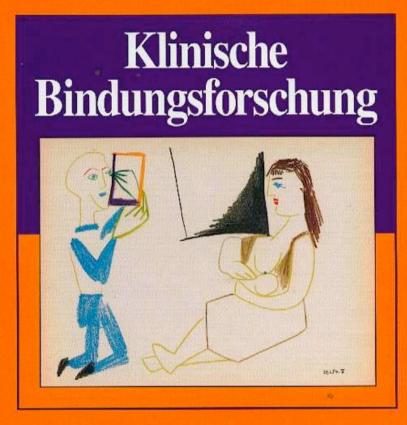Horst Kächele & Anna Buchheim
Attachment Theory as a Basis for Psychoanalysis

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and Psychotherapy

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Klinische Bindungsforschung

Theorien   Methoden   Ergebnisse

Recently three German authors have published a book titled

Clinical Attachment Research.

It explores theories, methods and results

The psychiatrist and psychoanalyst John Bowlby turned away from traditional psychoanalytic view of fantasy governing primarily life during childhood and focused on the implication of actual real events such as separation and loss on the emotional development of a child.

„Although John Bowlby was a psychoanalyst by formal training, he was a **true ethologist** by heart ... Bowlby began reading the classical ethological literature in the early fifties..

He was especially influenced by the work of primatologists studying mother-infant relationships" (Suomi 1995, p.185)

Ten-fifteen years ago very few people from the fields of psychotherapy would have connected the name of John Bowlby with a clinical topic. We searched for the appearance of Bowbly´s work in German psychoanalytic and cognitive textbooks in the eighties and nineties and found very few instances.

A rare exemption was the book" Cognitive Psychotherapy" published in Berlin where Liotti made „"attachment and cognition" a topic presenting „a guideline for the reconstruction of early pathogenic experiences in cognitive psychotherapy".

In: Perris C, Blackburn M, Perris H (Eds) Cognitive Psychotherapy. Theory and Practice. Springer, Berlin, p. 62-79, 1988

Even when John Bowlby received the honorary doctorship at the University of Regensburg in November 1999 none of the German specialized psychotherapeutic journals mentioned this remarkable event.

How could this happen?

The paper "Grief and mourning in infancy and early childhood" delivered in October 1959 before the British Psychoanalytic Society and in April 1960 at the Columbia University in New York spelled out the crucial controversial conceptual issues.

Bowlby radically criticized the prevailing psychoanalytic views of development.
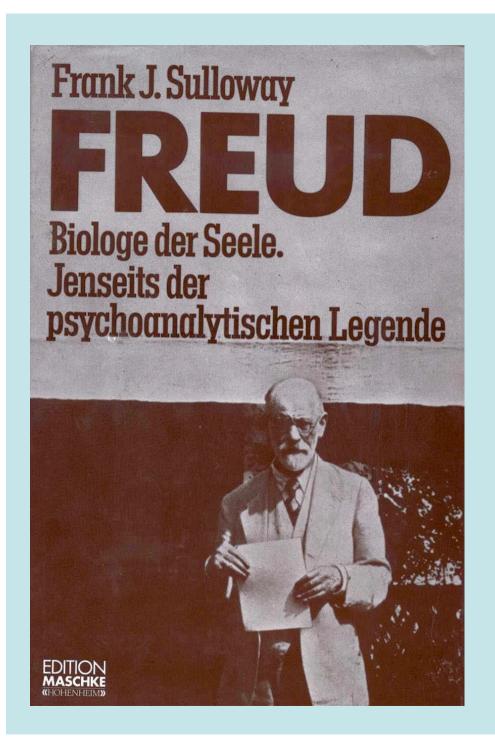
In Anna Freud´s and M. Schur´s discussion of Dr. John Bowlby´s paper the core distinction - in my view - dealt with the issue of

„**biology versus psychology**"

Discussion of Dr. John Bowlby´s position

Attachment theory was criticized as mechanistic, non-dynamic
and explicated according to thorough misunderstanding of
psychoanalytic therapy" (A. Freud 1960; M. Schur 1960).
Time and again the same reproaches appear:
„Bowlby is seen as having renounced drives, „the Oedipus",
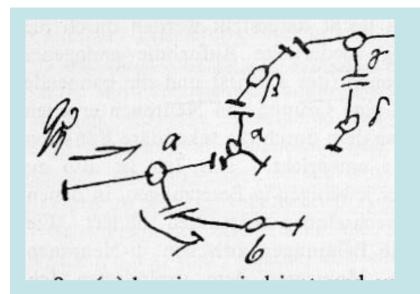unconscious processes, particular unconscious fantasy etc
or even worse:
„Bowlby treat humans as if they were animals"
so Phyllis Grosskurth in 1987

Frank J. Sulloway
FREUD
Biologe der Seele.
Jenseits der psychoanalytischen Legende

EDITION
MASCHKE
«HOHENHEIM»

However it may be interesting to remind us that Frank Sulloway titled his monograph

Freud - the biologist of the mind

published in 1979

german edition 1982

Freuds original neuro-scientific model

S.Freud 1895: Entwurf einer Psychologie

Neuronal networks described by Freud in his „Project for a Scientific Psychology" 1895

M.Spitzer 1996 Mind in the Net
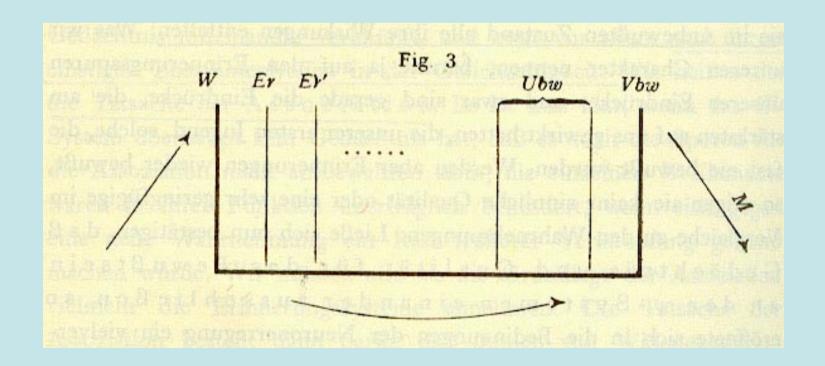
The Project 1895

Freud´s first model of sexual drive still was a truly somato-psychic one: (Male) sexual energy flows from the testes upward, crosses the soma-psychic boundary, turns into volutious feelings seeking an object etc

When Freud gave up his „project" in 1895 the new then truly psychoanalytic model made no effort of anchoring the psychological processes in any brain structures; psychoanalysis and all psychotherapies to arrive after the fifties of the last century became disconnected to biology until recently.

Fig. 3

19th century principle of constancy

However, the 19th century biological "principle of constancy",
which Freud adopted from Fechner, remained a pillar in
psychoanalytic theory :

"The nervous system is an apparatus which has the function of
getting rid of the stimuli which reach it, or of reducing them to
the lowest possible level; or which, if it were feasible, would
maintain itself in an altogether unstimulated condition"

 (Freud 1915c, p. 120)

Freuds drive/discharge model and developmental psychobiology

However, today's developmental psychobiologists take into account that the neurobiologically determined complexity, due to billions of neurones with thousands of interconnections, leads to uncertainty and a limitation in the ability to predict behavior.

