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Mentalizing Language Development in a Longitudinal Attachment Sample: Implications for Alexithymia

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Alexithymia · Family relations · Attachment organization · Internal state language · Emotion regulation · Symbolization

Abstract
Background: The construct of alexithymia implies a deficit in symbolization for emotional, somatic, and mental states. However, the etiologic factors for alexithymia have not yet been fully elucidated. The present study investigated the use of mentalizing language, i.e. the utterance of internal states, from a developmental perspective according to attachment organization and disorganization. ***Methods:*** A longitudinal design across 4 time points was applied to a volunteer sample of 42 children. At 12 months, children were tested with the strange situation procedure, the standard measure of attachment at the optimal age, and attachment classifications were taken of videotapes. At ages 17, 23, 30 and 36 months, mother and child were observed in simplified separation episodes of 30 min duration. Transcripts of the sessions were subject to coding of internal state words. ***Results:*** During the investigated span, securely attached children rapidly acquired emotion, physiology, cognition and emotion-regulatory language, whereas insecurely attached and disorganized children either completely lacked internal state language or displayed a considerable time lag in the use of emotion and cognition vocabulary. ***Conclusion:*** The results raise the possibility that alexithymia might be a consequence of deficits in the development of internal state language in the context of insecure or disorganized childhood attachment relationships.

Introduction

Alexithymia has long been described to be an integral part of many psychosomatic and mental disorders as apparent from psychotherapy [1–4]. While, in literal translation, the term alexithymia refers to an 'inability to give words to emotions and feelings' (α-, prefix for non-, lack of; λεξιζ, wording, reading, naming; θυμοζ, feeling, spirit, passion, mood emotion), patients exhibiting this trait may have a rudimentary use of emotion language. Notwithstanding the presence of some symbolic function-

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ing [5], the generally impoverished fantasy life of alexithymics has been linked to descriptions of the 'pensée opératoire' of the French school of psychosomatics. Current descriptions of alexithymia as a research construct comprise impaired emotion identification, the impaired ability to transpose enterocepted physiological processes to awareness, and the impoverishment of vivid imagination and fantasy [6]. These impairments have theoretically claimed to be based on a failure of the mental structure to bind affective excitation [7, 8]. For instance, according to the Lane and Schwartz [9] hierarchy of emotion awareness aligning to Piagetian cognitive stages, alexithymics are described as functioning on the preoperational level 3, corresponding to a low-imagistic and early lexical standard. This developmental lag might be a result of misled processes of mentalization [10] during a certain critical stage of early development. However, the majority of these speculations have not yet been empirically investigated. The present developmental study may therefore contribute empirically to the understanding of the early childhood genesis of alexithymia, although alexithymia could not be directly measured in this sample.

The research construct of alexithymia [11–13] has been found to be a component trait of many mental and functional disorders such as depression [14–16], anxiety disorders [15, 17], dissociation [18, 19], somatoform disorder [20, 21], personality disorders [14], coronary spasm [22], coronary heart disease [23], anorexia [24], chronic pain [21], and oligospermia [25]. The presumably enduring character of the impairment as a part of personality organization [16, 26] supports a view according to which its etiology might possibly consist of a developmental deficit.

Summarizing recent experimental results within a variety of emotion tasks, it can be posited that alexithymics have (1) difficulties in processing emotional information, in effective regulation of emotional arousal, and in expressing emotions, (2) an impairment in recognizing and verbalizing affective excitation, (3) a relative paucity of fantasy life, and (4) a close relation of thought and speech to concrete external or material events [3, 6]. Specifically, subjects exceeding established cutoff scores on the (twenty-item) Toronto Alexithymia Scale (TAS-20) [27, 28], a standard measure of alexithymia, uniformly exhibit impairments of verbal and nonverbal emotion recognition [7, 29, 30]. Although the TAS-20 does not directly address symbolization capacities, converging results from its combination with self-reports bearing on introspective capacities furthermore suggest that alexithymia is a state of disparateness between autonomic activation and the cognitive processing of bodily sensations and emotions [8]. The use of internal state language (ISL) might thus be of relevance in this trait.

