Scandinavian Journal of Psychology, 2006, 47, 505–511 DOI: 10.1111/j.1467-9450.2006.00525.x

Personality and Social Sciences

Decreased approach motivation in depression

CATHARINA E. WANG,[1] TIM BRENNEN[2] and ARNE HOLTE[2,3]

[1]*Department of Psychology, University of Tromsø, Tromsø, Norway*
[2]*Department of Psychology, University of Oslo, Oslo, Norway*
[3]*Department of Mental Health, Norwegian Institute of Public Health, Oslo, Norway*

Wang, C. E., Brennen, T. & Holte, A. (2006). Decreased approach motivation in depression. *Scandinavian Journal of Psychology*, *47*, 505–511.

The present study examined relations between choice preference and reaction time to emotionally valenced words, dysphoric symptoms (BDI), and dysfunctional attitudes (DAS) in clinically depressed (CD; $n = 61$), previously depressed (PD; $n = 42$), and never depressed controls (ND; $n = 46$). The results showed: (1) NDs and PDs exhibited a choice preference for the relatively more positive words and differed significantly from CDs; (2) PDs and CDs exhibited longer reaction time and differed significantly from NDs; and (3) BDI and DAS were positively associated with reaction time to positively valenced words, whereas no associations were found for reaction time to negatively valenced words. The increased reaction time, in PDs and CDs, is discussed as a possible vulnerability factor to depression, which may be related to decreased approach motivation.

Key words: Attentional bias, approach motivation, dysfunctional attitudes, vulnerability, depression.

Catharina E. Wang, Department of Psychology, University of Tromsø, N-9037 Tromsø, Norway. Tel: +47 77 64 64 46; fax: +47 77 64 56 10; e-mail: cwang@psyk.uit.no

INTRODUCTION

According to Beck (1967, 1976), cognitive vulnerability may develop in individuals who have a history of loss or adversity in childhood. Such devastating experience may contribute to the establishment of negative self-schemata, containing dysfunctional attitudes concerning loss, failure, and abandonment. Dysfunctional attitudes include beliefs such as one's happiness depends on being perfect, being in control, or on other people's approval (Beck, Hollon, Young, Bedrosian & Budenz, 1985).

Negative self-schemata are thought to be relatively stable across time, situations and mood-states but also to be relatively dormant and inaccessible during non-depressive states (Clark & Beck, 1999). They can be activated by a wide range of negative and stressful life events or situations, but especially by achievement-related stress or interpersonal-related stress that is reminiscent of the original devastating experience (Clark & Beck, 1999). When activated, negative self-schemata will tend to generate negative automatic thoughts and depressive affects, but also to negatively bias the individual's information processing. Beck (1976) also assumed that dysfunctional attitudes, when activated, would negatively influence the individual's coping style and automatic compensatory strategies.

Another perspective of what happens to cognitively vulnerable individuals, when confronted with a stressful situation, comes from theories of self-regulation. In those theories, a negative event, or an experience of "discrepancy" in a situation, initiates a shift in attention to evaluate the current situation (Gray, 1994; Higgins, 1987; Pyszczynski & Greenberg, 1987). This shift in attention begins with attention directed internally to focus on the self (Carver & Scheier, 1998), which allows individuals to compare their current state with their desired state, or to the goal, and to initiate behavior to reduce the discrepancy. According to Abramsom *et al.* (2002), such a shift in attention is generally an adaptive response because people switch their attention to the problem in an attempt to resolve it. However, individuals who are cognitively vulnerable to depression seem to have difficulty in disengaging their attention from this evaluation, or "checking" process, between current state and desired state. For example, holding the dysfunctional attitudes of rigid and perfectionist standards may both make it more difficult to solve problems, and to adjust one's goals in the face of thorny problems.

Gray (1994) proposed two psychobiological systems that are critical in the regulation of behavior: the Behavioral Approach System (BAS) and the Behavioral Inhibition System (BIS). While the BAS is sensitive to signals of reward, non-punishment, and escape from punishment; the BIS is sensitive to signals of punishment and non-reward (e.g., failure). While the activation of BAS causes the person to begin movement toward goals, the activation of BIS inhibits behavior that may lead to negative or painful outcomes. Signals activating BAS or BIS can either be external events or internal cognitions. While BAS is assumed to be associated with positive emotions such as hope, elation and happiness, BIS is assumed to be associated with negative affect and anxiety (Carver & White, 1994).