This degree of complexity guarantees individuality and assures self-determination. Complexity grows in the course of development. Humans are attributed with the ability to socialize themselves into the animate and inanimate world. Activity generated endogenously represents a fundamental principle which has taken the place of the drive/discharge hypothesis.

Kächele H, Buchheim A, Schmücker G, Brisch KH (2001) Development, attachment and relationship: New psychoanalytic concepts. In: Henn FA, Sartorius N, Helmchen H, Lauter H (Eds) Contemporary Psychiatry. Springer, Berlin, S 358-370

The crisis of psychoanalytic theory and the death of economic energy assumptions

Object relations are not discharge phenomena. Freud's concept of instinct as something arising from within the interior of the organism does not apply to the observation that the formation of object relations is a process of caring encompassing two people (a process that does not include climaxes or peaks of discharge).

... the concept of instinct itself has not received its necessary backing from contemporary biology .... I believe, as does Bowlby, that object relations have their analog in the attachment behaviors of other species (Modell 1984, pp. 199-200).

What is an object ?

From today's point of view the inner object is not seen as an isolated object, but rather as a memory framed by a context of activity. From birth the object representations take place in a multiple context of acts of varying quality. By repeated communicative acts unconscious schemata are created, which can become very stable.

Daniel Stern (1985) refers to this active process as the representations of interactions that have been generalized (RIG). He assumes that the infant divides the flow of an interaction into episodes (e.g. feeding) and from repeated similarities (invariances) a prototype or schemata is built and generalized. This schema guides the expectations and the behavior for the interactional sequences to follow.
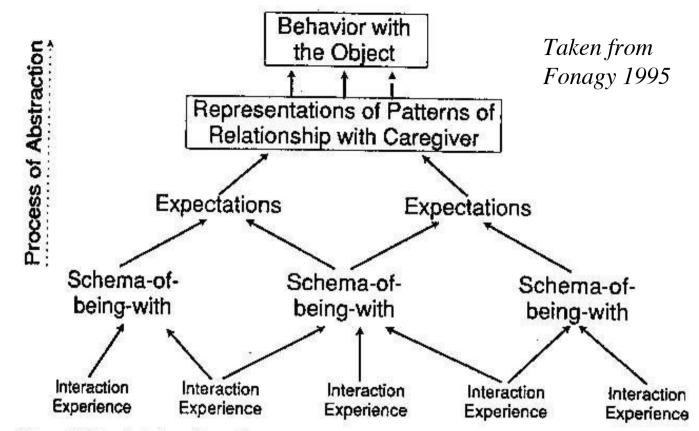
Figure 1 The Relationship of Experience, Expectations and Internal Working Models of Attachment Relationships

Taken from Fonagy 1995
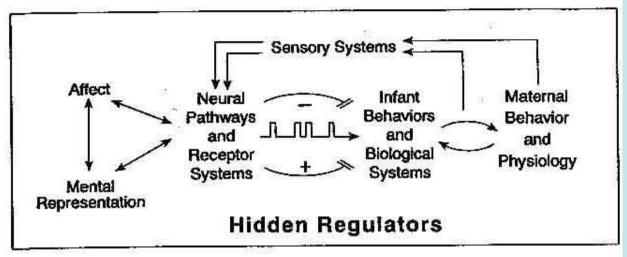
The **concept of schema** has become a building block for both developmental and clinical theories
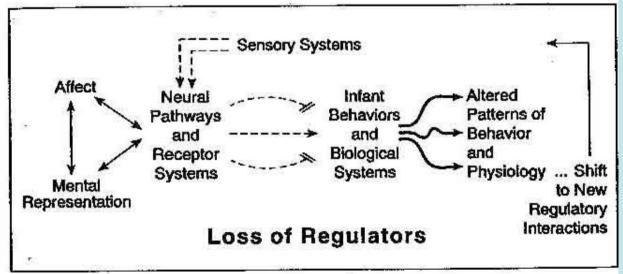
Developmental Biology is back

No longer the reference to „other non-human species" is excluded; on the contrary we find papers like the one of Suomi discussing

Influence of Attachment Theory on Ethological Studies of Biobehavioral Development in Nonhuman Primates

In Goldberg S, Muir, R Kerr, J (Eds) Attachment Theory. Social, Developmental and Clinical Perspectives. Analytic Press, Hillsdale 1995

Hidden Regulators

Loss of Regulators
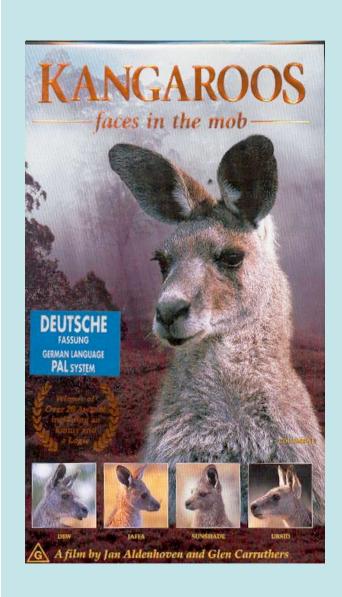
M. Hofer´s work on hidden regulators spells out that regulatory interactions appear to be capable of inducing the searching and proximity seeking behavior directed toward an increasingly specific object that is the hallmark of attachment behavior

M. Hofer: Hidden Regulators. In Goldberg S, Muir R & Kerr J (1995) Attachment Theory. Social, Developmental, and Clinical Perspectives. Hillsdale, Analytic Press

The biological basis of attachment theory I

- Attachment is an inborn system in the brain that envolves in ways that influence and organize motivational, emotional and memory processes with respect to significant caregiving figures

- At the most basic evolutionary level, the behavioral system improves the chances of the infant´s survival

- (Siegel D. J. 1999, The developing mind)

For two years, Australian film makers lived with this mob in a remote valley...

Follow the destinies of two lovable young joeys - a female called Sunshade whose mother is conscientious and successful; and Jaffa, a little male full of curiosity and courage but whose mother is casual and forgetful....

80% of young kangaroos do not reach the one year survival; only mothers that provide **a secure base** for their offspring are successful to rear their offsprings beyond that age.

The biological basis of attachment theory **II**

- Repeated experiences with the caregiver become encoded in implicit memory as expectations and then as mental models or schemata of attachment

- Studies of attachment have revealed that the pattering or organization of attachment relationships during infancy is associated with characteristic processes of emotional regulation, social relatedness, access to autobiographical memory, and the development of self-reflection and narrative

- (Siegel D. J. 1999, The developing mind)