Alexithymia and Language

While some authors [4] argue that alexithymia merely concerns the nonverbal domain, more recent findings on peculiarities of adult emotion language processing in alexithymics [7, 31] suggest that this trait might be based on a deficit of mental representation structures effective at the emotion-cognition interface. Confronted with emotion-eliciting pictorial material, alexithymics are less able to provide vocabulary denoting their subjective state [32]. Narratives on dream action in alexithymics, when immediately roused from nocturnal REM state offset, are significantly reduced in complexity, embellishment and affective vividness [33]. The relative paucity of imaginative quality of dream phantasms correlated with poorer language in verbal dream content descriptions.

Attachment and Alexithymia

There exist as yet only a few investigations that either synchronously or retrospectively connect alexithymia and attachment representation. One study assessing adult attachment within an inpatient group suffering from functional torticollis found that attachment security is inversely related to all three subscales of the TAS-20, and that the dismissing adult attachment type (which corresponds to the insecure-avoidant infantile 'A' pattern attachment organization) is prevalent in alexithymics of this symptomatology [34]. The use of self-report measures for attachment styles and separation anxiety in order to assess relations of attachment security with alexithymia, depression, and impulsive personality disorders [35] revealed trends toward the dismissing adult attachment type within the investigated clinical groups. Assessed for childhood experiences, alexithymics report retrospectively less maternal closeness [36], a cue that would point to attachment insecurity. Quite strongly supported is the association of maternal and offspring alexithymia within family relations: a previous study found evidence of a background for alexithymia in mother-child relations [37] during preadolescence. Using behavioral-genetic goodness-of-fit statistics [38], a comparison between monozygotic and dizygotic twins indicated a dominance of shared environmental factors in two of three TAS-20 dimensions, also pointing to the fact that familial factors are critical for the incidence of alexithymia. In brief, the evidence available thus far unequivocally supports the idea of mechanisms according to which attachment quality could

play an integral part of an intergenerational transmission of the alexithymia trait.

Given the clinical findings in adult alexithymics, namely their deficits in emotion language, as well as the likelihood of alexithymia to be a developmental psychopathology, a childhood attachment sample was investigated in a longitudinal design during an age span critical for the first emergence of ISL [39–41]. Because alexithymia has recently been linked to emotion regulation capacities [3], we also included the use of word categories, which are implied in this function, namely emotion-modulatory (employed for minimizing or maximizing emotional responses) and cognitive-contrast words (used for eliciting emotional responses by contrasting divergent perceptual realities).

According to current consensus, infants are classified into four attachment groups. Securely attached infants (B) calm down quickly when their mothers return: on reunion they show minimal resistance or avoidance of mothers. Avoidant infants (A) do not seek proximity to their mothers on reunion, but rather shun them. Resistant (C) infants seek dependent contact with their mothers but oppose at the same time bodily proximity. Finally, disorganized (D) infants show momentary absence of any particular strategy to deal with the separation stress; they show in contrast to organized patterns inconsistent or odd behaviors. Reliabilities given for 37 children are based on the first step (see below) classifications, but rechecked and conferenced consensus classifications were used throughout in the analyses.

Given previous developmental findings, the following research hypotheses were considered: (1) insecurely attached and disorganized children were expected to have difficulties in symbolizing bodily processes (physiology vocabulary); (2) since emotion vocabulary had been reported to emerge only during the third year, we expected differences in verbal emotion at t_3 and t_4; (3) from psychophysiological findings in alexithymics, it was expected that insecure and disorganized groups would have less linguistic tools for emotion regulation (emotion-modulatory particles); (4) since certain relations of attachment security with cognitive capacities had been demonstrated, it was assumed that differences in cognition vocabulary would become apparent, and (5) as more sophisticated social perspective-taking skills (in the sense of theory of mind capacities) had been shown to be predicted by attachment security, it was expected that differences bearing on the development of explicit mental representations (cognitive-contrast particles) would become observable.

Method

Participants

Forty-two mother-toddler pairs were studied as part of a larger study [see 42, for details] and consisted of unreferred volunteers. Written informed consent was obtained and renewed at each of the four time points. The mothers' average age was 29 (SD = 3.3), and the fathers' mean age was 32 (SD = 6.9). According to education and profession of the mothers and fathers, 72% of the sample was middle-class. The first language of all mothers was German and all children were Caucasian. There were 54.8% boys and 45.2% girls (19/23) in the sample. The original sample consisted of 80% first-borns and the proportion of stay-at-home mothers was 37.1%.

