Alexithymia and Memory for Facial Emotions*

Alexitimia y memoria para emociones faciales

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Abstract
Alexithymia is a multi-faceted personality construct that encompasses, among other features, difficulties in identifying and describing emotions. Prior research suggests that alexithymia is associated with poor recognition memory for emotional words. This study addressed the question of whether memory for emotional faces varies as a function of alexithymia. The 20-Item Toronto Alexithymia Scale (TAS-20), and measures of depression, trait anxiety and intelligence were administered to 40 healthy women. During the encoding experiment angry, fearful, happy, and neutral faces were presented. After 30 minutes a recognition test was conducted. Partial correlation analysis revealed that the TAS-20 scale Difficulties describing feelings was inversely correlated with correct recognition of fearful and angry faces. Alexithymia appears to adversely affect memory functioning for negative emotional faces.
Keywords
alexithymia; emotions; faces; facial expression; memory

Resumen
La alexitimia es un constructo de personalidad multifacética que abarca, entre otras características, dificultades en la identificación y descripción de emociones. La investigación previa sugiere que la alexitimia se asocia con pobre memoria de reconocimiento para palabras emocionales. Este estudio abordó la pregunta de si la memoria para las caras emocionales varía en función de la alexitimia. El 20-Item Toronto Alexithymia Scale (TAS-20) y mediciones de depresión, ansiedad-rasgo e inteligencia se administraron a 40 mujeres sanas. Durante la codificación se presentaron rostros de enojo, temeroso, feliz, y se presentaron rostros neutrales. Después de 30 minutos se llevó a cabo una prueba de reconocimiento. El análisis de correlación parcial reveló que la escala TAS-20 y la descripción de sentimientos se correlacionó inversamente con adecuado reconocimiento de rostros temerosos y enojados. La alexitimia parece afectar negativamente a la memoria para los rostros emocionales negativos.
Palabras clave
alexitimia; emociones; caras; expresión facial; memoria

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Alexithymia represents a deficit in the processing of emotional information (Taylor et al., 1997). The alexithymia construct includes the interrelated components difficulties in identifying, and describing one's feelings, externally oriented thinking, and constricted imaginal processes (Nemiah et al., 1976). Alexithymia is distributed normally in the general population (Franz et al., 2008), which supports the idea that it can be conceived as a dimensional personality variable. There is substantial evidence that alexithymic individuals are less able to identify emotional states from facial expressions (Grynberg et al., 2012). Especially difficulties in describing feelings have been found to be linked to interpersonal problems (Spitzer et al., 2005) and poor social skills (Lumley et al., 1996). It is plausible that a reduction in sensitivity to other persons' facial expressions could lead to misunderstandings and weaken social bonds.

Based on clinical observations it has been proposed that alexithymia is associated with problems in linking emotions to memories (Taylor et al., 1997). In the last decades several studies have been conducted to examine memory performance as a function of alexithymia. In most of these studies lexical stimuli were administered. It was repeatedly found that alexithymic individuals are characterized by a deficit in recognition memory for emotional words (Suslow et al., 2003; Luminet et al., 2006; Vermeulen & Luminet, 2009). Importantly, regarding the differential effects of the alexithymia components, previous findings suggest that in particular the so-called emotional factors of alexithymia (i.e. difficulties in identifying feelings and difficulties in describing feelings) are related to poor memory performance for emotional words (Suslow et al., 2003; Vermeulen et al., 2010). In contrast, the cognitive alexithymia factor externally oriented thinking was less or not at all related to recognition memory for lexical emotional stimuli.