 Published by Blackwell Publishing Ltd., 9600 Garsington Road, Oxford OX4 2DQ, UK and 350 Main Street, Malden, MA 02148, USA. ISSN 0036-5564.

From the self-regulation perspective, signals activating BIS may be a negative event or an experience of a "discrepancy" in the situation. Thus, confronted with such a situation, both in cognitively vulnerable and in less cognitively vulnerable individuals, the BIS will be activated to focus on the problem in order to resolve it. However, while less vulnerable individuals are able to disengage from the self-focused attention, cognitively vulnerable individuals become stuck in this checking process over the insoluble problem (Abramson *et al.*, 2002). In other words, vulnerable individuals are inclined to withdraw from the situation to avoid possible negative outcomes. The resumption of goal-seeking activity in less cognitively vulnerable individuals will probably be reflected in a deactivation of BIS and a reactivation of BAS. In cognitively vulnerable individuals one may, however, expect a large-scale deactivation of BAS, which may, if strong enough, result in a depressive episode (Abramson *et al.*, 2002).

Central to Beck's (cf. Beck 1967; 1976) cognitive theory of depression is the assumption that activated negative self-schemata will negatively bias the information processing. Other researchers have pointed out that depressed individuals are just lacking the "illusory optimism" which has been found to characterize non-depressed individuals (for a review on this area, see Alloy & Abramson, 1988). Other researchers (Ingram & Smith, 1984; Kendall & Hollon, 1981) suggest that it may be the equality between positive and negative thoughts that puts people at risk for depression. This viewpoint resembles that of the self-regulation perspective of depression, which holds that the core problem in depression may be the regulation between BIS and BAS.

Research on the cognitive style of depressed individuals has supported the presence of a negativity bias, but also the absence of a positivity bias. The different findings seem to depend on the cognitive function which has been studied, the severity of the dysphoric symptoms, and the method of the study (for a review: Clark & Beck, 1999; Gotlib & Neubauer, 2000). For example, in studies designed to measure visual attention, there has been found an attention bias toward negative information in depressed individuals using the Dot-Probe task (Mathews, Ridgeway & Williamson, 1996; Mogg, Bradley, Millar & White, 1995; Westra & Kuiper, 1997). By using the Deployment of Attention Task, however, depressed individuals have been found to lack a positivity bias, which was present in the non-depressed control group (Gotlib, McLachlan & Katz, 1988; Kakolewski, Crowson, Sewell & Cromwell, 1999; McCabe & Gotlib, 1995). Although the two tasks have many similarities, important differences may contribute to the discrepant results.

In the Dot-Probe Task, individuals are simultaneously presented with pairs of words with different valence (i.e., positive, negative). Both words then disappear from the screen and a small dot appears in the spatial location of *one of the words*. Participants are asked to press one of two buttons to indicate, as quickly as they can, when they see the dot. Accordingly, the dependent variable in this task has been reaction time. In the Deployment of Attention Task, individuals are also presented with two pairs of words with different valence. However, in this task the word pairs are replaced simultaneously, each word with a different color bar. The individuals do not report the words but which color bar that appears first. According to Titchener (1908), an attended stimulus will seem to occur before an unattended one, even when they occur simultaneously. Thus, the color bar chosen is assumed to indicate greater attention to the word it replaced. In this task, in contrast to the Dot-Probe Task, the dependent variable has usually been the choice made. Furthermore, in the Deployment of Attention Task individuals are forced to make a choice between two *simultaneously* presented color bars. In the Dot-Probe Task it is merely the reaction time to *either* the positive word, *or* the negative word that is measured.

Researchers have discussed whether the Deployment of Attention Task is a pure measure of visual attention. For example, Gotlib and Neubauer (2000) suggested that it implicitly encourages the use of guessing strategies. Such a possibility, they argue, seems to be confirmed by the fact that many participants in the task spontaneously claim that the two color bars seem to appear simultaneously.