Procedure

To control for cognitive development, the children were tested with the Bayley Scales of Infant Development [43] at 12 and 24 months of age [Mental Development Index (MDI) M_{12} = 108.63; SD = 15.18; M_{24} = 110.42; SD = 14.18]. The MDI is a substitute for an intelligence measure, which does not exist for infancy and toddlerhood. The Strange Situation Procedure (SSP) was carried out as described by Ainsworth and Wittig [44] and videotaped at a university observation laboratory. Simplified play-separation episodes were conducted when the children were 17, 23, 30 and 36 months old. These free play sessions, based on a standardized set of toys present at the laboratory, were 30 min in duration, including a 2-min separation episode after 20 min of joint play. Mothers had been instructed to play with their child, as they normally would at home, and to leave their child, after saying good-bye, once a knock sign had been given.

Measures

The videotapes of the SSPs were coded assigning the attachment classifications of Ainsworth et al. [60] (A-B-C) and Main and Solomon [61] (D). Dr. Ute Ziegenhain, an officially D-certified attachment coder, conducted a second step of classification together with a reliable coworker. All four of the attachment coders were ignorant of the other data evaluated within this study, and information as to attachment classifications was withheld from all other collaborators. There were 12 A-classified children (insecure-avoidant organization), 24 B-classified children (secure attachment organization), and 1 C-classified child (insecure-resistant organization). A pattern of attachment-disorganization (D classification), which is seen by a majority of attachment theorists as a dimension orthogonal to the A-B-C patterns, was found in 5 of the children.

Transcriptions

Six highly trained undergraduate students of psycholinguistics prepared phonological transcriptions of all verbally spoken discourse. Transcriptions were made according to the conventions of the HIAT transcription system [45], using the transcription program SyncWriter™ for Macintosh computers (med-i-bit, Hamburg, Germany). Time code signals on the VCR tapes allowed the determination of audio-recorded utterance on- and offset with a precision of 0.10 s.

Coding

For purposes of coding, computer-generated templates were filled in in parallel review of the transcription for each of the sessions. ISL was coded using a manual developed by Klann-Delius [46], which was roughly based upon original coding categories as used by Bre-

Table 1. Point-biserial and tetrachoric correlations of sociodemographic variables with attachment classifications

Variables	A group (r_{pb})	B group (r_{pb})	D group (τ)	Mean (SD)
Sex of child	0.09	–0.15	0.07	19/23
SES	0.01	0.12	0.01	3.05 (1.02)
Bayley raw, 1-year	–0.19	0.19	–0.12	106.34 (6.33)
Bayley MDI, 1-year	–0.28*	0.28*	–0.18	108.63 (15.18)
Bayley raw, 2-year	–0.13	0.12	–0.18	149.57 (6.66)
Bayley MDI, 2-year	–0.28*	0.27	–0.19	110.42 (14.18)
Birth body length	–0.02	0.04	0.08	50.13 (2.54)
Birth weight	0.08	–0.04	0.14	3,194.80 (367.96)
Apgar 10 min[a]	–0.16	0.17	0.17	9.85 (0.36)
Father cohabitation	–0.17	0.05	–0.41**	28/14
Stay-home mother	0.47**	–0.42**	–0.17	17/25
Number of siblings	–0.12	0.12	–0.06	0.17 (1.11)
Month of first word	–0.18	–0.20	–0.07	11.28 (2.19)
Month of locomotion	0.32*	–0.27	–0.07	13.41 (1.89)

Each group against combined others. df = 36–40. One-tailed. * $p < 0.05$, ** $p < 0.01$.
[a] Refers to the postpartum Apgar test score as a marker of neurodevelopmental integrity; the test scores at 1 and 5 min were 10 for all the children.