An important but yet unstudied question is whether alexithymia has effects on memory for emotional faces. Deficits in remembering emotional facial expressions could contribute to impaired social interactions and interpersonal misunderstanding in alexithymia. In the present study, for the first time the relationship between the personality trait alexithymia and memory for emotion faces was examined in a sample of healthy young volunteers. As we were interested in the effects of moderate degrees of alexithymic characteristics we administered a rather difficult encoding task to increase the likelihood to detect mnestic deficiencies. It has been pointed out previously that processing deficits in alexithymia could be subtle, and may not be manifest unless demands on emotion processing capacities are high (Parker et al., 2005). In our study, during the encoding task subjects had a dual task: they had to memorize and evaluate facial expressions. Angry, fearful, happy, and neutral facial stimuli were shown for only three seconds. After half an hour in which participants were distracted by completing questionnaires they had to identify the original faces among facial stimuli containing also unfamiliar stimuli.

Measures of depressed mood and trait anxiety were administered in the current study as previous research indicates that negative affectivity can be associated with alexithymia (Berthoz et al., 1999; Honkalampi et al., 2000) and, therefore, should be controlled in studies on emotion processing. It was hypothesized that alexithymia, and especially the emotional factors of alexithymia – difficulties in identifying feelings and difficulties in describing feelings – would be associated with poor memory performance for emotional faces.

Method

Participants

Forty healthy female university students participated in this study. The mean age was 22.6 yr. (*SD* = 2.5). All participants had normal or corrected-to-normal vision and were native speakers of German. They met the criterion of no previous psychiatric or psychotherapeutic treatments.

Measures

Toronto-Alexithymia Scale (TAS-20; Bagby et al. 1994). The TAS-20 is a self-report measure of

alexithymia, which consists of 20 items. Each item is rated on a 5-point Likert-type scale (from 1 = "strongly disagree" to 5 = "strongly agree"). The TAS-20 has a three-factor structure: 1. Difficulties identifying feelings, 2. Difficulties describing feelings, and 3. Externally oriented thinking. Information on the reliability and validity of the German translation of the TAS-20 has been provided (Bach et al., 1996). TAS-20 total and subscale scores of our sample are presented in Table 1.

Beck Depression Inventory (BDI; Beck & Steer, 1987). The BDI was used to assess severity of depression at the time of testing. The reliability and validity of the German version have been reported by Hautzinger et al. (2006).

State Trait Anxiety Inventory (STAI; Spielberger et al., 1970). The STAI (trait version) was administered to measure participants' trait anxiety (for information on the reliability and validity of the German version of the STAI, see Laux et al., 1981).

Multiple Choice Vocabulary Test (MWT-B; Lehrl et al., 1995). The MWT-B is an intelligence test and includes 37 items. The items consist of lines, each comprising one real word and four pronounceable pseudo-words. The four distracters are fictitious words. The subject is asked to find the correct word and to underline it. There are no time restrictions. Each word correctly recognized gives a point, which is added to the sum score for a maximum of 37. From the MWT-B scores intelligence quotients (IQs) can be calculated.

Encoding experiment: face evaluation task

Stimuli. Colored facial stimuli (angry, fearful, happy, and neutral) of 15 male and 15 female subjects were presented. Photographs were taken from a standardized picture series of emotional facial expression (*Karolinska Directed Emotional Faces* (KDEF; Lundqvist et al., 1998)). Each emotion condition consisted of 30 faces resulting in a total number of 120 faces shown during the encoding experiment.

Procedure. Participants were told that they would be presented with photographs of facial expression and their task was to evaluate and memorize the faces. A fixation cross of 500 ms preceded the face, which was presented for 3000 ms followed by a time interval (3500 ms) for rating the facial expression as threatening or non-threatening by button press. Facial stimuli were presented in a fixed random order format.

Recognition experiment.

Stimuli. The recognition task consisted of 120 original faces shown during the face evaluation task and 120 distractors (30 angry, 30 fearful, 30 happy, and 30 neutral faces of other individuals taken from the KDEF picture series (Lundqvist et al., 1998)).

