Research Article

DETECTION AND DISTRACTION EFFECTS FOR THREATENING INFORMATION IN SOCIAL PHOBIA AND CHANGE AFTER TREATMENT

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This work examines differences in the detection and distraction by social-threat-related information between a social phobia group (SP; N = 33) and a normal control group (NC; N = 32). The change obtained after psychological treatment is also studied for the SP group. A paper-and-pencil visual search task is used, in which the emotional valence of the "target" (social threat, physical threat, and neutral words) and "distractor" (social threat, physical threat, neutral, and nonsense words) verbal stimuli is manipulated. Results indicate that there are no differences in the detection of social-threat targets between SP and NC participants. However, the performance of SP individuals is more impaired when distractor stimuli related to social threat are presented, regardless of the target valence. This increased distraction by social-threat-related stimuli is reduced after psychological treatment, and this decrease is maintained at 6-month follow-up. Depression and Anxiety 0:1–9, 2007.

Key words: *social phobia; attentional bias; visual search; distractibility*

INTRODUCTION

Fear is an emotion that has great value for an individual's survival. One of its central functions is to facilitate the detection of danger or threats and to help the organism respond quickly and effectively to threatening situations. Therefore, it is not surprising that attempts to understand how this emotion works have been centered on the processes for detection of the stimuli, that is, on the attentional process. In the case of people with anxiety disorders, current cognitive theories state that these individuals could have developed excessively "exaggerated" threat-detection processes, which make them respond to scarcely threatening cues [e.g., Beck et al., 1986; Bower, 1981; Mathews and Mackintosh, 1998; Matthews and Wells, 2000; Mogg and Bradley, 1998; Öhman, 1996; Williams et al., 1988, 1997].

On the one hand, a variety of tasks have been used to examine biases in selective attention to emotional stimuli. However, attentional tasks that do not include competition between stimuli for attentional resources have not found differences between anxious and nonanxious people in the processing of threatening information [e.g., Mathews and Milroy, 1994]. On the other hand, experimental tasks presenting various stimuli simultaneously *have* found these differences [e.g., MacLeod and Mathews, 1991]. Therefore, it appears that the problem lies not in the efficiency of the threatening information per se, but rather in the attentional priority given to a threat in preference to other stimuli [Mathews and Mackintosh, 1998].

Although it has been proposed that this preferential processing could partly explain the etiology and maintenance of anxiety disorders, the mechanisms

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underlying this preference are not yet well delineated [Amir et al., 1998; Bögels and Mansell, 2004]. For instance, Williams et al. [1988] suggested two mechanisms: the *affective decision mechanism*, which appraises the threatening value of the stimuli, and the *resources allocation mechanism*, which determines the allocation of the processing resources. In the second version of their theory, Williams et al. [1997] propose that the units of information representing a threatening stimulus are strengthened by carrying an emotional "tag" as a result of biological preparation or prior learning. This tag gives a threatening stimulus an advantage over any competing one, thereby automatically increasing the likelihood of triggering the secondary resources allocation mechanism, thus leading to attentional bias. If there is no competition, then there is no advantage for a threatening stimulus. A single stimulus (threatening or not) would always have control of the output, regardless of whether it has a tag.

Mogg and Bradley (1998) have also emphasized the role of two systems with conceptually different functions: *valence evaluation* (which is responsible for assessing stimulus threat value) and *goal engagement* (which determines the allocation of resources for cognitive processing and action). According to these authors, anxiety disorders are characterized by not only a bias in the automatic initial orientation towards threat but also action avoidance tendencies, which serve to reduce the subjective distress and/or danger. Therefore, after initially orienting to a threat, anxious persons' focus of attention is unstable, with a tendency to shift repeatedly toward and away from the threat; that is, the maintenance of attention to threat would be subject to conflicting response tendencies: automatic vigilance versus avoidance strategies [Mogg and Bradley, 1998].

This vigilance–avoidance pattern has also been suggested by Amir et al. [1996, 1998, 2002]. In the specific case of social phobia (SP), these authors suggest that processing biases could be characterized by abnormalities in both automatic activation and strategic inhibition of threatening information. This hypothesis is consistent with clinical observations indicating that these people attend preferably to threatening information but are not successful when they try to eliminate their negative thoughts.

The most common experimental tasks for assessing the presence of attentional biases are those that present two or more stimuli that simultaneously compete for attentional resources. In these types of tasks, the presence of the threatening stimulus may favor the performance of anxious people (e.g., in the dot probe task), or impair it (e.g., in the emotional Stroop task).