therton and Beeghly [47]. In contrast, however, to the Bretherton and Beeghly manual, coding criteria were more strictly confined to any vocabulary on mentation; this means that terms denoting perceptive acts, which were not considered as 'mental' per se, were not included into the coding scheme. Specifically coded were the following categories: positive emotion (e.g. 'happy', 'interested'), negative emotion (e.g. 'mad', 'scared'), ambivalent emotion (e.g. 'odd', 'strange'), valence reversal (e.g. 'not happy'), abilities (e.g. 'able', 'try'), obligation/permission (e.g. 'let', 'be supposed to'), physiology (e.g. 'thirsty', 'awaken'), volition (e.g. 'will', 'wish'), cognition (e.g. 'think', 'forget'), moral/standards judgement (e.g. 'right', 'mean'), emotion-modulatory particles (e.g. 'a bit weary', 'more/less than'), and cognitive contrast particles (e.g. 'actually', 'still').[1]

Reliabilities

Attachment Classifications. Primary agreement for the standard classifications (A-B-C) was 75% corresponding to $\kappa = 0.71$; agreement for the D pattern was 88%, yielding $\kappa = 0.68$. The relatively low κ value despite much higher relative consensus is a known phenomenon in statistics literature [48, 49] resulting from the fact that only positive statements and not negative judgements (zero scores) account for the coefficient.

Transcriptions. Reliability was determined as the proportion of agreement between the six transcribers. Agreement on phonological tone units reached 95.6%; agreement for utterance on- and offset was 96.9% by the application of a 0.20-second criterion for identical timing.

[1] For reasons of brevity, coding criteria cannot be fully presented in this article, but the detailed criteria in English and German can be obtained from the first author upon request.

Internal State Language. Coding for ISL was done by three coders blind to attachment classifications. One coder coded the entire material, while the other two coders each coded 30% of the transcriptions (for all coded ISL content variables of children, median $\kappa = 0.97$).

Results

Intercorrelations with Sociodemographic Confounders

Table 1 presents the results of 13 selected sociodemographic and neurodevelopmental markers from standard biserial and tetrachoric correlation analyses with the different attachment groups (C dropped). Because the cells of the D group are small, Kendall's τ coefficients combined with Fisher's exact probabilities were calculated for this group. As is common in the majority of attachment studies, confoundation with external sociodemographic markers tends to be low in magnitude. However, three significant complementary correlation patterns are interesting here. The Bayley MDI at 1 and 2 years is associated with attachment security, whereas children with insecure-avoidant attachment organization are more likely to score lower in cognitive testing. The Bayley MDIs were also related to children's general verbosity, however, not to children's ISL counts (not shown in table 1). Talkativeness and ISL scores did not covary in general (analyses not reported here for brevity). The second pattern involves stay-at-home mothers who are more likely to have inse-

Table 2. Nonparametric ANOVA statistics across time points testing attachment by time interactions and developmental stability of ISL variables

Variables	RTE time 1	RTE time 2	RTE time 3	RTE time 4	Effects of time		
					F	*p*	df
Positive emotion	0.4054	0.7774	0.7774	0.8521	13.82	0.00000	2.26
Negative emotion	0.3323	0.8358	0.7530	0.7530	15.47	0.00000	2.29
Ambivalent emotion	0.4603	0.7957	0.7957	0.8729	1.86	1.00000	1.61
Valence reversal	0.7569	0.7569	0.8268	0.8269	10.88	0.00001	2.15
Abilities	0.7331	0.8001	0.8001	0.9007	20.52	0.00000	2.24
Physiology	0.6825	0.7822	0.7207	0.8750	8.88	0.00003	2.48
Volition	0.7361	0.7361	0.9117	0.8358	21.64	0.00000	1.98
Obligation	0.7281	0.7281	0.8566	0.8735	37.71	0.00000	1.61
Cognition	0.7609	0.8308	0.8377	0.9181	8.29	0.00009	2.36
Moral/standards	0.6984	0.7500	0.5548	0.8460	7.33	0.00435	1.89
Modulatory particles	0.7162	0.7688	0.8616	0.9042	47.55	0.00000	1.66
Cognitive particles	0.7619	0.6989	0.8432	0.7619	17.52	0.00000	1.27

N = 36. RTEs reflecting group by time interactions for B attachment group contrasted to A attachment group are presented with significance approximations derived from ANOVA-type statistics (χ^2 df adjustment).

cure-avoidant children, while secure attachment organization is inversely correlated with a permanent stay-at-home status of the mother. A third interesting pattern is locomotion, where early independent upright locomotion onset correlates with avoidant attachment organization. The inverse association of upright locomotion onset with attachment security, however, did not reach conventional significance levels. There was also a highly significant inverse association for disorganized attachment with absent-father family conditions according to these analyses.