Following this argument, one may hypothesize that the Deployment of Attention Task resembles the sort of discrepant situation that is likely to activate the BIS. For cognitively non-vulnerable individuals, the problem of the two color bars seemingly appearing simultaneously may be resolved by refocusing their attention to the instruction of the task (i.e., "Please decide as fast as possible"). For cognitively vulnerable individuals, however, no solution of the problem may be found. Rather they will focus on their need to solve the task perfectly and not to guess if not certain, to ruminate about their upcoming feelings of incompetence, and to be occupied with self-criticism. Elevated reaction times may be the consequence. At present, this prediction has not been investigated with regard to the Deployment of Attention Task.

The purpose of the present study was to examine the relations between cognitive vulnerability, approach motivation and visual attention to emotionally valenced words in clinically depressed individuals, in non-depressed individuals with a prior history of depression, and in never depressed controls. To do so, we employed the Deployment of Attention Task to measure visual attention to emotionally valenced words. However, due to the possibility that this attention task also may resemble a discrepant situation, we hypothesized that reaction time in the present study would be a measure of approach motivation. Dysfunctional attitudes were used as a measure of cognitive vulnerability.

The predictions were: first, because several studies (Gotlib *et al.*, 1988; Kakolewski *et al.*, 1999; McCabe & Gotlib, 1995), which have used the Deployment of Attention Task, have found non-depressed individuals to be positively biased, whereas depressed individuals showed no choice preference, the same prediction was made for the present study. Also, we

predicted that dysfunctional attitudes and dysphoric symptoms would be negatively related to choice preference for positively valenced words. Second, we predicted that reaction time, as a measure of approach motivation, would be a state-independent vulnerability measure and increased both in clinically depressed and previously depressed individuals compared to non-depressed controls. Also, we predicted a positive correlation between reaction time to positively valenced words and dysfunctional attitudes and dysphoric symptoms. No correlation between reaction time to negatively valenced words and dysfunctional attitudes and dysphoric symptoms were predicted.

METHOD

Participants

Participants were 149 subjects (122 women and 27 men, aged 18 to 54, $M = 28.6$, $SD = 10$) living in Tromsø, Norway. To recruit subjects, the Beck Depression Inventory (BDI; Beck, Rush, Shaw & Emery, 1979) and the Previous Depression Questionnaire (PDQ; Wang, 1996) were administered to approximately 800 undergraduate students at the University of Tromsø, and to approximately 600 patients consulting their general practitioner, also in Tromsø. About 340 (43%) students and 180 (30%) patients returned the questionnaire by mail. From this sample, subjects were invited to participate if they had a BDI score above 16 (clinically depressed), or scored below 16 and met the requirements for previous depression on the PDQ. In addition, a random sample was selected among those who had a BDI score between 0 and 9 (normal range), and did not meet the requirements for previous depression on the PDQ. This screening resulted in a total sample of 184 participants (84 patients and 100 students). That is, 35% of the subjects who returned the screening questionnaires.

These subjects were individually diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders (*DSM-IV*; American Psychiatric Association, 1994), using the "The Structured Clinical Interview for *DSM-IV*, Axis I disorders" (SCID-CV) (First, Spitzer, Gibbon & Williams, 1997). The SCID-CV section relating to Mood Disorder was used for including subjects, and the SCID-CV section related to Psychotic Symptoms was used to exclude individuals with such symptoms. Thus, the final group assignment was made according to *DSM-IV* (American Psychiatric Association, 1994) criteria and not in accordance with Beck and Steer's (1987) classification for normal range, mild, moderate and severe depression on the BDI. Based on information from the interviews, 30 (17%) individuals were excluded from the study either because they failed to meet the full criteria for a current or a previous depression, because their previous depression was more than five years ago, or because they had psychotic or hypomanic symptoms. In addition, 5 (3%) individuals dropped out the study before completion. The final sample consisted of 61 clinically depressed [CD], (36 patients and 25 students; $M = 30.8$ years, $SD = 10$), 42 previously depressed [PD] (17 patients and 25 students; $M = 27.0$ years, $SD = 8$) and 46 never depressed [ND] (18 patients and 28 students; $M = 26.9$ years, $SD = 9$). Nine of the CDs and one of the PDs were on antidepressive medication. One of the CDs and one of the PDs were on neuroleptics. None of the participants were inpatients and thus they were not severely depressed. For the PDs the mean period since the last major depressive episode was 1.7 years ($SD = 14.84$).