Procedure. Participants had to decide whether they have seen the faces during the face evaluation task or not. They rated the facial emotion as previously seen ("Yes") or as distractor ("No") by pressing a button. During the recognition experiment

Table 1

Means, Standard Deviations, and Reliability Data on the 20-Item Toronto Alexithymia Scale, Beck Depression Inventory, State Trait Anxiety Inventory (trait version), and MWT-B Intelligence Test

Scale/ Test	M	SD	Minimum	Maximum	Cronbach alpha
TAS-20					
Difficulties Identifying Feelings	10.9	2.6	7	18	0.74
Difficulties Describing Feelings	8.9	2.8	5	15	0.75
Externally Oriented Thinking	14.9	2.9	10	26	0.67
Total	34.6	6.5	25	57	0.75
BDI	4.0	3.7	0	14	0.83
STAI-Trait	32.7	7.6	21	55	0.92
MWT-B Intelligence test (IQ)	116.4	11.9	97	143	---

Source: own work

each face was presented without time limit until the participant responded. Facial stimuli were presented in a fixed random sequence. Pictures were presented on the screen of a personal computer. Experiments were programmed using the software package Inquisit (Draine, 2004).

Procedures

After a complete description of the study, written informed consent was obtained from all participants. The study was conducted in accordance with the Declaration of Helsinki as revised in 1989 and was approved by the institutional ethics committee. Experiments started with the face evaluation task. Then participants had to complete STAI and BDI. 30 minutes after the face evaluation task the recognition experiment was conducted. TAS-20 and MWT-B were administered after the recognition experiment. Financial compensation for study participation was provided.

Analysis

For the recognition experiment, correct recognition indices were computed by subtracting false recognition rates (false alarms) from correct recognition rates (hits) to obtain a purer measure of memory performance (see also Vermeulen et al., 2010). These indices were then transformed into a percentage score (correct recognition index for a condition divided by the number of items presented in that condition, which was then multiplied by 100). Correlation analyses (Product-Moment correlations and partial correlations) were computed on percentage scores. A participant who recognized correctly, for example, fifteen happy faces while making seven false alarms on happy distractors would obtain a correct recognition index for happy faces of eight (fifteen hits minus seven false alarms) and a percentage of correct recognition of 26.7% (eight happy faces divided by thirty originally presented happy faces).

Results

There were significant positive correlations of TAS-20 total score with trait anxiety (STAI) and depression (BDI) ($r = 0.67$ and $r = 0.48$, $p < 0.01$) but not intelligence (MWT-B) ($r = 0.05$, $p = 0.73$). All TAS-20 subscale scores showed also significant positive correlations with STAI and BDI ($ps < 0.05$) but not MWT-B ($ps > 0.42$).

For fearful faces, mean percentage of correct recognition was 27.8 ($SD = 19.0$). Mean percentage of correct recognition of angry faces was 26.1 ($SD = 15.7$). For happy faces, mean percentage of correct recognition was 29.4 ($SD = 18.7$). Finally, mean percentage of correct recognition of neutral faces was 25.3 ($SD = 15.4$). According to the results of a repeated measures analysis of variance (ANOVA), recognition performance did not differ between facial expression conditions (F (3.37) $= 1.43$, $p = 0.25$). For all conditions, percentage of correct recognition was greater than zero as indicated by the results of one sample t-tests ($ps < 0.001$).

Product-moment correlation analyses showed that only the TAS-20 subscale Difficulties describing feelings was (inversely) related to correct recognition of fearful, and angry facial expression (see Table 2 and Figure 1). That means that difficulties in verbalizing emotions were associated with poor recognition of negative or threatening emotional faces. After applying partial correlation analysis, i.e. partialing out effects of depression (BDI) and trait anxiety (STAI), correlations remained very similar. Most importantly, the subscale Difficulties describing feelings was still significantly correlated with recognition of fearful and angry faces (see Table 2). Neither the TAS-20 total score nor the other subscales showed correlations with recognition performance.