Attachment - a bridging concept
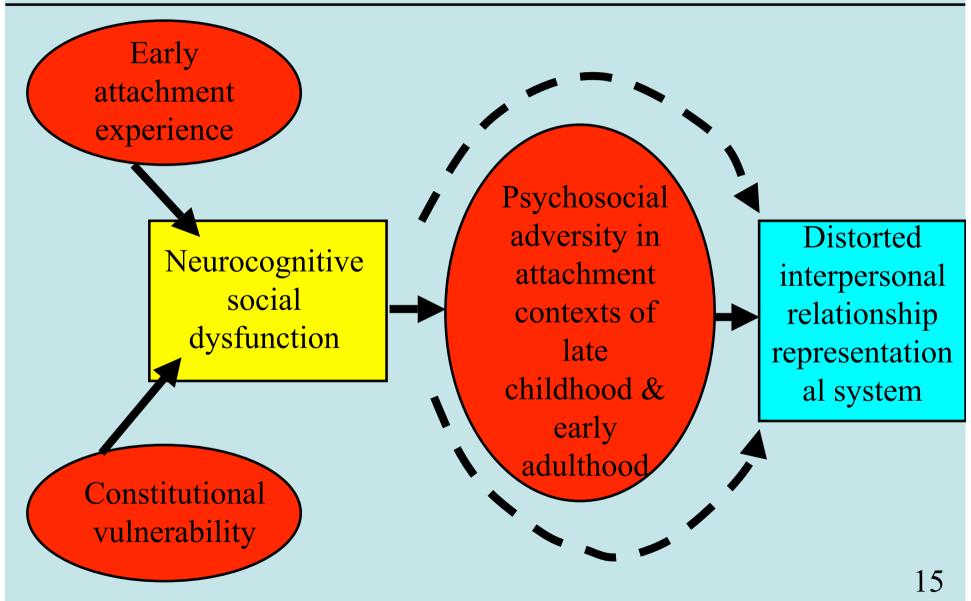
Adult attachment is the stable tendency of an individual to make substantial efforts to seek and maintain proximity to and contact with one or a few specific individuals who provide the subjective potential for physical and/or psychological safety and security. This stable tendency is regulated by inner working models of attachment, which are **cognitive-affective schemata** built from the individual´s experience in his or her interpersonal world"

Berman and Sperling 1994, p.8

Peter Fonagy recently pointed out that the relationship between attachment theory and emotional and cognitive schemata is more complex than it has been generally recognized.

In his excellent overview which he delivered at the last year´s Ulm conference an attachment he proposed the following model for the role of attachment in personality disorder:

Schematic view of the role of attachment in personality disorder

Early attachment experience

Neurocognitive social dysfunction

Constitutional vulnerability

Psychosocial adversity in attachment contexts of late childhood & early adulthood

Distorted interpersonal relationship representational system

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A New Attachment Theory Understanding of Move from Infant Behaviour to Adult Representation
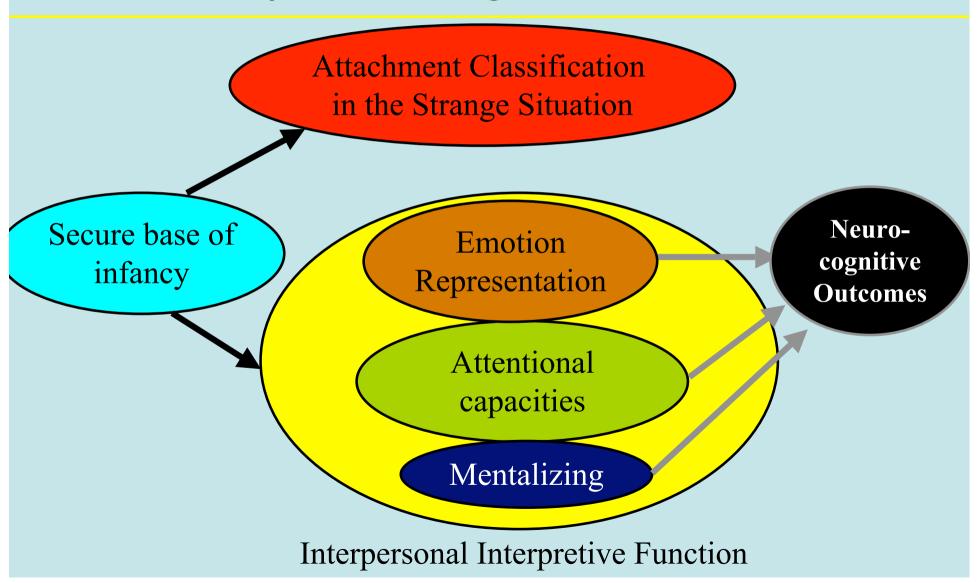
- Classical attachment theory:
    - Early relationship representations determine the pattern of adult relationship representations
    - 'Silent connections' (neural connections in implicit memory) are reawakened by later adversity
- His contention:
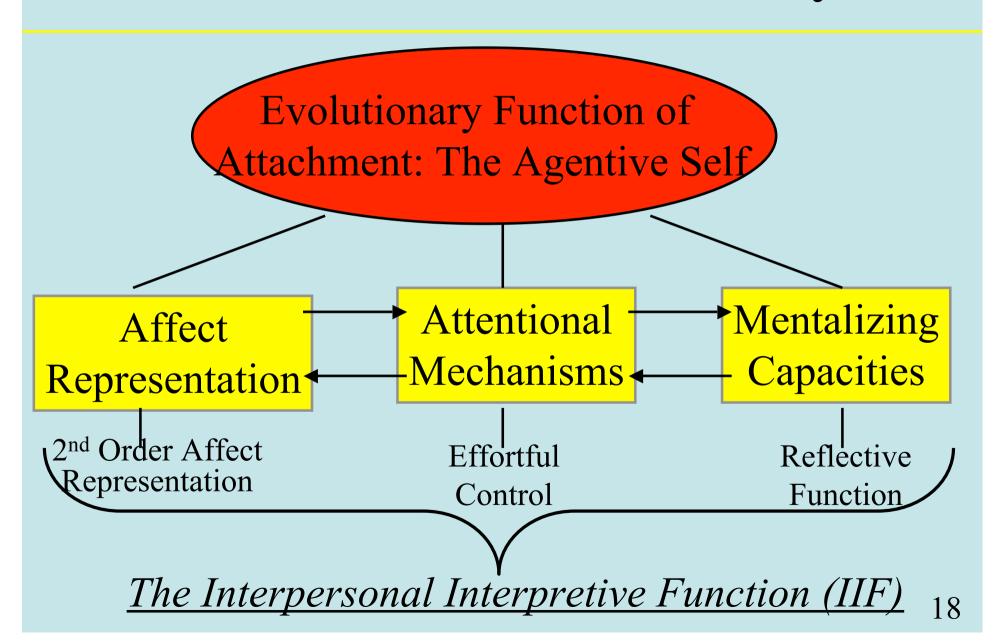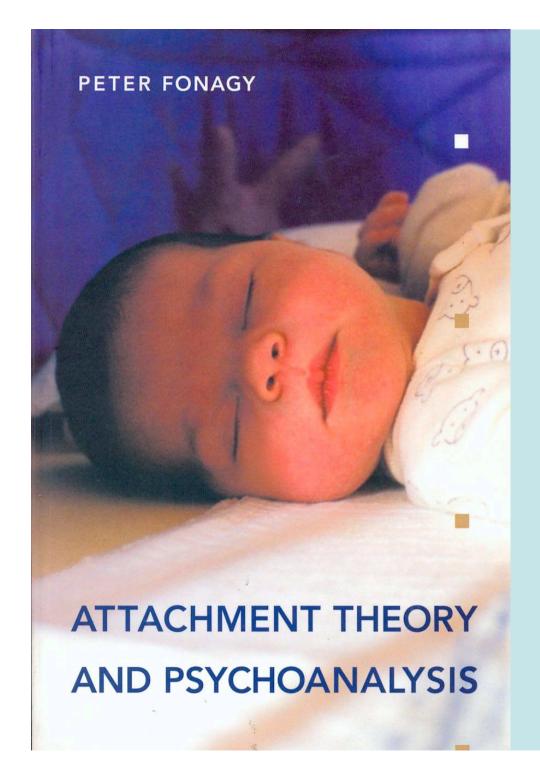
    Attachment confers a selective advantage to humans by the opportunity it affords for the development of neurocognitive social capacities

The Relationship of Attachment Security and Long Term Outcomes

Attachment Classification in the Strange Situation

Secure base of infancy

Emotion Representation

Attentional capacities

Mentalizing

Neuro-cognitive Outcomes

Interpersonal Interpretive Function

Modern Attachment Theory

18

PETER FONAGY

ATTACHMENT THEORY AND PSYCHOANALYSIS

From this model one may conclude that

„The most promising area of attachment research from a psychoanalytic point of view is the study of disorganized/disoriented attachment behavior"

So, Peter Fonagy in his recent comparative monograph.