The "visual search" task has also been used. In the first study using this experimental paradigm, Mathews et al. [1990] asked the participants [patients with generalized anxiety disorder (GAD) and normal controls (NCs)] to discriminate between the words *left* and *right* by pressing a button. The presence or absence of a distractor (another word) that could be threatening–nonthreatening, and the fact of knowing–not knowing the location of the distractor and the target were manipulated. Results showed that persons with GAD responded more slowly and were more easily distracted by the distractor words. They were especially distracted when the distractor words were threatening (with no differences between physical and social threat). However, this occurred only when the target location was unknown, necessitating a visual search.

The authors replicated these results in a later work [Mathews et al., 1995], in which they confirmed that patient responses, compared to those of NCs, were slower when the distractor words were threatening. These authors also studied whether this bias disappeared after treatment, and although they did not find positive results in their first study, data in the second study indicated that the vigilance effects (i.e., distractibility) did not persist after treatment.

The tasks mentioned thus far (Stroop, dot probe, and visual tasks) are aimed at identifying a neutral stimulus (a color, a dot, a word) by manipulating the emotional valence of the distractor stimuli. However, these tasks do not investigate what happens when the stimulus to be identified is also threatening. To do this, some authors have used the "face-in-the-crowd" paradigm, in which facial expressions are manipulated. The person is then asked to indicate whether all the faces in a crowd (consisting of 8 or 12 persons) are the same or whether there is some discrepancy. In nonclinical populations, researchers using scores obtained in trait and state anxiety have found differences in people's detection of threatening facial expressions [Byrne and Eysenck, 1995; Hansen and Hansen, 1988; Hampton et al., 1989]. In clinical populations, Gilboa-Schechtman et al. [1999] employed an SP sample and found partial support for the attention bias hypothesis. Participants with SP did not identify the negative (angry) faces faster, but they needed more time to identify the positive (happy) ones. Additionally, although they were more distracted by the threatening distractor faces than were NC participants, this also occurred with positive distractors faces.

Rinck et al. [2003] have proposed two modified visual search tasks based on the one introduced by Neisser [1963]. These tasks allow testing for both selective detection and selective distraction, with a full combination of targets and distractors. In both tasks, the stimuli are words. In the first task, participants had to search for a target word (anxiety-related or not) hidden in a matrix of letters that also formed words (anxiety-related or not). In the second task, each word was given in its entirety, and the matrices consisted of single words separated by blanks spread out across the screen. The first task was applied to patients with GAD, to patients with SP who were afraid of giving speeches, and NC participants; the second task was applied only to participants with GAD and NC participants. Results failed to show either distraction or target detection

effects in participants with SP. The authors recognized that they had no convincing explanation for this result and that it would require more research.

Our work is designed to analyze the performance of people with SP when two sources of stimuli are competing for the processing of resources. To this end, a paper-and-pencil visual search task, similar to the second version proposed by Rinck et al. [2003], is used: The person has to find various target (neutral, social-threat-related, and physical-threat-related) words on a card that also includes distractor (neutral, social-threat-related, physical-threat-related, and nonsense) words.

First, we examine whether an SP group and an NC group differ regarding distraction by social threat information. We expected that when distractors and targets belong to the same category, performance would be affected for all participants. However, whereas in the NC group social distractors affect more social targets and less nonsocial targets, in the SP group social distractors affect all targets (social-threat-related, physical-threat-related, and neutral). According to the hypothesis, participants with SP will allocate more attentional resources in the processing of social threat than other distractors; therefore, this group will be more affected by the social distractors. This difference is not expected to be as notable for the NC group.

Second, we examine whether there are differences between the two groups in the detection of social threat (target words). We expected that SP participants would more quickly detect socially threatening information compared to NC participants, especially when nonsocial information is presented as distractors.

Third, we examine the bias specificity issue by analyzing whether these biases in selective attention of the SP group to threatening stimuli are limited to social threat or whether they also extend to physical threat. Last, we determine whether the attentional biases are maintained after a cognitive-behavioral treatment is applied and at 6-month follow-up.

METHODS

PARTICIPANTS

The sample comprised two groups: a social phobia (SP) group ($N = 33$) and a normal control (NC) group ($N = 32$). Participants in the clinical group met DSM-IV criteria [American Psychiatric Association, 1994] for SP. Twenty participants in the SP group had generalized SP and the other 13 had specific SP. All of them came from the Anxiety Disorders Clinic of the Jaume I University of Castellón (Spain). For the diagnosis, the Anxiety Disorders Interview Schedule—Revised [ADIS-R; DiNardo et al., 1988] adapted to DSM-IV criteria was administered by doctoral-level students supervised by expert clinicians. Afterwards, all participants received the treatment program described below. The therapists were doctors or doctoral-level students. All clinicians were trained in the delivery of the manualized treatment protocols for the treatment of SP.