The SCID interviews were administered by four *DSM-IV* interviewers who had been individually trained by a highly qualified supervisor in the administration of the SCID. All the SCID interviews were audio taped, and subsequently, 30 of these interviews, 10 from each group, were randomly sampled for reliability testing. The inter-rater agreement (kappa) between two raters for groups (ND, PD, CD) was 0.9, $p < 0.0001$. When the kappa was calculated between subjects who had never experienced a depressive episode (i.e., ND) and those who had (i.e., PD and CD), the obtained result was 1.0, $p < 0.0001$. These results indicate a highly satisfactory reliability of the group assignments.

The Regional Committee for Medical Research Ethics evaluated the study, the participants gave written informed consent, were paid NOK 100 (US$15) per hour for their participation, and were treated in accordance with the "Ethical Principles of Psychologists and Code of Conduct" (American Psychological Association, 1992).

Measures

The BDI (BDI; Beck *et al.*, 1979) is a widely used, 21-item self-report symptom scale that assesses a variety of affective, behavioral, cognitive and somatic symptoms indicating dysphoric states or clinical depression. For each item, there are four alternative statements that reflect increasing levels of severity. Possible scores range from 0 to 63. Beck and Steer (1987) have classified BDI scores as follows: normal range, 0–9; mild-moderate depression, 10–18; moderate-severe depression, 19–29; and serious depression, 30–63. They also recommended a cut-off point for clinical depression at 16. Psychometric properties of the BDI have been provided by Beck, Steer and Garbin (1988). The BDI was administrated in the initial screening to select potentially participants to the study, and also later to measure dysphoric symptoms on the day of testing.

The Dysfunctional Attitude Scale (Form A)(DAS; Weissman & Beck, 1978) is a 40-item self-report questionnaire designed to measure the presence of dysfunctional attitudes that may relate to cognitive vulnerability to depression (Oliver & Baumgart, 1985). Examples of DAS items are "My value as a person depends greatly on what others think of me", or "One can get pleasure from an activity regardless of the end result", i.e. the content of these statements concern dependency, need for approval, perfectionism performance standards, and rigid ideas about the world. For each item, subjects indicate their level of agreement using a seven-point scale ranging from *totally agree* through *neutral* to *totally disagree*. Possible scores range from 40 to 280, with higher scores indicating greater dysfunctional attitudes. Psychometric properties of the DAS have been provided by Chioqueta and Stiles (2004), Dobson and Breiter (1983), and Oliver and Baumgart (1985).

Stimulus words and apparatus

The words used were the Norwegian translations of those used in Gotlib *et al.* (1988), McCabe & Gotlib (1995), and in Kakolewski *et al.* (1999). The neutral words were all nouns (e.g., glacier, magazine, pepper), whereas the positive and the negative words were all adjectives (e.g., positive words: exuberant, vibrant, bold; negative words: gloomy, defeated and failure). The words were translated to Norwegian by the first and third author. The second author, a native speaker of English, translated the Norwegian words back to English again to test the correctness of the translation.

A viewing box, built with the same measurements as the box used by Kakolewski *et al.* (1999), was placed in front of a 15-inch color monitor, was 23 cm high, 32 cm wide, and 49 cm long (distance from screen to participants' eyes). Seated and at eye level, participants looked into an opening shaped like a pair of goggles. Inside the box a vertical partition split the viewing area. The interior was painted flat black to reduce reflections.

Table 1. *One-way ANOVAs for effects of clinically depressed, previously depressed, and never depressed on the BDI, the DAS, the choice of word, and the reaction time*

	Never depressed (n = 46)		Previously depressed (n = 42)		Clinically depressed (n = 61)		
	M	(*SD*)	*M*	(*SD*)	*M*	(*SD*)	*F*
BDI	1.13	(1.68)	6.40	(4.05)	15.70	(8.50)	83.15***
DAS	93.85	(21.36)	116.64	(30.40)	133.63	(38.25)	20.64***
Choice of word	62.41	(10.6)	61.26	(10.5)	54.43	(11.7)	7.87**
Reaction time$_{tot}$	1157.1	(480)	1439.7	(734)	1490.8	(722)	3.64*

