Psychology in Spain, 2001, Vol. 5. No 1, 26-32

COGNITIVE BIASES IN PANIC DISORDER: A COMPARISON BETWEEN COMPUTERISED AND CARD STROOP TASK

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This study examines attentional biases in panic disorder with agoraphobia (PDA) measured by two emotional Stroop formats: the card format and the computerised format. The aims of this work are (a) to compare the results obtained in the two formats with the same sample, and (b) to test whether these cognitive biases are automatic. In order to achieve the latter aim, the backward pattern masking procedure is used (MacLeod & Rutherford, 1992). Participants were 25 PDA individuals and 25 normal control subjects (NC). Results suggest that the card format is more sensitive for showing attentional bias towards threatening information, since the computerised format fails to show such an attentional bias. With regard to the level of processing involved, in contrast to that which occurs in other anxiety disorders, PDA patients process threatening information selectively at a strategic level, but not at an automatic level.

Este trabajo estudia la existencia de sesgos atencionales en el trastorno de pánico con agorafobia (TPA) mediante dos formatos de la tarea Stroop emocional: el formato de tarjetas y el computerizado. Los objetivos son: (a) comparar los resultados de ambos formatos en una misma muestra y (b) comprobar si estos sesgos cognitivos son automáticos. Para ello, se utiliza el procedimiento de "enmascaramiento retroactivo" (MacLeod y Rutherford, 1992). La muestra estaba compuesta por 25 personas con TPA y 25 controles normales. Los resultados indican que el formato de tarjetas parece más sensible a la hora de evidenciar el sesgo atencional ante la información amenazante, ya que el formato computerizado fracasa a la hora de mostrar dicho sesgo. En cuanto al nivel de procesamiento implicado, en contra de lo que ocurre en otros trastornos de ansiedad, los pacientes con TPA parecen procesar selectivamente la información amenazante a nivel estratégico y no automático.

At present, cognitive theories on anxiety disorder focus not only on the *content* of these patients' cognitions, but also on *how* they process information. One of the hypotheses that has received most experimental support in recent years postulates that people suffering from anxiety disorders attend to and codify information related to their fears and preoccupations in a selective way. Moreover, this attentional bias appears to play an important role in both the vulnerability and the persistence of these disorders.

Among the most important cognitive experimental tasks used in recent years to evaluate the existence of these biases in processing is the Stroop colour-naming task (Stroop, 1935), in its revised version by Mathews and MacLeod (1985). As stimulus material, this version uses words related to fears and preoccupations specific to anxiety. Numerous experimental studies have shown that people suffering from various anxiety disorders present an increase in response latencies on naming the colour of words specific to anxiety, as compared to neutral words (e.g., Mathews and MacLeod, 1985; Ehlers, Margraf, Davies and Roth, 1988; Hope, Rapee, Heimberg and Dombeck, 1990). Thus, it seems that the meaning of this material attracts the attention of these individuals despite the fact that the instructions given request the very opposite.

Recently, MacLeod (MacLeod and Hagan, 1992; MacLeod and Rutherford, 1992) has argued that the Stroop task, in the form that it has been applied, implies *strategic* processing on the part of the subject, which is therefore susceptible to the influence of coping strategies. However, the selective processes of attention and codification may also be *automatic*, that is, without deliberation on the part of the person. This author proposes using the Stroop task with *backward pattern masking*, which consists in presenting the stimulus words in the centre of a computer screen for a very brief period and

The original Spanish version of this paper has been previously published in Psicothema, 2000, Vol. 12, No 2, 165-170

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then rapidly masking the stimulus. Studies carried out up to now using this technique show that individuals with high trait anxiety (e.g., MacLeod and Rutherford, 1992) and those suffering from specific phobias (e.g., Van den Hout, Tenney, Huygens and de Jong, 1997) present selective processing of the threatening information that occurs at a preconscious level.

As far as panic disorder (PD) is concerned, we have so far found no work in the literature in which the procedure of *backward pattern masking* was used. Of the nine existing studies, four use the card Stroop format and the other five use the computerised Stroop format. The results obtained by the former group indicate that PD patients present an attentional bias towards the threat (Ehlers, Margraf, Davies and Roth, 1988; Carter, Maddock and Magliozzi, 1992; Mathews amd Klug, 1993; Hayward, Ahmad and Wardle, 1994). On the other hand, the studies carried out using the computerised format were aimed at exploring the question of the *specificity* of attentional bias, that is, to study whether it is necessary for the content of the threatening words to be related to the patient's specific fears for the bias to appear (McNally, Riemann and Kim, 1990; McNally, Riemann, Louro, Lukach and Kim, 1992; McNally, Amir, Louro, Lukach, Riemann and Calamari, 1994; Maidenberg, Chen, Craske, Bohn and Bystritsky, 1996; Quero, Baños and Botella, 1996). In this area the results obtained are less clear, since some studies provide empirical evidence in favour of the specificity hypothesis, while others obtain results that contradict it. Moreover, in some of the studies the group x valence interaction does not reach statistical significance, even though it approaches it.