Defensive Processes

George & Solomon (1999) propose that a major difference between psychoanalysis and attachment theory falls in the description of the defensive processes themselves. Traditional psychoanalytic models provide a complex constellation of defenses to interpret a broad range of intrapsychic phenomenon, including fantasy, dream, wish, and impulse.

According to George and Solomon (1999) Bowlby´s perspective conceives defensive exclusion in terms of two qualitatively distinct forms of information processing: **deactivation** (similar to repression) and **cognitive disconnection** (similar to splitting). These two defensive strategies provide the individual (infant and adult) with an organized form of excluding information from conscious awareness or separating affect from a situation or person eliciting it.

George and West (1999) conclude:

"In order to understand the relationship between adult attachment and mental health risk we need to examine the attachment concepts of defense and segregated systems, the mental processes that define disorganization" (S. 295).

Suggesting that these representational structures have developed under conditions of attachment trauma (abuse, loss) the concept of segregated systems is fruitful to explain some forms of relationship-based psychopathology in adults.

They conclude that "in summary the attachment contribution to mental ill health is not the product of avoidance, but rather the product of **attachment disorganization** that results in repeated experiences of dysregulation and breakdown of defense" (S. 298).

The Ulm Study on Neural Correlates of attachment disorganization in Borderline Patients

Scientific working group:

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Henrik Walter, Dept. of Psychiatry III, University of Ulm

Horst Kächele, Dept. of Psychosomatic Medicine and Psychotherapy, University of Ulm

Carol George, Mills College, Oakland, CA, USA

Tilo Kircher, Dept. of Psychiatry and Psychotherapy, University of Tuebingen

Philipp Martius, Psychotherapeutic Clinic, Bad Wiessee, Clinic Dr. Schlemmer

Manfred Spitzer, Dept of Psychiatry III, University of Ulm

Attachment system as a determinant of interpersonal relationships in Borderline Personality Disorder (BPD)

- There is some evidence of a specific link between childhood maltreatment, i.e. childhood sexual abuse, and BPD

- As children, such individuals frequently had caregivers who were themselves within a so called „borderline spectrum" of severe BPD

- It has been suggested that the experiences of interpersonal attack, neglect, and threats of abandonment of persons with BPD may account for their perceptions of current relationships as attacking and neglectful.

- In studies with the Adult Attachment Interview (Fonagy et al. (1996) found, that in a total sample of N = 36 patients with BDP n=27 (75%) were classified as „preoccupied" (three-group-distribution). Comparing 4 attachment groups, n=32 (89%) had an „unresolved" state of mind.

- Similarly, in Patrick et al.´s (1994) study, all women (n=12) with BPD were classified as preoccupied and 75% of them were classified as „unresolved"

Borderline Personality Disorder and Deficit in Mentalizing (Fonagy et al. 2000)

- Some personality disordered individuals are those victims of childhood abuse who *coped by refusing to conceive* of their attachment figures´ thoughts, and thus *avoided having to think about* their caregiver´s wish to harm them.
- Continuing to defensively disrupt their capacity to depict mental states in themselves and in others leaves them to operate on inaccurate, rigid schematic impressions of thoughts and feelings.

- **Unstable sense of self**
  - As a consequence of the absence of reflective capacity
- **Impulsivity**
  - Due to the lack of awareness of their own emotional states associated with the absence of symbolic representations of emotions
- **Emotional instability and irritability**
  - Interpersonal schemata are notably rigid in patients with BPD, because they cannot imagine that the other could have a construction of reality different from one they experience.

Functional Magnetic Resonance Imaging (fMRI)

- Non-invasive method

- Regional neural activity is correlated with regional increase in blood flow

- Measured signal is based on the „BOLD"-effect: (bold = blood oxygenation level dependent)

  - Because oxygenated and deoxygenated hemoglobin differ in magnetic properties, fMRI signal changes occur

Dsyregulated amygdalic emotion in Borderline Personality Disorder

- **Herpertz et al. (2001) Evidence of abnormal amygdala functioning in borderline personality disorder: A functional MRI study.** *Biological Psychiatry 50(4):292-8*

- Intense and *rapidly changing mood states* are a major feature of BPD

- **Subjects**: N = 6 Borderline-patients, N = 6 healthy controls

- **Method**: Presentation of 12 aversive und 12 neutral pictures of the International Affective Picture System (Lang et al. 1999) using fMRI

- **Results**:
- Bilateral activation of amygdala in patients compared to controls
- Activation of medial and inferolateral prefrontal cortex (BA 47) in patients.

- **Conclusions**:
- *Enhanced amygdala activation in BPD* is suggested to reflect the intense and slowly subsiding emotions commonly observed in response to even low-level stressors.
- Borderline subjects' perceptual cortex may be modulated through the amygdala leading to *increased attention to emotionally relevant environmental stimuli*

Imaging Volumes:
Hippocampus and Amygdala

- Driessen M et al. (2000): Magnetic Resonance Imaging Volumes of the Hippocampus and the Amygdala in women with Borderline Personality Disorder and early traumatization. *Arch Gen Psychiatry 57: 1115-1122*

- n=21 female patients with BPD and n=21 controls
- Borderline patients had nearly 16% smaller volumes of the hippocampus and 8% smaller volumes of the amygdala (P<.05) than the healthy controls
- The results for both hemispheres were nearly identical
- The volumes of the hippocampus were negatively correlated with the extent and the duration of self-reported early traumatization only when BPD and controls were considered together

Limbic and prefrontal dysfunction in BDP

- Jüngling et al. (in press): Positron emission tomography in female patients with BPD. *Journal of Psychiatric Research*

- N= 12 female patients with BPD, free of psychotropic medication for at least 4 weeks
- Significant frontal and prefrontal hypermetabolism in patients with BPD relative to controls
- Significant hypermetabolism in the hippocampus and cuneus
- This study demonstrated limbic and prefrontal dysfunction under resting conditions in patients with BPD
- Dysfunction in this network of brain regions, which has been implicated in the regulation of emotion, may underlie symptoms of BPD

Neural correlates of continuous fluent speech using fMRI

Kircher et al. (2000) Neuroreport 18: 4093-4096
Kircher et al. (2001) Arch Gen Psychiatry 58: 769-774

- **Subjects**
  - N=6 male patients with schizophrenia, N=6 male controls

- **Procedure:**
  - fMRI was measured while subjects spoke about *7 Rorschach inkblots* for 3 minutes each.