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
BDI = Beck Depression Inventory. DAS = Dysfunctional Attitude Scale.
The Choice of Word = A positive choice was defined (scored) as the selection of the color bar corresponding to the word having *relatively* more positive valence in an item pair, whereas a negative choice was defined (scored) as the selection of the color bar corresponding to the word having *relatively* more negative valence in an item pair. The procedure contained 108 word pairs. Accordingly, a 50/50 choice of positive/negative words will be 54/54. The table presents the choice of relatively more positive words.
Reaction time = the time from when the colored bars have been presented to when the subject has pressed the key.

Procedure

The participants underwent the BDI before the Deployment of Attention Task was administrated. Each participant was given a standard instruction:

"When you look into this box you will see two crosses. Focus on the crosses. The crosses will be replaced by words, and different colored bars will then replace the words. Your task is to press either a key on the left 'z', or a key on the right '/'. When you think that the left bar appeared first, you are going to press the key on the left side ('z'). When you think that the right bar appeared first, you are going to press the key on the right ('/') side. *Please decide as fast as possible.* Any questions? The first few trials are for practice. After the practice trials are completed, the experiment will begin. There are a few pauses in the task, and the computer screen will tell you of the pause. You will be given an opportunity to rest before the experiment resumes. Any questions?"

A computer program presented the preset trial sequence:[1] (a) 3-s blank screen; (b) 1-s presentation of two fixation crosses placed laterally to the vertical partition so that each eye could see only one cross; (c) fixation crosses replaced by 100 ms of blank screen; (d) 730 ms presentation of a pair of words, one in each field; (e) the words simultaneously replaced, each with different color bars (red, blue or green); (f) a key press; "z" or "/" (keyboard on table below viewing box) to record lateral response choice and latency; and (g) next trial initiated. Six practice trials allowed familiarity with the procedure. If participants answered "yes" to further practice, then the same six practice trials were repeated.

The procedure contained 108 word pairs. This provided three groups of 36 pairs each, including positive/negative, positive/neutral, and neutral/negative. Visual fields were counterbalanced. For example, in the positive/negative word combinations the positive word appeared on the right and left 18 times each. This provided totally six groups with 18 pairs each. A positive choice was defined (scored) as the selection of the color bar corresponding to the word having *relatively* more positive valence in an item pair. For example, if a neutral word was paired with a negative word, the neutral word was scored as the relatively more positive, i.e., if ten positive choices were made when they were displayed in the left visual field, eight alternate (negative or neutral) choices were made in the right visual field. Pairs were presented in random order. The color bar combinations, which replaced the word pairs, were also independently counterbalanced.

After completing the Deployment of Attention Task, the participants performed the DAS.

RESULTS

To determine whether the three groups of participants differed with respect to symptoms and attitudes, separate one-way analyses of variance (ANOVA) were conducted on the subjects' BDI and DAS (Table 1). These analyses yielded significant effect for group on both the BDI and on the DAS. Follow-up contrast tests indicate that all three groups differed significantly from each other on these two measures.

Choice of word

A 3 (CD/PD/ND) × 3 (word valence combination; positive/negative, positive/neutral, neutral/negative) × 2 (visual field; left, right) mixed ANOVA was performed on the choice of the relatively more positive words. As predicted, the group main effect was significant, $F(2, 146) = 7.87$, $p < 0.001$. The CDs chose the relatively more positive words less frequently than the NDs and less than the PDs, as shown by contrasts, (NDs vs. PDs: $t(146) = 0.49$, $p > 0.05$; CDs vs. NDs: $t(146) = 3.71$, $p < 0.0001$; CDs vs. PDs: $t(146) = 3.10$, $p < 0.002$) (Table 1). Also, we tested if the mean choice of positively valenced words, in each of the three groups, were significantly different from what would be expected by chance (50%, i.e., 54). We found that the non-depressed individuals chose significantly more than 50% of the positive words (ND: $Z = 5.38$, $p < 0.001$; PD: $Z = 4.48$, $p < 0.001$), whereas the depressed individuals chose about 50–50 (CD: $Z = 0.12$, $p > 0.05$). Neither the main effect for word valence combination, the main effect for visual field, nor the interaction between factors were significant.