Participants in the NC group were volunteers recruited through announcements to take part in the study. All of them underwent a screening interview to rule out the presence of any mental disorder before confirming their participation. They were matched to the clinical sample in age, sex, and educational level. Demographic characteristics of both groups are summarized in Table 1. No statistical differences were found between them in age, sex, marital status, or educational level.

TABLE 1. Demographic characteristics and scores obtained in the questionnaires [*M*(*SD*)]

	NC group	SP group	SP group posttreatment	SP group follow-up
Male	9	11		
Female	23	22		
Single	24	25		
With couple	8	8		
Studies				
University	17	22		
High School	7	9		
Primary School	8	2		
Age	27.65 (11.71)	27.42 (11.35)		
BDI	5.92 (4.72)	12.13 (8.28)	6.54 (7.23)	8.04 (10.01)
FNE	8.05 (6.67)	24.90 (3.81)	19.46 (8.21)	20.17 (6.68)
SAD	16.05 (6.98)	19.27 (6.99)	12.73 (6.57)	6.00 (2.73)
SPAI-SP	68.11 (35.67)	108.09 (26.67)	69.89 (21.29)	87.39 (41.02)
SPAI-AG	17.24 (11.94)	22.84 (12.71)	16.38 (9.77)	16.38 (9.77)
STAI-State	16.65 (7.88)	24.54 (9.29)	16.12 (7.89)	17.08 (7.57)
STAI-Trait	19.84 (8.35)	33.33 (10.67)	24.28 (10.78)	26.82 (13.02)

SPAI-SP, SPAI Social Phobia subscale; SPAI-AG, SPAI Agoraphobia subscale.

VISUAL SEARCH TASK

We designed a pencil-and-paper visual search task. Participants had to find two "target" words, which were repeated a total of six times on a card. Each card also included 66 distractor words (total = 72 words per card). The words we used are presented in Table 2 (words presented originally in Spanish): 13 social-threat-related words (11 distractors and 2 targets), 13 physical-threat-related words (11 distractors and 2 targets), 13 words related to objects that can be found in a kitchen (11 distractors and 2 targets), and 11 nonsense words (all distractors). The emotional words (physical and social threat) were pulled from the published literature [e.g., Mattia et al., 1993; McNally et al., 1990] and rated according to their adequacy to each emotional category by seven independent judges (expert psychologists in SP treatment). Only words rated 7 or above (in a scale from 0 = *Not related* to 10 = *Completely related*) were included. All words were matched on average letter length and frequency of use according to Juilland and Chang-Rodríguez [1964] word frequency norms.

On each card a unique emotional category for target words (social threat, psychical threat, and neutral) and distractor words (social threat, physical threat, neutral, and nonsense) was used. All combinations between type of target (three) and type of distractor (four) were carried out, and these combinations were repeated twice over a total of 24 cards. The two target words on each card were repeated a total of six times in random combinations: 3-3, 2-4, or 4-2. Each distractor word was repeated six times per card (a total of 66 distractor words). Cards of DINA 4 size were used, and the words were printed in lowercase letters (Courier 14), placed in six columns, each with 12 words. The locations of both the distractor and target words were randomized in all cases, so there were no identical cards. The presentation of the cards was ordered so that neither the type of distractor nor the type of target was repeated twice in a row. In this fixed sequence a start point was randomly determined for each participant. Moreover, two practice cards were included with the same structure, but the distractor words were always a series of "s's" of different lengths (e.g., ssss) and the target words in both cases were *susurro* (whisper) and *siseo* (hiss).

Participants were asked to find the target words as fast as possible and to mark them with a pen. The card was placed face down on the table, and the task began when the person turned it over, and finished when the person said "finished"; the next card was then placed face down. Time was measured in seconds with a chronometer, by an experimenter who was blind to the participants' condition.

TREATMENT

A group cognitive-behavioral treatment program for SP was applied, following the guidelines by Heimberg [1991]. It comprised 14 weekly sessions, each with a duration of approximately 2.5 hours. The therapeutic components included (1) an educational component, (2) a cognitive component (identifying and cognitive restructuring of negative thoughts), (3) an exposure component, and (4) a relapse prevention component.