- **Results:**
  - *Temporal activation during speech*:
    Controls: word frequency correlated with left superior temporal activation
    Patients: word frequency correlated with right superior temporal activation
    (abnormal reversed lateralization)

  - *Neural correlates of Formal Thought Disorder:*
    Severity of positive FTD inversely correlated with activity of Wernicke area (sensory language area in the left hemisphere), a region implicated in the production of coherent speech. Reduced activity in this area might contribute to the articulation of incoherent speech.

Aims of our study

- To find neural correlates of attachment patterns in BPD compared to healthy controls using fMRI

- Aim of this approach was to measure directly neural correlates of individual attachment with respect to
  a) formal criteria and
  b) specific content and meaning (attachment related).

Siginificance of our approach

- For this approach the *Adult Attachment Projective - A new measure to assess adult attachment* (George et al. 1999) was expected to be the adequate measure, because:

  - it activates reliably the attachment system in adults **using specific visual stimuli (pictures),**
  - there is a standardized instruction **to tell a story to each picture**,
  - and these **narratives can be recorded** and are available **for further coding and classification** (secure, dismissing, preoccupied and *unresolved*) along the coding manual (George et al. 1999).

Adult Attachment Projective
(George, West, Pettem 1999)

8 Projective Pictures
7 Attachment Scenes + Neutral Warm-up

Dyadic

- **Departure**
- **Bed**
- **Ambulance**

Alone

- **Child at Window**
- **Bench**
- **Cemetery**
- **Corner**

AAP Instruction
for the subject in the scanner

We will be showing you a set of pictures, one at a time.
Please tell a story about what is going on in the picture.
There are no right or wrong answers.

Just make up a story about what´s going in the picture:

- what led up to that scene,
- what the characters are thinking or feeling,
- and what might happen next

Please hold your head still while speaking

AAP-Pictures

The AAP measures…

- Attachment Status
  - **Secure**
  - **Organized Insecure**
    - **Dismissing**
    - **Preoccupied**
  - **Unresolved**
- Conceptually derived dimensions of self and attachment relationships
  - **Agency**
  - **Goal-corrected partnership (Bowlby, 1969)**
  - **Desire for relationships**

Specific question of our study

1. Can we adapt the standardized AAP procedure to use in the fMRI scanner?

2.

Experimental design

1. Immediately before scanning subjects were given a standard set of verbal instructions on the AAP and practiced the AAP with two neutral non-AAP pictures

2. Subjects were instructed to speak as much as they felt able to on viewing the AAP-pictures, and to hold their head as still as possible

3. No prompting was given if subjects paused or stopped

4. Each AAP picture (N = 9: N = 2 neutral n = 7 attachment-related) was presented 120 sec, interpicture intervall 45 sec

5. The fMRI adapted AAP lasted 25 min in total
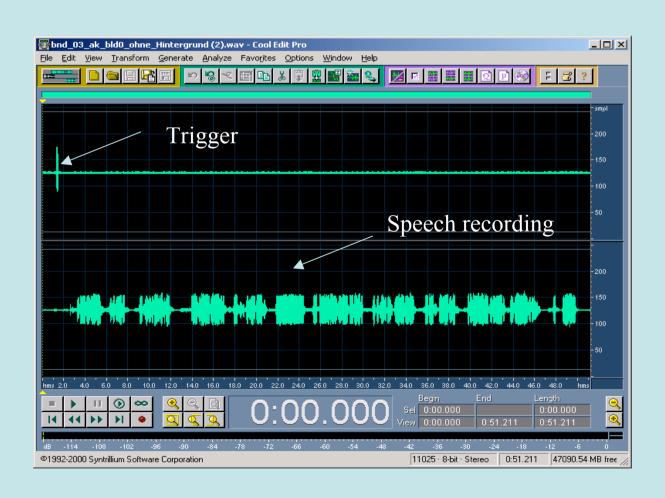
- Stimuli were presented with fMRI compatible video-goggles
  (Resonance Technologies. Northridge, CA)
- Speech was digitally recorded by means of a fMRI compatible microphone
  positioned closely to the mouth
- Subjects wore customized headphones reducing the noise of image aquisition
  and allowing communication with the experimenter

Subject´s speech during scanning was recorded on a computer in digitized form

Coding of AAP cases

- Each AAP case (n=27) was translated verbatim into English
- Relevant AAP markers (e.g. Defensive Processes) in each case were checked by an independent (blinded for group) translator
- The 27 translated cases were blindly rated by Carol George, and the German AAP cases were also rated by Anna Buchheim
- Interrater-Reliability (CG and AB):
  - Test-cases (n=30): $\kappa = 0.87$ (90%)
  - fMRI-study (n=27): $\kappa = 0.80$ (88%)

Distribution of AAP-classifications (n=27)

	patients	controls	N
R **Resolved**	**4**	**11**	15
U **(Unresolved)**	**7**	**5**	12
	11	16	27

p=.096 n.s.

Disorganization of attachment:
"Unresolved" vs. "Resolved"

- AAP´s Segregated System Marker describe a mental state in which painful attachment-related memories are isolated and blocked from conscious thought.

- The judge first codes the presence of „markers": danger, failed protection, helplessness, emptiness

- Then the judge codes whether this material is:
- **<u>Unresolved:</u>**
  - Failure to resolve segregated system markers in response to at least one attachment picture,
  - Leads to continued experiences of failed protection, perceived threat, or extreme mental distress
- **<u>Resolved:</u>**
  - Capacity to act („he´ll turn around and goes home")
  - Reflection/reparation („she works through the problem")
  - Comfort, help („he calls a friend")
  - Protection of Self („don´t come near me")

AAP-example "Resolved"

- **AAP-picture: Child at Window**

- In this picture a girl is dreaming away looking out of the window at houses and gardens vis-a`vis. What led up to this? Having moved into a new city the girl is examining her room for the first time. And the view she has got from there. **She feels extremely lonely and lost** and *is looking whether there are children in the neighborhood where she then; where the next playground is, where her school is,* **whether there is somebody outside with whom she could make friends** and she really doesn't know yet what she is supposed to do here or is doing here. She is standing there a little lonely and **lost** and without courage. *But this will change once she has lived here for a while, her room will be completely furnished, she then will feel at ease* **and find many new friends.**

- **Segregated System Marker: „she feels extremely lonely", „lost"**
- **Internalized secure base: „find some friends", „make new friends"**
- *Capacity to act:* „*is looking where the next playground is*"

AAP-example "Unresolved"

- ## AAP-picture: Corner

- **He is afraid**. I believe he is beaten, maybe by his own father. He moved towards the corner trying to save himself one step back after the other and so ended up **being cornered**, he's got no chance to get away from him. He is raising his hands but this is only a reflex action. **He actually knows that he cannot defend himself**. **He waits that it will stop although he is without hope that it will stop.** These moments always seem to be endless. And he actually comes nearer, the father. Maybe hits once again.

- **Segregated System Marker: fear: „is afraid", helplessness: „being cornered"**

- *Unresolved*: *no* capacity to act, *no* comfort/help, *no* internalized secure base

Hypotheses

- Attachment disorganization is associated with a dysfunctional regulation of affects.

- Borderline patients show a high proportion of *Unresolved* states of mind with respect to sexual or physical abuse.

