (2007) Psychobiology of traumatization and trauma-related structural dissociation of the personality. In: Vermetten E, Dorahy MJ, Spiegel D. (eds.). *Traumatic Dissociation, Neurobiology and Treatment*. Washington, DC: American Psychiatric Publishing, Inc.
- Panksepp J. (1998) *Affective Neuroscience. The Foundations of Human and Animal Emotions*. New York: Oxford University Press.
- Panksepp, J. (2000) The Long-term Psychobiological Consequences of Infant Emotions. *Infant Mental Health Journal*, 22(1-2): 132-173.
- Panksepp, J. (2011) *Psychology, Behavioral Neuroscience, Neuroscience*. Mauritius: Betascript Publishing.

- Perry, B. D. (1997) Incubated in terror: Neurodevelopmental factors in the “cycle of violence”. Cybrary version. In: J. Osofsky. (ed.). *Children, Youth and Violence: The Search for Solutions*, pp. 124-148. New York: Guilford Press.
- Perry, B.D. (1999) Posttraumatic stress disorders in children and adolescents. Academy version of article to appear in *Current Opinions in Pediatrics*, 11 (4) Psychiatry: 121-132
- Perry, B. D. (2006). The neurosequential model of therapeutics: Applying principles of neuroscience to clinical work with traumatized and maltreated children. In N. B. Webb (ed.), *Working with traumatized youth in child welfare* (pp. 27–52). New York: Guilford Press.
- Perry, B.D. (2009) Examining child maltreatment through a neurodevelopmental lens: clinical application of the Neurosequential Model of Therapeutics. *Journal of Loss and Trauma* 14: 240-255
- Perry, B.D. & Hambrick, E. (2008) The Neurosequential Model of Therapeutics. *Reclaiming Children and Youth*, 17 (3) 38-43.
- Perry, B.D. & Dobson, C.L. (2013) The Neurosequential Model of Therapeutics in Treating Complex Traumatic Stress Disorders (pp. 249-260). In: J. D. Ford & C. A. Courtois (eds.) *Children and Adolescents*. New York: The Guilford Press.
- Perry, B. D., Pollard, R. A., Blakely, T. L., Baker, W. L. & Vigilante, D. (1995) Childhood Trauma, the neurobiology of adoption, and “use-dependent” development of the brain. How “states” become “traits”. *Infant Mental Health Journal*, 16: 271-291.
- Porges, S.W. (1997) Emotion: An Evolutionary By-product of the Neural Regulation of the Autonomic Nervous System. In: C.S. Carter, B. Kirkpatrick & I.I. Lederhendler (eds.). *The Integrative Neurobiology of Affiliation*. Annals of the New York Academy of Sciences.
- Porges, S.W. (1998) Love: An Emergent Property of the Mammalian Autonomic Nervous System. *Psychoneuroendocrinology*, 23(8): 837-861.
- Porges, S.W. (2007) The Polyvagal Perspective. *Biological Psychology*, 74(2): 116-143.
- Purves, D., Augustine, G. J., Fitzpatrick, D., Katz, L. C., LaMantia, A., McNamara, J. O. & Williams, S. M. (2001). *Neuroscience*. Sunderland, MA. Sinauer Associates.
- Riccio, C. A., Sullivan, J.R., Cohen, M. J. (2010). *Neuropsychological Assessment and Intervention for Childhood and Adolescent Disorders*. New York: John Wiley & Sons
- Sander, L. (1969) Regulation and organization in the early infant-caretaker system. In: R. J. Robinson (ed.). *Brain and early behaviour*, pp.311-333. London: Academic Press.
- Sander, L. (1977) The regulation of exchange in the infant-caretaker system and some aspects of the context-content relationship. In: M. Lewis & Rosenblum (eds.) *Interaction, conversation, and the development of language*, pp. 133-156. New York: Wiley.
- Sander, L. (1988) The event structure of regulation in the neonate-caregiver system as a biological background for early organization of psychic structure. In: A. Goldberg (ed.). *Frontiers in Self Psychology*, 3: 3-27. Hillsdale, NJ: The Analytic Press.
- Schore, A. (1994) *Affect regulation and the origin of self*. Hillsdale, NJ: Lawrence Erlbaum Ass.
- Schore, A. (2003a) *Affect Dysregulation and Disorders of the Self*. New York & London: W.W. Norton & Company.