PROCEDURE

Before the administration of the visual search task, the SP group underwent two assessment sessions in which we administered the ADIS-R and a broad battery of questionnaires that assessed specific aspects of SP. Participants with SP repeated the visual search task after 14 weeks, just after the treatment program was finished, together with the battery of psychological tests. Three participants dropped out of the treatment during the process. The task was again applied at 6-month follow-up along with the psychological tests, but four of the participants could not be contacted. It would have been preferable for NC participants to have

TABLE 2. Words (in English) used in the visual search task

	Social Threat	Physical Threat	Neutral	Nonsense
Distractor words	criticism	asphyxiation	table	galcion
	taunt	ambulance	rag	betesen
	humiliation	heart	tray	sefrina
	stupid	doctor	cupboard	hallison
	rejection	weakness	glass	mesolincia
	shy	attack	spoon	cajufes
	idiot	dizziness	plate	fozfal
	clumsiness	death	sink	lertasio
	disdain	heart beating	chair	drevia
	insecure	hospital	drawer	pasamica
	shame	emergency	bucket	quedrio
Target words	ridiculous	suffocation	washing machine	
	silly	heart attack	fry pan	

also repeated the task in the same periods, to completely rule out a practice effect. However, the intersession time was quite long (14 weeks and 6 months), so is not probable that the practice effect would have been maintained.

We assessed the NC group in a session designed to rule out any current mental disorder. The visual search task was applied in the same way as for the SP group.

Participants in both groups were administered the Beck Depression Inventory [BDI; Beck et al., 1979], the State–Trait Anxiety Inventory [STAI; Spielberger et al., 1983], the Social Phobia and Anxiety Inventory [SPAI; Turner et al., 1989], the Fear of Negative Evaluation Scale [FNE; Watson and Friend, 1969], and the Social Avoidance and Distress Scale [SADS; Watson and Friend, 1969]. Table 1 presents means and typical deviations obtained in these questionnaires. Score comparisons between the two groups showed statistically significant differences for all questionnaires except for the SPAI Agoraphobia subscale. When the scores were obtained by the SP group in three assessment periods (pretreatment, posttreatment, and follow-up), significant differences for all questionnaires were found between the first and the second periods (pre- vs. posttreatment), and the first and the third periods (pretreatment vs. follow-up period). Repeated measures analyses of variance (ANOVAs) were applied for all questionnaires and all *F*s were statistically significant [BDI: $F(2, 44) = 6.127$, $P<.004$; SAD: $F(2, 40) = 4.567$, $P<.02$; FNE: $F(2, 40) = 3.678$, $P<.03$; SPAI-SP: $F(2, 36) = 5.136$, $P<.01$; SPAI-AG: $F(2, 36) = 3.46$, $P<.04$; STAI-S: $F(2, 44) = 17.73$, $P<.001$; STAI-T: $F(2, 44) = 9.39$, $P<.001$].

RESULTS

First, we analyzed errors and omissions in each card. Errors were practically nonexistent. As for omissions, we found no differences on any card. For each combination type of Target × Type of distractor there were two cards. Repeated measures ANOVAs for each different pair type of cards were applied; we found no differences in either the time employed between the two cards or between the groups or the interaction Cards × Group effect. Therefore, the mean of the two equal cards, shown in Table 3, was calculated. Reaction times above 2 standard deviations of the general mean for each participant were considered outliers and were deleted from the analyses.

COMPARISONS BETWEEN THE TWO GROUPS (SP VS. NC)

We applied a repeated measures ANOVA 2 (group: SP vs. NC) × 3 (target: neutral, physical threat, and social threat) × 4 (distractor: neutral, physical threat, social threat, and nonsense). This analysis revealed a main effect for Target ($F(2, 122) = 7.97$; $P<.001$). Post hoc tests revealed that all participants detected the social target more quickly. A main effect for Distractor was also found [$F(3, 183) = 59.48$, $P<.001$]. Post hoc analyses indicated that the most interfering distractor in the search was the one related to social threat, then physical threat, with no differences between the neutral and nonsense words distractors. The Target × Distractor interaction effect was also significant [$F(6, 366) = 22.01$, $P<.001$]. Although the social distractors interfered the most, this interference was even greater when the target to be found was also socially threatening.