Longitudinal Time Effects in ISL Acquisition

The study design and data level suggested the use of a nonparametric repeated-measures ANOVA statistic that is specifically adjusted to suit relatively small sample sizes (model script F1_LD_F1.sas from ftp://ftp.ams.med.uni-goettingen.de/pub/nonpar/ld). A random-effect factorial design with attachment group (B/A contrast) and time as fixed, and subjects as random factors, constrained by sample size and total number of observations, was applied [50]. The results for time effects, displayed by table 2, indicate the presence of longitudinal effects for time and interaction effects for ISL categories along the between-subjects B/A contrasts. There were highly significant results for all variables except emotion ambivalence (where it is known that verbal emotion ambivalence emerges only during school age) [51]. Overall, the results show that normal steadiness in language development is present in the entire sample.

Relative Treatment Effects for Time Points

The within-subjects attachment group by time interactions are presented as relative treatment effects (RTEs), based on mean rank sums, and reflect the impact of the specific age on the respective vocabulary category (here expressed as a proportion value). For positive emotions, there is a peak difference at 23 months. For negative emotions, in contrast, strongest contrast effects are seen at 36 months, after high levels at 23 and 30 months. Both ability words and valence reversals (negated emotions) have stable but relatively low RTEs at 17–23 and 23–30 months, respectively. Terms denoting bodily states (physiology) exhibit an early high RTE at 23 months. For use of the volition vocabulary the peak interaction effect is at 30 months, whilst this is the case at 36 months for cognition-related language use. Also, this is the case for language tools used for emotion regulation (emotion-modulatory particles). Moral terms drop at 30 months and also cognitive-contrast particles show a decline after peaking group differences at 30 months.

Application of Conditional Permutation

Because word frequencies were not normally distributed, robust nonparametric approaches were further fa-

Table 3. Nonparametric tests for between-group effects of attachment organization and disorganization on ISL variables

Variables	B classification		A classification		D classification	
	U	*Z*	*U*	*Z*	*U*	*Z*
Time 1: 17 months						
Positive emotion	89.00	2.19*	76.00	2.13*		
Negative emotion	111.00	1.83^{+}	66.50	2.73**		
Physiology	87.00	2.36**	91.00	2.13*		
Modulatory particles	94.00	1.97*	73.00	2.50**		
Time 2: 23 months						
Positive emotion	64.50	2.81**	63.50	2.71**		
Negative emotion	124.50	1.71*	110.00	1.67^{+}		
Valence reversal	64.00	2.83**	63.00	2.73		
Physiology	63.50	3.10**	78.50	3.36**	52.00	1.29
Time 3: 30 months						
Negative emotion	125.50	1.72^{+}	110.00	1.95*		
Valence reversal	63.00	2.73*				
Physiology	81.00	2.24*	81.00	2.24*		
Cognition	60.50	3.28**	67.50	2.68*		
Moral/standards	63.50	3.24**	62.50	2.84**		
Time 4: 36 months						
Negative emotion					26.50	2.86**
Abilities	91.00	2.10*	78.50	2.36**		
Physiology	120.50	1.50^{+}	84.00	2.20**		
Volition			92.00	1.99*		
Cognition	104.00	2.61**	84.00	2.85**		
Moral/standards			66.50	2.99**		
Modulatory particles	84.00	2.29*	80.00	2.24*		

N = 37. *U* coefficients reflect mean ranks. *Z* scores are reported with one-tailed tie-corrected significance. * $p < 0.05$; ** $p < 0.01$; $^{+}$ $p < 0.1$.

vored to estimate attachment between-group effects. For this reason, exact permutation distributions [52] implemented as the software script NonParametric Combination (NPC Test 2.0) in StatXact version 5.0 (Cytel Software, Cambridge, Mass., USA, www.cytel.com) were computed to calculate one-sample Z tests (manual at www.methodologica.it). The significance levels so obtained through Fisher's *Z*s were augmented with standard Mann-Whitney *U* coefficients, which present average ranks among groups, as normalized to the smallest and highest scores (normal distribution approximation) [53].