Associations between choice of words, symptoms and attitudes

To determine how choice of positive words was associated with symptoms and attitudes, correlations were computed for all groups. The results are presented in Table 2. A significant negative correlation was obtained for BDI for the CDs, but

Table 2. *Bivariate correlation between BDI, DAS and choice of words and reaction time for all three groups and for the total sample*

	Never depressed		Previously depressed		Clinically depressed		Total sample	
	BDI	DAS	BDI	DAS	BDI	DAS	BDI	DAS
Choice of words	−0.074	−0.29*	−0.190	−0.44**	−0.42**	−0.34**	−0.43***	−0.43***
Reaction time								
Total	0.002	−0.001	−0.041	−0.031	0.045	0.087	0.152	0.132
Positive words	0.025	0.034	0.086	0.131	0.142	0.185	0.241***	0.239***
Negative words	−0.029	−0.031	−0.113	−0.125	−0.076	−0.024	0.048	0.026

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed).

not for the other two groups. For DAS, significant negative correlations were obtained for all three groups

Reaction time

First, outliers (defined as being more than three standard deviations from the mean, calculated separately for each condition and participant) were removed. Then, a 3 (CD/PD/ND) × 3 (word valence combination; positive/negative, positive/neutral, neutral/negative) × 2(visual field; left, right) mixed analysis of variance (ANOVA) was performed on reaction time. As predicted, the group main effect was significant, $F(2, 146) = 3.64$, $p < 0.029$. The CDs and the PDs had a longer reaction time than the NDs, as shown by follow up *t*-tests between groups: NDs vs. CDs: $t(105) = -2.71$, $p < 0.008$; NDs vs. PDs: $t(86) = -2.16$, $p < 0.034$; CDs vs. PDs: $t(101) = -0.35$, $p < 0.727$ (Table 1). The main effect for word valence combination, the main effect for visual field, and the interactions between factors, were not significant.

To get a measure of how the reaction time to the actual choice of word was associated to the relatively more positive word, and to the side of presentation (i.e., visual field), the mean reaction time of four combinations of conditions, for each participant, were computed on the adjusted reaction times: (1) "negative left" included negative/neutral-left choice and negative/positive-left choice (PosRL: positive word to the right, chooses left); (2) "negative right" included neutral/negative-right choice and positive/negative-right choice (PosLR: positive word to the left, chooses right); (3) "positive left" included positive/neutral-left choice and positive/negative-left choice (PosLL: positive word to the left, chooses left); and (4) "positive right" included neutral/positive-right choice and negative/positive-right choice (PosRR: positive word to the right, chooses right). A 3(CD/PD/ND) × 2 (positive valence; left, right) × 2 (choice; left, right) mixed analyses of variance (ANOVA) was performed on reaction time. A significant interaction was obtained between positive valence and choice, $F(2, 135) = 6.5$, $p < 0.012$. Follow up *t*-tests indicated that the reaction time to relatively more positive words did not differ as a function of which side the word was presented ($t(147) = -0.081$, $p < 0.935$) (PosLL: $M = 1323.1$, $SD = 651$; PosRR: $M = 1322.3$, $SD = 667$). Neither did the reaction time to relatively more negative words differ as a function of which side the word was presented ($t(137) = 0.920$, $p < 0.359$) (PosLR: $M = 1448.3$, $SD = 1021$; PosRL: $M = 1424.8$, $SD = 717$). However, a significant difference in reaction time was obtained between PosLR and PosRR ($t(144) = 2.059$, $p < 0.041$). None of the other interactions between factors, or the main effects, were significant.

Associations between reaction time, symptoms and attitudes

To determine how reaction time was associated with symptoms and attitudes, correlations were computed for the total sample and for all groups. The results are presented in Table 2. As predicted, for the total sample, significant positive correlations were obtained between reaction time for positive words and BDI and DAS, whereas no significant correlations were obtained between reaction time to negative words and BDI and DAS. For each group, no significant correlations were obtained.