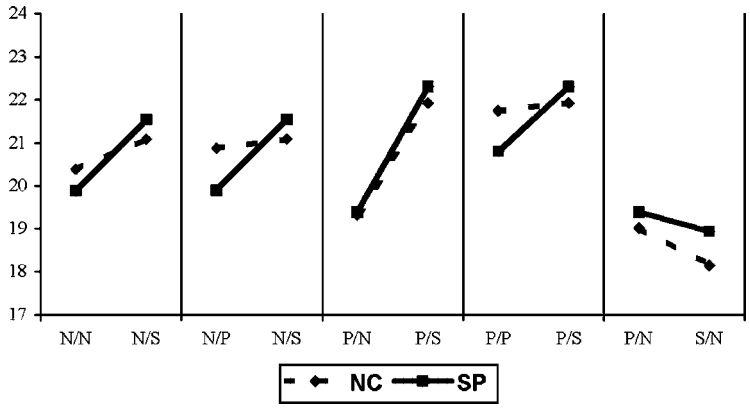
When the group variable was considered, no significant results were found for either the Group main effect, or for the Group × Target and Group × Distractor interaction effects. Nevertheless, a third level statistically significant interaction effect, Group × Target × Distractor, was found [$F(6, 366) = 2.08$, $P<.05$].

To more easily understand this third-level interaction, we broke it down into comparisons of means. Post hoc tests pointed out that the Group modified the nature of the Target × Distractor interaction (see Fig. 1).

In the neutral target condition, the SP group responded much more slowly when socially threatening

TABLE 3. Means (standard deviations) of the reaction times in the visual search task (seconds)

Distractor	Target	NO	SP	SP posttreatment	SP follow-up
Neutral	Neutral	20.39 (5.11)	19.89 (4.93)	18.91 (3.76)	17.73 (3.48)
	Physical	19.02 (3.48)	19.38 (4.49)	18.56 (3.84)	17.25 (3.47)
	Social	18.15 (3.38)	18.948 (5.17)	17.92 (3.30)	17.09 (4.12)
Social threat	Neutral	21.08 (4.28)	21.53 (5.04)	19.51 (3.63)	18.96 (4.19)
	Physical	21.94 (4.63)	22.30 (5.95)	20.17 (3.73)	19.95 (3.80)
	Social	22.89 (4.51)	23.01 (6.03)	21.04 (3.61)	20.23 (3.01)
Physical threat	Neutral	20.89 (5.40)	19.90 (5.42)	18.82 (3.09)	18.03 (8.36)
	Physical	21.74 (5.63)	20.80 (4.11)	19.08 (3.90)	18.77 (4.18)
	Social	19.72 (4.37)	19.86 (4.68)	18.90 (3.80)	17.83 (3.88)
Nonsense	Neutral	20.21 (4.95)	20.56 (4.61)	19.28 (3.68)	18.31 (4.44)
	Physical	19.98 (5.03)	19.27 (4.43)	18.13 (4.15)	16.91 (3.27)
	Social	18.69 (4.24)	18.58 (4.52)	17.87 (3.76)	17.123 (3.78)



distractors were present than when physically threatening distractors were present, compared to the NC group [$F(1, 62) = 4.654$, $P < .03$]. In the physical threat target condition, the SP group also responded significantly more slowly than the NC group when social threat distractors were present than when physical threat distractors were present [$F(1, 61) = 4.509$, $P < .04$]. Finally, in the neutral distractors condition, the NC group detected the social target faster than the physical target, compared to the SP group [$F(1, 61) = 3.93$, $P < .05$]. The other comparisons were not statistically significant.

SP GROUP COMPARISONS BEFORE AND AFTER TREATMENT AND AT FOLLOW-UP

Visual search task means obtained at pretreatment, posttreatment, and 6-month follow-up are presented in Table 3. To analyze the changes that occurred after treatment, we applied a repeated measures ANOVA 2 (Moment: before and after treatment) × 3 (Target: neutral, physical, social) × 4 (Distractor: neutral, physical, social, nonsense). The results showed that the main effect for Distractor was significant [$F(3, 87) = 44.797$, $P < .001$]. The social distractors interfered with the task most, followed by the physical distractors; no differences were found between the neutral and nonsense distractors. The Target × Distractor interaction was also significant [$F(6, 174) = 20.33$, $P < .001$]; the social distractors' interference was higher for the social targets than the other targets. Last, the Moment × Distractor interaction was significant as well [$F(3, 87) = 3.49$, $P < .01$]. Post hoc tests indicated that differences between the two moments were only found for the cards with social distractors, showing a lower interference after treatment.

To test whether the results obtained after treatment were maintained at 6-month follow-up, we applied a repeated measures ANOVA 2 (Moment: pretreatment and follow-up) × 3 (Target: neutral, physical, and social) × 4 (Distractor: neutral, physical, social, and nonsense). Again results showed a significant Distractor main effect [$F(3, 75) = 42.854651$, $P < .001$], and a significant Target × Distractor interaction effect [$F(6, 150) = 20.34$, $P < .001$]. Finally, Moment × Distractor interaction was also significant [$F(3,75) = 4.09$, $P < .001$]. Post hoc tests again indicated differences between pretreatment and follow-up for the social distractors.