Estimation of Group Differences

With the exception of negative emotion words that are more frequent in A children at 30 months and in D children at 36 months, word counts were greater for B children in all other variables. Table 3 shows the results of the comparison of the A group > B/C/D, B group > A/C/D, and the D group > B/C/A. Because A and B patterns account for most of the variance, contrastive results appear in both groups. *U* values that are most informatory, however, vary according to the number of subjects in one group [54].

At 17 months, the difference in physiology vocabulary between secure and insecure children had reached a high significance, where words denoting bodily processes and somatic states were advanced in secure children but, as with emotion words, missing in insecure and disorganized children. This was also true for the time point at 23 months for negative emotion in the B group. However, at 30 months the effect for physiology vocabulary represented only a significant trend for the B group. The

inverse trend, representing the lag for the A group, was still highly significant. There were, in turn, marked differences for cognition and moral words in favor of attachment security at 30 months. At 36 months, there was a significant main effect for attachment disorganization in negative emotion terms. There was also superiority of the secure-attachment group for cognition verbs and modulatory particles: B children are distinguished in their use of terms denoting cognitive acts and are advanced in words that are employed to modulate emotional arousal. B children uttered more positive emotion at 17 and 23 months, and were more reduced in negative emotion, except at 23 months.

Discussion

The analyses of attachment effects suggest that insecure children (1) have at least a considerable time lag in the acquisition of mentalizing language, and (2) might therefore fail to progress to a developmental trajectory that might lead them to the construction of reflective capacities during school age development. Although a very small fraction, the children coded for attachment disorganization show an almost complete absence of ISL up to 36 months. The analyses, therefore, suggest that alexithymia might emerge as a (partial) result of attachment insecurity and/or disorganization.

This conclusion can be justified on the grounds of two arguments. First, the transition to the preschool period (3–6 years) is seen in the developmental literature as critical for the establishment of autonomous internal emotion regulation [55, 56]. Children who are lacking the linguistic 'tools' to process emotions and to understand causes and consequences of affects might be hindered in their normal further development within this domain. Second, clinical findings point to a link of avoidant attachment patterns (corresponding to the dismissing adult attachment type) with alexithymia and the data of the present study suggest that avoidant children have measurable delays in emotion and physiology vocabulary.

Hypothesis 1 is best supported by the present data, since with respect to physiology vocabulary, securely attached children display the most consistent differences against the other patterns. Ontogenetically, physiology vocabulary has been shown to emerge during the span of 18–24 months [40, 57]. Insecure and disorganized children lack physiology language during the second year and continue to lag as compared to B children. Contrary to hypothesis 2, it was found that emotion vocabulary is present already in the 18- to 24-month span in B children, a finding that could not be expected from the literature [58]. At t_1, there is a dominance of positive emotion in B children, while at 23 months the relation of positive to negative is inversed: a greater developmental progression of negative verbal expressions has been described [59] as part of a so-called normative development.

Supported by the data is hypothesis 3, which shows that emotion-modulatory particles become the most important branch of ISL during the course of the third year. In addition, B children are advanced in making use of cognitive tools (hypothesis 4). Cognitive-contrast particles, however, which are related to metarepresentative skills [39, 41] remained a scarce commodity in all four attachment groups. However, with respect to attachment group difference, hypothesis 5 could be supported. All five of these word categories could possibly address difficulties in the emotional and social-cognitive functions of alexithymia, as demonstrated in the clinical literature, and should therefore also be directly investigated as regards the speech of alexithymics.

Conclusions

The disparities found among different attachment groups suggest that, since (1) the insecure attachment group A (and possibly C) exhibit a distinct developmental delay in the acquisition of vocabulary essential for successful emotion regulation, and (2) since the attachment-disorganized fraction of children (group D) exhibit an almost complete lack of mentalizing language up to the age of 3 years, these groups might provide candidates to develop alexithymia later in life. It was not possible to directly address this issue in the present study because of the lack of respective instruments designed for children. Future research should seek to investigate the possible relation of ISL with adult attachment measures.

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