- We expected significant differences between organized and disorganized attachment patterns associated with brain activity in limbic areas.

fMRI-analysis

- Each block of picture presentation (2 min.) was broken down into 6 epochs of 20 sec. each
- For each 20 sec-epoch the amount of spoken words (word frequency) was calculated and used as a covariate in the fMRI model
- For the analysis presented here, each epoch was modeled as a regressor with the covariate of word frequency
- Each picture/subject was modeled separately in order to be able to compare pictures with different attachment markers
- All attachment pictures of all subjects were entered into a fixed-effects analysis
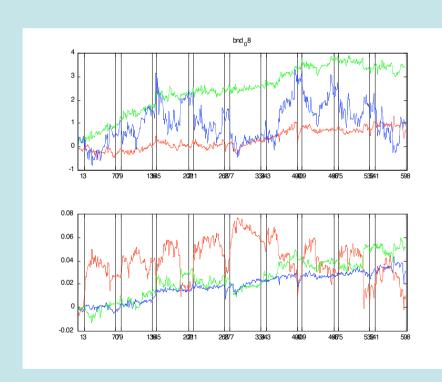
controls
R U
patients
R U

Kontrollen-R

1 F							
V03_bo=	37	41	15	0	0	0	
V03_b1=	28	29	47	14	6	0	
V03_b2=	38	42	25	18	35	12	
V03_b3=	39	40	60	30	0	0	
V03_b4=	42	24	36	37	0	0	
V03_b5=	51	41	38	11	0	0	
V03_b6=	33	27	34	20	0	0	
V03_b7=	26	40	49	30	19	18	
V03_b8=	55	51	22	33	0	0	

2 F						
V05_bo=	50	43	34	0	0	0
V05_b1=	38	46	40	50	34	0
V05_b2=	42	45	26	32	0	0
V05_b3=	35	53	55	46	3	0
V05_b4=	29	33	33	44	9	0
V05_b5=	39	45	47	41	32	5
V05_b6=	22	50	32	44	43	19
V05_b7=	34	38	36	25	22	0
V05_b8=	43	43	27	31	44	9

3 F						
V14_bo=	1	1	1	1	1	1
V14_b1=	29	31	23	46	14	0
V14_b2=	27	37	46	18	14	0
V14_b3=	29	35	33	41	26	18
V14_b4=	25	30	34	29	37	10
V14_b5=	34	35	44	38	23	29
V14_b6=	28	35	38	40	26	6
V14_b7=	32	37	34	36	14	26
V14_b8=	33	46	31	23	22	0

4 F						
V16_bo=	43	43	17	0	0	0
V16_b1=	41	39	0	0	0	0
V16_b2=	46	34	23	0	0	0
V16_b3=	42	44	25	0	0	0
V16_b4=	38	32	9	0	0	0
V16_b5=	37	47	18	0	0	0
V16_b6=	39	43	29	0	0	0
V16_b7=	46	45	27	0	0	0
V16_b8=	39	43	15	0	0	0

5 Ds						
V19_bo=	61	72	56	35	43	0
V19_b1=	40	41	61	44	46	26
V19_b2=	52	58	54	37	63	50
V19_b3=	42	50	47	45	41	51
V19_b4=	44	55	46	53	57	53
V19_b5=	45	67	51	48	59	8
V19_b6=	43	51	65	64	60	48
V19_b7=	37	55	55	42	53	53
V19_b8=	40	56	57	57	59	61

6 F							
V26_bo=	35	22	0	0	0	0	0
V26_b1=	25	22	0	0	0	0	0
V26_b2=	31	20	0	0	0	0	0
V26_b3=	28	29	0	0	0	0	0
V26_b4=	30	33	13	0	0	0	0
V26_b5=	35	43	0	0	0	0	0
V26_b6=	19	22	0	0	0	0	0
V26_b7=	21	24	0	0	0	0	0
V26_b8=	25	10	0	0	0	0	0

Kontrollen-R

7 Ds						
V30_bo=	19	44	26	33	17	34
V30_b1=	35	25	36	30	32	26
V30_b2=	33	18	31	37	34	37
V30_b3=	32	52	48	11	43	26
V30_b4=	32	22	15	42	29	20
V30_b5=	29	49	30	30	28	10
V30_b6=	33	24	29	20	27	29
V30_b7=	29	17	34	22	30	37
V30_b8=	25	19	33	27	34	29

Kontrollen-UnRes

1 U						
V04_bo=	33	34	14	0	0	0
V04_b1=	26	20	20	21	6	0
V04_b2=	24	39	13	0	0	0
V04_b3=	32	21	27	0	0	0
V04_b4=	41	6	26	6	0	0
V04_b5=	41	45	19	3	0	0
V04_b6=	24	23	22	14	0	0
V04_b7=	34	21	0	23	0	0
V04_b8=	37	24	17	1	0	0

2 U						
V06_bo=	24	34	19	0	0	0
V06_b1=	38	41	17	0	0	0
V06_b2=	29	35	39	31	0	0
V06_b3=	36	28	33	28	9	6
V06_b4=	30	46	33	36	0	0
V06_b5=	38	35	38	17	0	0
V06_b6=	25	35	33	39	42	27
V06_b7=	37	39	38	31	33	7
V06_b8=	34	39	30	29	6	0

3 U						
V07_bo=	36	43	26	36	4	0
V07_b1=	23	31	19	29	3	14
V07_b2=	28	36	33	13	11	19
V07_b3=	24	48	16	14	6	0
V07_b4=	17	17	13	20	18	18
V07_b5=	28	30	37	30	9	0
V07_b6=	26	23	30	31	0	0
V07_b7=	26	29	28	17	15	7
V07_b8=	21	30	12	20	21	0

4 U						
V15_bo=	32	42	27	31	36	19
V15_b1=	25	29	32	28	32	17
V15_b2=	25	15	26	29	26	20
V15_b3=	27	38	31	25	20	14
V15_b4=	28	15	23	39	28	29
V15_b5=	36	31	28	26	34	24
V15_b6=	26	22	21	21	22	11
V15_b7=	20	24	31	30	39	17
V15_b8=	22	30	33	41	29	26

5 U						
V20_bo=	36	47	43	23	23	6
V20_b1=	21	25	1	0	10	0
V20_b2=	21	23	36	43	28	31
V20_b3=	16	38	25	23	3	0
V20_b4=	9	28	18	29	20	31
V20_b5=	19	31	35	23	2	0
V20_b6=	2	21	17	6	13	28
V20_b7=	13	31	21	11	25	15
V20_b8=	21	40	19	0	0	0

6 U						
V29_bo=	39	29	24	0	23	0
V29_b1=	16	26	25	46	6	0
V29_b2=	6	38	25	27	29	29
V29_b3=	7	16	31	26	27	40
V29_b4=	10	25	17	33	46	24
V29_b5=	22	26	30	36	37	0
V29_b6=	19	37	31	31	42	20
V29_b7=	10	25	24	35	29	19
V29_b8=	8	24	37	18	41	22

Patienten-R

1 E						
V11_bo=	44	5	4	0	11	0
V11_b1=	23	18	23	0	0	0
V11_b2=	25	32	17	0	0	0
V11_b3=	41	13	20	0	0	0
V11_b4=	21	35	0	0	0	0
V11_b5=	35	22	20	13	0	0
V11_b6=	41	10	9	0	9	0
V11_b7=	32	12	21	0	0	0
V11_b8=	25	20	25	0	7	0