DISCUSSION

In general, the data obtained in this study indicate that social-threat-related information is relevant for participants with and without SP. This information is not just detected earlier, but when it acts as a distractor its interference is higher than when the distraction belongs to another semantic category. Therefore, with regard to our first aim in this work (the increased influence of social distractors), the data indicate that social-threat-related stimuli produce a higher interference than the rest of the stimuli in both groups. However, there are differences between groups according to the type of target to be found. In the SP group, social distractors always affect all the targets more, whereas in the NC group its effect is lower when nonsocial targets have to be detected. It could be argued that the increased distraction effect in SP participants when socially threatening information is present could be attributed to the capturing of attention during the visual search.

Our results are partly in line with those achieved by Mathews et al. [1990, 1995], who also used a visual search task, although they employed exclusively neutral targets, and found that participants with GAD were slower than NCs in detecting them when the distractors were emotional. However, Mathews et al. did not find differences between the physical- and social-threat-related distractors, whereas in our study these differences are apparent. This discrepancy between studies could be due to the type of sample used; whereas people with GAD could be affected by any

emotional stimulus, people with SP are especially affected by social-threat-related stimuli.

The work by Gilboa-Schechtman et al. [1999] used the face-in-the crowd paradigm in SP and NC groups. However, these authors did not offer the global comparison between the types of target faces (neutral, angry, happy, and disgusted) and the distractor faces or crowd (neutral, happy, and disgusted). On one hand, they analyzed the role of the target by making four specific comparisons and finding results favoring the hypothesis of an attentional bias in SP only in two of them: (1) angry and happy targets in a neutral crowd (participants with SP were no faster than NCs in identifying angry expressions, but they were slower to detect happy faces), and (2) angry and disgusted targets in a neutral crowd (participants with SP were faster in detecting angry faces than disgusted ones, whereas NCs did not show any difference). Gilboa-Schechetman et al. also failed to find a faster detection of social threatening faces (angry) in participants with SP.

To analyze the role of the distractors, Gilboa-Schechtman et al. [1999] made six comparisons. Results in favor of the hypothesis only appeared in two of them: (1) angry targets in neutral versus angry crowds; and (2) angry and happy crowds, when all the faces had identical emotional expressions. These authors concluded that participants with SP were more distracted in angry than neutral crowds, but they also were more distracted in happy crowds, which suggested a general sensitivity toward emotional expressions. Although in our work we do not use positive emotional stimuli, our results also indicate a higher interference in SP for social distractors. However, there is a discrepant result in the study by Gilboa-Schechtman et al., because in our case we did not find differences between groups when the cards "neutral target–neutral distractor" and "social threat target–social threat distractor" were compared. The characteristics of the type of task used could justify this discrepancy. In our work, we did not present facial expressions (clear hostility signs towards the person); rather, we presented verbal stimuli (arbitrary symbols of threat); we used 11 different distractor words (whereas in the work by Gilboa-Schechtman et al., all distractors were equal, with the same individual showing the same facial expression); and, finally, the subject was asked not only to detect the presence or absence of the target but also its location.

Regarding the second objective of our work, faster detection of social threat targets, the data indicate that when this information is deliberately searched for, all participants find it faster than when the information to be found is neutral. If the information is related to physical threat, its detection is also faster than when it is neutral, but slower than when the information to be found is social. Therefore, in contrast to our prediction, participants with SP did not show an increased detection of socially threatening stimuli; that is, our results did not provide evidence of a cognitive bias that facilitates the conscious detection of potential threat cues in individuals with SP. Or rather, this bias is not different from that shown by NC participants. These data corroborate those obtained in the studies by Gilboa-Schechetan et al. [1999] and by Rinck et al. [2003].

In this work, participants with SP did not find social-anxiety-related words faster than the other participants (participants with GAD and NCs). However, Rinck et al. [2003] also failed to find that participants with SP were particularly distracted by social-anxiety-related words. These authors recognized that this result was surprising and not in agreement with results observed for the very same participants in the study by Becker et al. [2001] using a modified Stroop task. In that study, participants with SP were distracted specifically by speech-related words. Rink et al. [2003] offered no explanation for this result.

The absence of differences between SP and NC groups in the detection of social threat targets would be against the presence of a bias along the whole attentional process. Therefore, results obtained in this work would indicate the importance of studying the temporal course of attention toward the threatening meaning in SP, and of differentiating between distraction and detection of threat. It could be maintained that target detection involves strategic processes, because it requires cognitive capacity and conscious attention, and is subject to voluntary control. However, distraction is related to automatic processes, because it does not involve volition; that is, it is involuntary [McNally, 1995]. Insofar as being involuntary is a central attribute of automaticity [McNally, 1995], our results could be said to show that participants with SP show cognitive biases in automatic processes.