Discussion

In the present study, participants had to evaluate and memorize emotional and neutral faces. Thirty minutes later a recognition test was conducted. As indicated by the percentage of correct recognition participants' memory performance was far from perfect but substantially above chance level. Recognition could have been rather difficult because of the large number of stimuli to be remembered and short presentation times during encoding. For the

Table 2
Product-Moment Correlation Coefficients Between the 20-Item Toronto Alexithymia Scale and Percentage of Correct Face Recognition and Partial Correlation Coefficients for which the Linear Effects of Depressed Mood (BDI) and Trait Anxiety (STAI) are Removed (N=40)

Expression condition	Difficulties Identifying Feelings	Difficulties Describing Feelings	Externally Oriented Thinking	Total Score
Fearful faces				
Partial r	-0.15	-0.4**	0.07	-0.22
R	-0.08	-0.3*	0.1	-0.11
Angry faces				
Partial r	0.04	-0.33*	- 0.19	-0.04
R	0.04	-0.28*	0.17	-0.03
Happy faces				
Partial r	0.02	-0.26	0.07	-0.08
R	0.03	-0.25	0.07	-0.06
Neutral faces				
Partial r	0.0	-0.25	0.24	0.01
r	-0.01	-0.23	0.2	-0.01

** $p < 0.01$, one-tailed. * $p < 0.05$, one-tailed.
Source: own work

whole sample, no performance differences between facial expression categories were observed. This is not surprising since under deep processing conditions, as in evaluative judgment tasks, emotional stimuli appear not to be remembered better than neutral stimuli (Reber et al., 1994).

Confirming in part our hypotheses, we found evidence that difficulties in describing feelings were inversely related to recognition of fear and anger faces. Thus, it appears that alexithymia adversely affects memory functioning for negative emotional faces. Importantly, recognition performance was specifically explained by variations in alexithymia scores and not by alternative variables like depression or trait anxiety. Present results are consistent with and extend previous findings showing a memory deficit for emotion words in alexithymia (Luminet et al., 2006; Vermeulen & Luminet, 2009). Our data are also in line with observations of previous recognition studies based on lexical stimuli that the *emotional* factor of alexithymia (i.e. difficulties in describing feelings) but not the cognitive factor externally oriented thinking style is related to poor memory performance (Suslow et al., 2003; Vermeulen et al., 2010).

However, we found no support for the hypothesis that difficulties in identifying feelings are associated with low recognition of emotional faces. Possibly, the ability to name or label emotions could be especially relevant in the successful recognition of (negative) emotional faces. According to our results individuals who have few problems in describing their internal emotional states are more efficient in the encoding and recognition of facial emotional expressions of other people. Our findings are consistent with the theoretical assumption that the same schemes could be used to process internal and external sources of emotional information (Lane & Schwartz, 1987).

It is possible that poor memory for facial emotions may have a negative influence on interpersonal interactions and relationships. Individuals who remember poorly negative facial expressions of others within a situational context may miss important communicative messages (e.g., irritation) and, therefore, could be subsequently rejected by others. It is known that difficulties in describing feelings are linked to interpersonal problems (Spitzer et al., 2005) and poor social support (Lumley et al., 1996).

The generalizability of the present results and conclusions is limited since the present sample consisted only of healthy young women not characterized by high scores for alexithymia. Future studies have to investigate whether stronger as-