- Schore, A. (2003b) *Affect Regulation & the Repair of the Self*. New York & London: W.W. Norton & Company
- Siegel D. J. (1999): *The developing mind. Toward a neurobiology of interpersonal experience*. New York: The Guilford Press.
- Stern, D.N. (1977) *The First Relationship*. Cambridge, MA: Harvard University Press.
- Stern, D. N. (1985) *The Interpersonal World of the Infant*. New York: Basic Books.
- Stern, D. N. (1995) *The Motherhood Constellation*. New York: Basic Books.
- Stern, D. N. (2004) *The Present Moment in Psychotherapy and Everyday Life*. New York & London: W. W. Norton & Company.
- Strauss, E., Sherman, E. M., Spreen, O. (2006). *A Compendium of Neuropsychological Tests: Administration, Norms, and Commentary*. Oxford: Oxford University Press.
- Thatcher, R.W. (1996) Neuroimaging of cyclic cortical reorganization during human development. In: R. Thatcher, G. Lyon, J. Rumsey & N. Krasnegor (eds.) *Developmental neuroimaging*. London: Academic Press.
- Trevarthan, C. (1979) Communication and cooperation in early infancy: A description of primary intersubjectivity. In: M. Bullowa (ed.). *Before speech: The beginning of interpersonal communication*. pp. 321-347. Cambridge, UK: Cambridge University Press.
- Trevarthen, C. (1989) Development of early social interactions and the affective regulation of brain growth. In: C. Euler, H. Fossberg & H. Lagercrantz (eds.). *Neurobiology of Early Infant Behavior*, 55: 191-215. Wenner-Gren International Symposium. New York: Stockton Press.

- Trevarthen, C. (1993) The self born in intersubjectivity: The psychology of an infant communicating. In: U. Neisser (ed.). *The perceived self: ecological and interpersonal sources of self Knowledge*, pp.121-173. New York: Cambridge University Press.
- Trevarthen, C. (1998) The concept and foundations of infant intersubjectivity. In: S. Bråten (ed.). *Intersubjective communication and emotion in early ontogeny*, pp. 15-46. , Cambridge, UK: Cambridge University Press.
- Tronick, E.Z. (1989) Emotions and emotional communication in infant. *American Psychologist*, 44: 112-119.
- Tronick, E. Z., Ricks, M. & Cohn, J. F. (1982) Maternal and infant affective exchange: Patterns of adaption. In: T. Field & A. Fogel (eds.). *Emotion and early interaction. Normal and high-risk infants*, pp. 83-100. Hillsdale, NJ: Lawrence Erlbaum Ass.
- Tronick, E.Z. & Gianino, A. (1986) Interactive mismatch and repair: Challenges to the coping infant. *Zero to Three: Bulletin of the National Center Clinical Infant Program*, 5: 1-6
- Tronick, E.Z. & Cohn, J. F. (1989) Infant-mother face-to-face interaction: Age and gender differences in coordination and occurrence of miscoordination. *Child Development*, 60: 85-92.
- Tronick, E. Z. & Weinberg, M. K. (1997) Depressed mothers and infants: failure to form dyadic states of consciousness. In: L. Murray & P. J. Cooper (eds.). *Postpartum depression in child development*, pp. 54-81. New York: Guilford Press.
- van der Hart, O., Nijenhuis, E.R.S. & Steele, K. (2006) *The Haunted Self: Structural Dissociation and the Treatment of Chronic Traumatization*. Norton. NY.
- van der Kolk, B.A. (1987) *Psychological trauma*. Washington, DC: American Psychiatric Press.
- van der Kolk, B.A. (1996): The body Keeps the score: Approaches to the psychobiology of posttraumatic stress disorder. In: B. A. van der Kolk, A. C. McFarlane & L. Weisaeth (eds.). *Traumatic stress: The effects of overwhelming experience on mind, body and society*, pp. 214-241. New York: Guilford Press.
- van der Kolk, B. A. & Fislser, R. E. (1994) Childhood abuse and neglect and loss of selfregulation. *Bulletin of the Menninger Clinic*, 58: 145-168.
- van der, Kolk, B.A & McFarlane, A. C. (1996): The Black Hole of Trauma. In: B. A. van der Kolk, A. C. McFarlane & L. Weisaeth (eds.). *Traumatic stress: The effects of overwhelming experience on mind, body and society*, pp. 3-23. New York: Guilford Press.