DISCUSSION

This study was conducted to examine the relationship between cognitive vulnerability, approach motivation and visual attention to emotionally valenced words in clinically depressed, previously depressed and never depressed individuals. We hypothesized that reaction time in the Deployment of Attention Task may be a measure of approach motivation rather than a measure of visual attention, and thus a state-independent vulnerability factor to depression. However, in choice preference we predicted the presence of a positivity bias in non-depressed individuals, while clinically depressed individuals would be characterized by the absence of such a positivity bias.

First, a central issue in depression research is whether depressed individuals are cognitively characterized by the lack of a positivity bias or by the presence of a negativity bias. Results from the present study support previous research with the Deployment of Attention Task, which has found non-depressed individuals to be positively biased in choice preference, while depressed individuals were characterized by the absence of this positivity bias (Gotlib *et al.*, 1988; Kakolewski *et al.*, 1999; McCabe & Gotlib, 1995). In the

present study, also the non-depressed individuals with a prior history of depression were positively biased in choice preference. This may indicate that choice preference in the Deployment of Attention Task is a state-dependent measure of depression. Due to the fact that the PDs, compared to the NDs, exhibited more dysfunctional attitudes, and more dysphoric symptoms, these findings may indicate that there may be "a threshold" where the positivity bias disappears. The results, which indicate that it was only in the CD-group that dysphoric symptoms were associated to choice preference, may support this suggestion. Dysfunctional attitudes, on the other hand, were significantly associated to choice preference in all three groups and may therefore, when activated, be a cognitive vulnerability factor that decreases the processing of positive stimuli. This is an interesting finding as dysfunctional attitudes have usually been assumed to negatively bias the individual's information processing, and to generate negative automatic thoughts and depressive affects (Beck 1967; 1976). Accordingly, the present finding may indicate that dysfunctional attitudes also impair the ability to attend to positive information and by this wipe out the "illusory optimism" which often characterizes non-depressed individuals.

In visual attention tasks, reaction time has usually been regarded as a measure of selective attention either to positively or to negatively valenced information. In the present study, we hypothesized that reaction time is better conceptualized as a measure of approach motivation. Two findings seem to support this suggestion. First, reaction time was not related to choice preference. If reaction time had been a measure of selective attention, reaction time would have followed the positivity bias, i.e. decreased reaction time in PDs and NDs when choosing the relatively more positive words. However, no such interaction effect occurred. On the contrary, the obtained difference in reaction time was between the group with no history of depression (ND) and the other two groups who have experienced depression (PD and CD). Accordingly, reaction time seems to be a common factor in PDs and CDs, independently of depression status and information processing style. If reaction time in the present study is not a measure of selective attention, an alternative is that it is a measure of motoric retardation, which often follows depressive symptoms. However, the findings that total reaction time were unrelated to BDI and DAS do not support such an interpretation.

In conclusion, the present results provide support for the suggestion that reaction time in the Deployment of Attention Task, may be a measure of approach motivation, rather than a measure of selective attention. Furthermore, decreased approach motivation may be related to dysfunctional attitudes and may be a state-independent vulnerability factor to depression. However, decreased approach motivation does not directly influence information processing such as choice preference. On the other hand, decreased approach motivation may be an important part of an escalation process of dysphoric mood in to a clinical depression.

The authors wish to thank the participants, the general physicians in Tromsø who have contributed by recruiting participants to the project, and the research assistants Kjersti Fredheim, Renate Berg and Tanja Berg. Furthermore, they wish to thank Rue L. Cromwell, J. Jeffrey Crowson Jr., Maria Lewicka, Monica Martinussen and Tore C. Stiles for their helpful suggestions, and Ingunn Skre for the training in SCID I-interviewing. The Norwegian Research Council, the Norwegian Foundation for Health and Rehabilitation, the Norwegian Council for Mental Health, and the Psychiatric Research Centre of Northern-Norway has financially supported the project.

NOTE

[1] The fixation crosses were 6 mm × 6 mm and were presented at a visual angle of 0.7°. All words were presented in capital letters and had a height of 8 mm and ranged in length from 2.7 cm to 9 cm. The visual angle of the words ranged from 3.16° to 10.49°. The color bars (red, blue or green) that replaced the word pairs had a height of 1.5 cm and a length of 9.5 cm with a visual angle of 11.07°.

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Received 2 February 2005, accepted 16 December 2005