On the other hand, results obtained in our work are consistent with those obtained when the emotional Stroop cards task is used [e.g., Amir et al., 1996; Baños et al., 2005; Becker et al., 2001; Hope et al., 1990; Lundh and Öst, 1996; Mattia et al., 1993; McNeil et al., 1995; Spector et al., 2003]. In this task, the meaning of a word acts as a distractor. When the card includes social threat words (i.e., the distractors are related to social threat), the performance of people with SP is slower, the same as occurs with the visual search task. However, distractors are spatially separated from the target in this study.

What this study adds to the data obtained with the Stroop paradigm is that these differences between groups are not observed when the main task also demands attention to a socially threatening stimulus. Therefore, it could be argued that people with SP dedicate more involuntary attentional resources to irrelevant socially threatening stimuli, leaving fewer resources available for the main task. However, when the stimulus to be found is also related to social threat, this competition for attentional resources affects NC participants equally; that is, the presence of a cognitive bias in SP requires not only threatening stimuli competing with the main task, but also

stimuli of different emotional valence included in the main task.

As for cognitive-behavioral treatment, the data suggest that it is effective in reducing the attentional bias toward socially threatening information. Although performance at posttreatment still indicates that social distractibility was the primary feature for participants with SP, they showed reaction time differences before and after treatment only when the distractors were social. It seems that the treatment enables patients to be less sensitive to this type of distraction. Furthermore, these results are maintained in a 6-month follow-up period. However, caution is needed in drawing such a conclusion: Although statistical change occurred, the clinical relevance remains unclear, because social distractor interference is still higher than when the distraction belongs to another semantic category (something that also happens for NC group). In any case, and as McNally [1995] says, it remains to be seen whether therapy is also able to inculcate positive biases such as those in normal individuals, or whether it is only limited to the neutralization or elimination of negative biases. It would have been interesting to administer the task in the NC group again, 14 weeks later, to compare the results between the groups. Despite this limitation, it is not very probable that the practice effect in the task would have been maintained in the SP group after 3.5 months.

Finally, a series of limitations that this work presents should be mentioned. Perhaps because cards with social distractors contain many threatening stimuli (66 out of 72 words), they induce anxiety in participants with SP that influences their performance. However, this argument would not explain why, precisely, in the card where all stimuli are related to social threat (distractors and targets), there are no differences between the two groups (SP and NC). Another important shortcoming is that the stimuli we used are words, and in natural scenarios, isolated words infrequently constitute a source of threat. Replication of the results using more ecological stimuli, such as persons with different facial expressions, would be needed. Also in need of study is whether there are biases in the detection of these expressions, and whether they occur in the attentional maintenance phase.

REFERENCES

American Psychiatric Association. 1994. Diagnostic and statistical manual of mental disorders. 4th ed. Washington, DC: Author.

Amir N, Foa EB, Coles ME. 1998. Automatic activation and strategic avoidance of threat-relevant information in social phobia. J Abnorm Psychol 107:285–290.

Amir N, Freshman M, Foa E. 2002. Enhanced Stroop interference for threat in social phobia. J Anxiety Disord 16:1–9.

Amir N, McNally RJ, Riemann B, Burns J, Lorenz M, Mullen JT. 1996. Suppression of the emotional Stroop effect by increased anxiety in patients with social phobia. Behav Res Ther 11/12: 945–948.

Baños RM, Quero S, Botella C. 2005. Attentional biases in social phobia measured by two emotional Stroop task formats (card and computerized) and mediating role of several clinical variables. Int J Clin Health Psychol 5:23–42.

Beck AT, Emery G, Greenberg RL. 1986. Anxiety disorders and phobias: A cognitive perspective. New York: Basic Books.

Beck AT, Rush AJ, Shaw BF, Emery G. 1979. Cognitive therapy of depression: a treatment manual. New York: Guilford Press.

Becker ES, Rinck M, Margraf J, Roth W. 2001. The emotional Stroop effect in anxiety disorders: general emotionality or disorder specificity? J Anxiety Disord 15:147–159.

Bögels SM, Mansel W. 2004. Attention processes in the maintenance and treatment of social phobia: hypervigilance, avoidance and self-focused attention. Clin Psychol Rev 24:827–856.

Bower GH. 1981. Mood and memory. Am Psychol 36:129–148.