2 Ds						
V12_bo=	40	17	0	0	0	0
V12_b1=	25	9	7	10	6	0
V12_b2=	36	9	7	17	0	0
V12_b3=	31	24	25	23	6	0
V12_b4=	28	22	24	12	0	0
V12_b5=	28	29	25	13	0	18
V12_b6=	19	21	19	29	7	8
V12_b7=	23	20	30	6	0	0
V12_b8=	32	30	24	12	0	0

3 F						
V13_bo=	27	15	0	15	18	28
V13_b1=	15	27	14	15	14	1
V13_b2=	23	19	24	29	32	25
V13_b3=	20	33	29	24	16	24
V13_b4=	17	28	18	30	27	27
V13_b5=	14	16	25	17	0	0
V13_b6=	24	15	36	26	8	17
V13_b7=	24	12	31	20	19	19
V13_b8=	15	29	27	37	34	14

4 E						
V18_bo=	42	18	0	0	0	0
V18_b1=	39	48	31	0	0	0
V18_b2=	29	46	51	0	0	0
V18_b3=	37	38	41	29	0	0
V18_b4=	26	60	35	2	0	0
V18_b5=	26	59	45	34	0	0
V18_b6=	21	28	46	22	0	0
V18_b7=	19	29	45	35	0	0
V18_b8=	25	45	48	33	0	0

5 F						
V22_bo=	23	27	47	25	15	0
V22_b1=	24	26	29	32	38	33
V22_b2=	14	17	26	28	31	26
V22_b3=	17	42	35	39	39	31
V22_b4=	19	28	29	27	42	38
V22_b5=	19	43	42	29	30	32
V22_b6=	15	29	36	32	36	26
V22_b7=	8	37	35	41	33	31
V22_b8=	18	23	27	34	32	26

Patienten-UnRes

1 U						
V08_bo=	53	45	35	31	0	38
V08_b1=	35	45	31	32	0	0
V08_b2=	50	34	31	16	37	0
V08_b3=	35	43	41	21	31	10
V08_b4=	44	41	23	8	0	0
V08_b5=	43	46	3	14	0	0
V08_b6=	38	28	23	0	0	0
V08_b7=	29	48	14	26	13	0
V08_b8=	49	24	33	34	0	0

2 U						
V09_bo=	27	34	40	24	28	11
V09_b1=	32	32	24	24	42	26
V09_b2=	25	42	33	37	22	35
V09_b3=	38	33	32	37	33	33
V09_b4=	30	30	37	33	39	21
V09_b5=	44	36	36	28	34	31
V09_b6=	43	20	43	14	28	19
V09_b7=	28	32	49	40	34	25
V09_b8=	33	22	43	32	29	22

3 U						
V10_bo=	32	44	33	17	37	37
V10_b1=	42	55	43	40	22	16
V10_b2=	42	31	37	37	48	16
V10_b3=	39	24	62	43	32	17
V10_b4=	32	32	40	54	33	19
V10_b5=	16	45	29	43	50	15
V10_b6=	23	61	37	48	59	17
V10_b7=	40	30	48	36	34	25
V10_b8=	32	45	48	29	37	10

4 U						
V17_bo=	49	60	54	3	0	29
V17_b1=	28	34	44	43	29	61
V17_b2=	35	42	45	35	49	11
V17_b3=	37	51	47	42	44	29
V17_b4=	36	42	58	45	48	64
V17_b5=	38	46	54	54	56	25
V17_b6=	29	51	49	53	63	60
V17_b7=	23	40	48	49	38	56
V17_b8=	28	56	55	51	64	56

5 U						
V21_bo=	37	51	24	26	12	0
V21_b1=	36	60	54	19	0	23
V21_b2=	44	45	48	22	42	0
V21_b3=	24	54	46	48	40	41
V21_b4=	31	37	44	50	45	19
V21_b5=	25	26	45	66	52	17
V21_b6=	17	46	35	42	34	25
V21_b7=	27	14	29	4	6	9
V21_b8=	31	35	28	21	40	20

6 U						
V24_bo=	10	5	7	5	5	11
V24_b1=	29	28	18	13	17	3
V24_b2=	13	39	28	19	34	23
V24_b3=	15	46	35	30	6	10
V24_b4=	16	37	45	38	30	44
V24_b5=	23	40	27	26	32	29
V24_b6=	9	25	14	28	29	8
V24_b7=	7	22	19	9	25	4
V24_b8=	18	17	5	5	19	33

7 U						
V27_bo=	27	55	48	20	1	0
V27_b1=	20	15	23	29	24	0
V27_b2=	15	36	42	25	3	0
V27_b3=	35	47	28	6	0	0
V27_b4=	36	45	21	0	29	4
V27_b5=	38	59	31	29	23	22
V27_b6=	43	50	39	57	41	1
V27_b7=	40	47	37	16	23	14
V27_b8=	42	70	16	29	0	0

8 U						
V28_bo=	20	21	8	6	0	14
V28_b1=	10	26	6	36	0	7
V28_b2=	20	23	32	10	0	0
V28_b3=	27	35	21	41	11	11
V28_b4=	20	26	17	18	24	29
V28_b5=	20	12	29	21	4	14
V28_b6=	15	14	12	13	9	5
V28_b7=	9	21	15	11	30	16

Much movement

Little movement

Word frequency of the AAP narratives

- patients:

  x = 27,66 ±2,47

- controls:

  x = 30,06 ±2,05

- fMRI-AAP-narratives were comparable in word, length and quality to AAP-narratives under normal circumstances
- All narratives were codable along the AAP manual

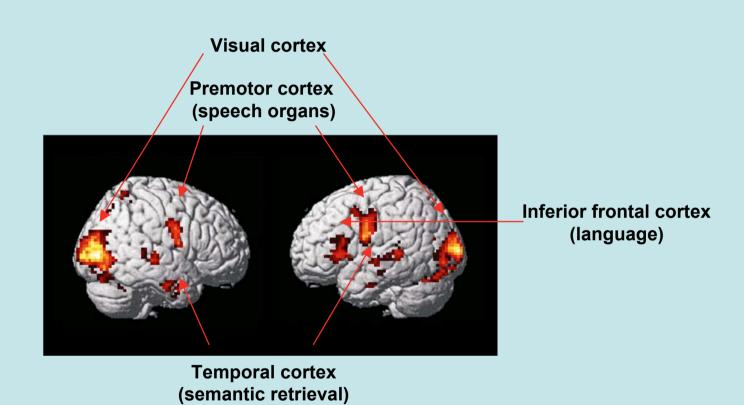# Brain regions, which are activated by the AAP task

Please tell a story about the picture
What led up to that scene
What are the characters felling or thinking
And what might happen next?

„Oh yes, like my grandpa somehow at that time, ähm well, äh somebody is being transported and he never comes back. The child thinks, yes the child somehow realizes that this is something serious. the older woman doesn't have to say anything, the child gets it all by his own and äh, the ambulance men are covering him, he perhaps is already even already dead. Won't come back. It's such a moment when nobody speaks. Nobody speaks but everybody knows what's the matter. The end.