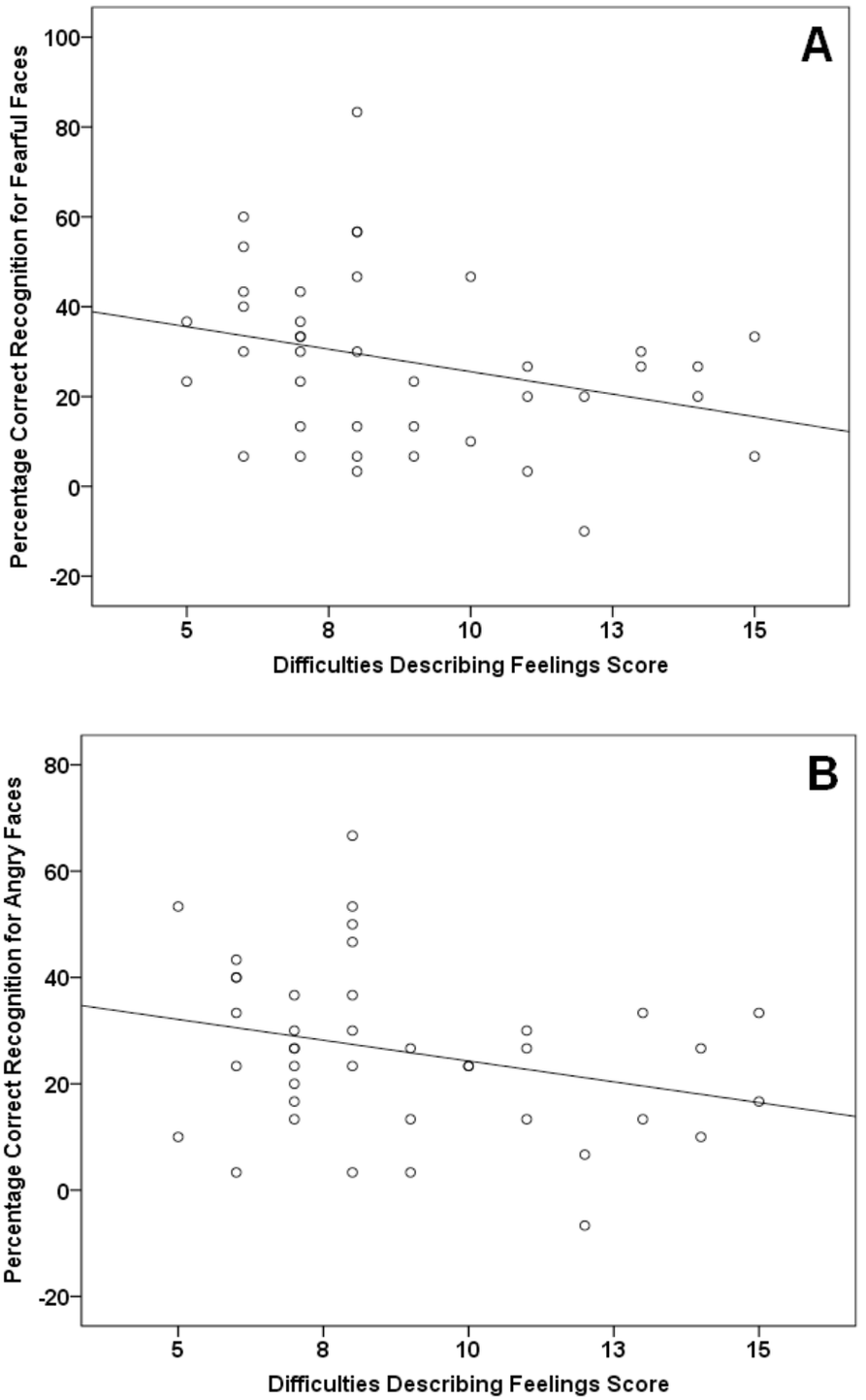

Figure. 1. *Correlation between TAS-20 Subscale Difficulties Describing Feelings and Percentage Correct Recognition of Fearful Faces (A) and Angry Faces (B) ($r = 0.3$ and $r = 0.28$, $p < 0.05$)*

Source: own work

sociations between alexithymic characteristics and memory for emotion faces could be revealed when individuals suffering from clinically relevant degrees of alexithymia are included. It remains also to be further clarified whether difficulties in describing feelings are selectively related to poor memory for threatening but not other negative emotion faces (e.g., disgust or sadness).

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