Byrne A, Eysenck MW. 1995. Trait anxiety, anxious mood, and threat detection. Cognit Emotion 9:549–562.

DiNardo PA, Brown EJ, Barlow DH. 1988. The Anxiety Disorders Inventory Schedule—Revised (ADIS-R). Albany, NY: Graywind.

Gilboa-Schechtman E, Foa EB, Amir N. 1999. Attentional biases for facial expressions in social phobia: the face-in-the-crowd paradigm. Cognit Emotion 13:305–318.

Hampton C, Purcell DG, Bersine L, Hansen CH, Hansen RD. 1989. Probing "pop out": another look at the face-in-the-crowd-effect. Bull Psychonomic Soc 27:563–566.

Hansen CH, Hansen RD. 1988. Finding the face in the crowd: an anger superiority effect. J Pers Soc Psychol 54:917–924.

Heimberg RG. 1991. Cognitive behavioural treatment of social phobia in a group setting: a treatment manual. Unpublished manuscript, State University of New York, Albany.

Hope DA, Rapee RM, Heimberg RG, Dombeck MJ. 1990. Representations of the self in social phobia: vulnerability to social threat. Cogn Ther Res 14:177–189.

Juilland A, Chang-Rodríguez E. 1964. Frequency dictionary of Spanish words. The Hague: Mouton.

Lundh L, Öst L. 1996. Stroop interference, self-focus and perfectionism in social phobics. Pers Individual Differences 20: 725–731.

MacLeod C, Mathews A. 1991. Biased cognitive operations in anxiety: accessibility of information or assignment of processing priorities. Behav Res Ther 29:599–610.

Mathews A, Mackintosh B. 1998. A cognitive model of selective processing in anxiety. Cogn Ther Res 22:539–560.

Mathews A, May J, Mogg K, Eysenck M. 1990. Attentional bias in anxiety: selective search or defective filtering? J Abnorm Psychol 99:166–173.

Mathews A, Milroy R. 1994. Processing of emotional meaning in anxiety. Cognit Emotion 8:535–553.

Mathews A, Mogg H, Kentish J, Eysenck M. 1995. Effects of psychological treatment on cognitive bias in generalised anxiety disorder. Behav Res Ther 33:293–303.

Matthews G, Wells A. 2000. Attention, automaticity, and affective disorder. Behav Modification 24:69–93.

Mattia JI, Heimberg RG, Hope DA. 1993. The revised Stroop color-naming task in social phobics. Behav Res Ther 31: 305–313.

McNally RJ. 1995. Automaticity and the anxiety disorders. Behav Res Ther 33:747–754.

McNally RJ, Riemann BC, Kim E. 1990. Selective processing of threat cues in panic disorder. Behav Res Ther 28: 407–412.

McNeil DW, Riess BJ, Taylor LJ, Boone ML, Carter LE, Turk MS, Lewin MR. 1995. Comparison of social phobia subtypes using Stroop tests. J Anxiety Disord 9:47–57.

Mogg K, Bradley BP. 1998. A cognitive–motivational analysis of anxiety. Behav Res Ther 36:809–848.

Neisser U. 1963. Decision time without reaction time: experiments in visual scanning. Am J Psychol 76:376–385.

Öhman A. 1996. Preferential preattentive processing of threat in anxiety: preparedness and attentional biases. In: Rapee RM, editor. Current controversies in the anxiety disorders. New York: Guilford Press.

Rinck M, Becker ES, Kellerrmann J, Roth WT. 2003. Selective attention in anxiety: distraction and enhancement in visual search. Depress Anxiety 18:18–28.

Spector IP, Pecknold JC, Libman E. 2003. Selective attentional bias related to the noticeability aspect of anxiety symptoms in generalized social phobia. J Anxiety Disord 17:517–531.

Spielberger CD, Gorsuch RL, Lushene RE, Vagg PR, Jacobs GA. 1983. Manual for the State–Trait Anxiety Inventory. Palo Alto, CA: Consulting Psychologists Press.

Turner SM, Beidel DC, Dancu CV, Stanley MA. 1989. An empirically derived inventory to measure social fears and anxiety: the Social Phobia and Anxiety Inventory. Psychol Assess 1:35–40.

Watson D, Friend R. 1969. Measurement of social-evaluative anxiety. J Consult Clin Psychol 33:448–457.

Williams JMG, Watts FN, MacLeod C, Mathews A. 1988. Cognitive psychology and emotional disorders. Chichester, UK: Wiley.

Williams JMG, Watts FN, MacLeod C, Matthews A. 1997. Cognitive psychology and emotional disorders. 2nd ed. Chichester, UK: Wiley.