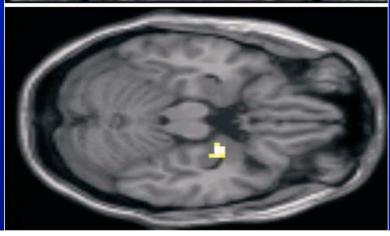# Main effect of AAP-pictures

Main effects of AAP

- all effects were significant with p<0.001 (n=27)

- *Visual cortex*: picture presentation
- *Higher visual areas* (including fusiform gyrus): emotional information processing
- *Premotor cortex*: speech related activation
- *Inferior prefrontal cortex*: language related activation
- *Temporal cortex*: episodic memory and retrieval of semantic information

- No differences between patients (n=11) and controls (n=16) with respect to main effect
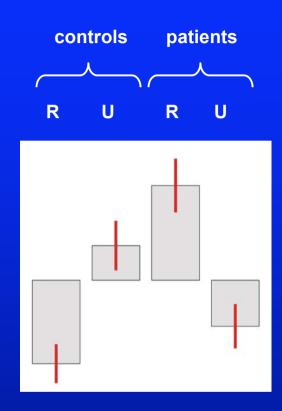
... But there is an interaction effect between borderline diagnosis and activation of the amygdala
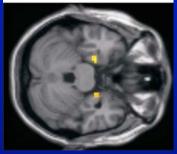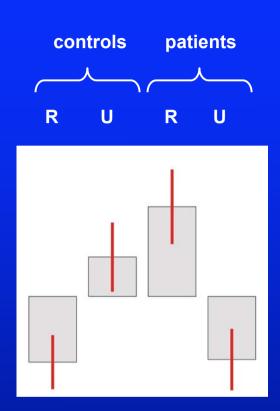
right activation of the amygdala

random effects analysis
p < 0.001 uncorrected
Amygdala right
(x = 24, y = -6, z = -21)
p < 0.05 corrected (svc)

left activation of the amygdala

controls · patients

R · U · R · U

random effects analysis
p < 0.005 uncorrected
Amygdala left
(x=-21, y=-9, z=-27)
p < 0.05 corrected (svc)

Interaction effect of group and resolution of the narrative

- *There are no main effects of borderline pathology or attachment type alone BUT there is a significant interaction*

-

- On a high significance level **_p < 0.001_** uncorrected
- disorganized (U) controls and
  - organized (R) patients

  show a right activation of the amygdala **(x = 24, y = -6, z = -21)**

- On a lower significance level : **_p < 0.005_** uncorrected
  - Disorganized (U) controls and
  - organized (R) patients

  show a right *and left* activation of the amygdala **(x= -21, y= -9, z= -27)**

Conclusion 1

- The results of our fMRI study show that overt speech and visual AAP stimuli (n=128) induce significant activations in visual, motoric, and language related brain regions.
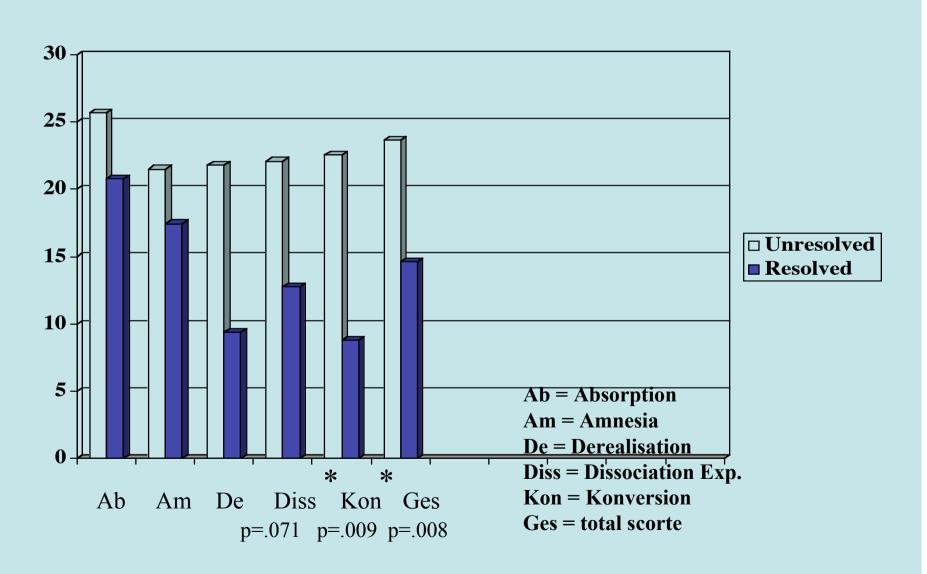- The paradigm is working

Conclusion 2

- We found a dysfunction of the amygdala in Borderline patients, which was dependent on the attachment type (organized versus disorganized)
- The mode of dysfunction was surprising at first sight. From a theoretical perspective we would have expected a higher activation of the amygdala in disorganized patients.
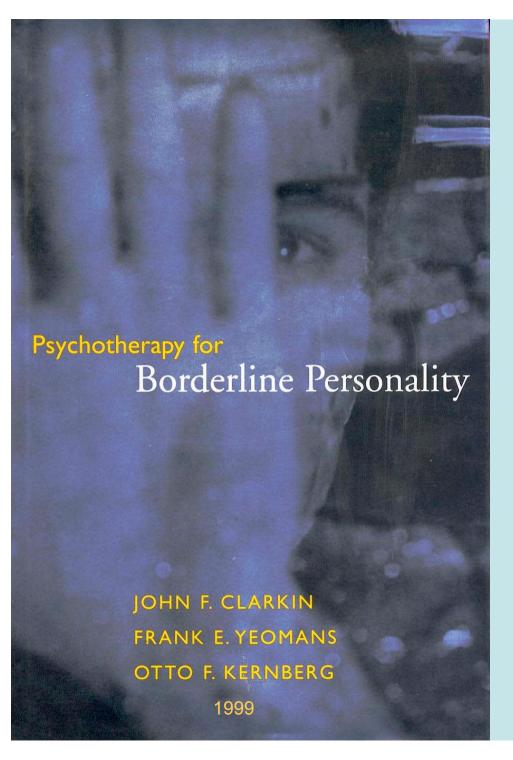
BUT

- Looking at clinical data we found, that unresolved patients (disorganized) had higher scores in the dissociation scale

Dissociation scores in Resolved / Unresolved patients (n=11)
Questionnaire of dissociative symptoms (FDS)
(Bernstein & Putnam 1986)

Ab = Absorption
Am = Amnesia
De = Derealisation
Diss = Dissociation Exp.
Kon = Konversion
Ges = total scorte

□ Unresolved
■ Resolved

Ab   Am   De   Diss   Kon   Ges
p=.071   p=.009   p=.008

Tentative Interpretation

- Current studies on information processing have shown that attentional control has an influence on the emotional information processing of the amygdala

- In healthy subjects the amygdala was not activated automatically by emotional faces, if subjects have put their attention on other items (objects) than the faces (Pessoa et al. 2002, PNAS 99: 11458-63)

- A possible explanation of our interaction effect could be that disorganized patients talk about traumatic contents, but they don´t put their attention on the emotional aspects of the story, rather on something else

- From a clinical point of view these patients possibly dissociate or split threatening contents from consciousness

Next steps ?

We now shall test the impact of Transference Focused Psychotherapy (Clarkin et al. 1999) on the neural processing of these patients.

We expect a change in basic emotion-processing for unresolved narratives !!!!!

Psychotherapy for
Borderline Personality

JOHN F. CLARKIN

FRANK E. YEOMANS

OTTO F. KERNBERG

1999