In any case, none of the aforementioned studies compares the different formats of the emotional Stroop task. Therefore, the present study has two main aims. First, to compare a group of people with PD and a group of normal controls (NC) in the two Stroop task formats, and second, to study whether this bias occurs without the influence of conscious strategies in PD patients. For this purpose, a *backward pattern masking* condition was designed, similar to that used by MacLeod and Rutherford (1992). Bearing in mind these general objectives, the specific hypotheses proposed are as follows:

Insofar as the card Stroop format is concerned: 1) Hypothesis on the *existence* of attentional bias: patients with PD will show a greater interference for threatening words than for neutral words, compared to NC individuals; 2) *Specificity* hypothesis: PD patients will show a greater interference for panic threat words than for social threat words; 3) *Emotionality* hypothesis: patients with PD will not show interference when faced with emotional words, as long as these have a positive valence.

With regard to the computerised Stroop format, the same hypotheses are proposed as for the card format with respect to existence of the bias, specificity and emotionality. Moreover, in this case it is also postulated that PD patients will show attentional bias in the *backward pattern masking* condition.

METHOD

Sample

The sample was composed of two groups of participants:

a) Panic disorder with agoraphobia group (PDA): This consisted of 22 females and 3 males (N=25). In order to carry out the diagnosis, we used an adaptation of the DSM-III-R structured interview to the new diagnostic criteria of the DSM-IV (APA, 1994). The adaptation was carried out by our research team. All of the participants presented an additional diagnosis of agoraphobia, and had sought psychological help for their problems. Ages ranged from 21 to 43 years (M=29; SD=6.95).

b) Normal Control Group (NC): This consisted of 21 females and 4 males (N=25) with no history of mental disorder, and whose participation was voluntary. These subjects were paired in age, sex and educational level with the panic patients. Ages ranged from 18 to 52 (M=26.20; SD= 9.17)

Materials

a) Questionnaires: Beck's Depression Inventory (BDI: Beck, Ward, Mendelson, Mock and Erbaugh, 1979), the State-Trait Anxiety Inventory (STAI S-T: Spielberger, Gorsuch and Lshener 1970) and the WAIS Vocabulary Test (Spanish adaptation of Wechsler's Intelligence Scale for Adults; Yela and Cordero, 1996).

b) Modified card Stroop format: We designed a task similar to that used by Mathews and MacLeod (1985), and which involved 6 cards. We used three categories of words with emotional content: 12 social threat words, 12 panic threat words and 12 words with positive emotional valence. For each emotional card, we designed a control card made up of neutral words (see Table 1). The words with emotional valence were taken from the published literature (e.g., MacNally et al., 1990; Mattia, Heimberg and Hope, 1993), and were assessed for their appropriateness to each category by 7 independent judges (psychologists with expertise in the treatment of PD). The neutral words were chosen on the basis of the length of the emotional words. Each neutral card was made up using a different semantic category

(see Table 1). Each card was composed of 12 columns of 8 words (total=96). Each word was repeated 8 times, with the only constraint that no word or colour was repeated in consecutive order. The colours were: blue, red, green and black (presented on a white background). The task consisted in naming aloud the colour of the ink in which the words were printed, without reading them, and trying not to make mistakes. In addition to the 6 cards, subjects were initially shown a practice card composed of rows of "O" (e.g., "OOOOOO") of different lengths. The cards were presented randomly in pairs, i.e., each control card was always shown before its threatening card. Time was registered by means of a chronometer.

c) *Modified computerised Stroop format*: Following MacLeod and Rutherford (1992), we designed a computerised Stroop format using the *backward pattern masking* version together with a lexical decision task (the latter to check the appropriateness of this procedure). As stimulus material we used the same emotional categories as in the card Stroop format (social threat, panic threat and positive), and as neutral words we used only the words related to the semantic category "furniture". The emotional Stroop task was made up of 384 experimental trials distributed randomly throughout 4 experimental blocks. Each block was in turn divided into 4 presentations, each with 24 words (two presentations with masking and two presentations without masking). Each of the 48 words appeared 4 times (in the four colours used) in each of the two conditions ("masked" and "unmasked"). In the "unmasked" condition the word remained in the centre of the screen until the subject emitted a response. In the "masked" condition the word was displayed for 20 milliseconds in the centre of the screen before being substituted by a mask (a row of 'X's) of the same colour and length as the word previously shown, and which disappeared as soon as the subject gave a response. In each condition, and also in the lexical decision task, an attention focus point (rows of white 'X's) appeared in the centre of the screen prior to the appearance of the word. The participant had to identify the colour in which the words appeared on the computer screen.

Table 1
Words used in the card emotional Stroop task

Social threat	Neutral social threat (furniture)	Panic threat	Neutral panic threat (Stationery)	Positive	Neutral positive (kitchen)
Shyness	Window	Asphyxia	Notebook	Sincere	Lucky
Failure	Curtain	Distressing	Wallet	Honest	Glass
Rejection	Painting	Heart attack	Compass	Joy	Cupboard
Clumsy	Sideboard	Drowning	Folder	Kind	Fridge
Ridiculous	Carpet	Dizziness	Eraser	Upbeat	Fruit bowl
Offence	Chair	Faint	Diary	Pleasure	Tap
Inferior	Shelf	Vertigo	Paper	Calm	Cloth
Disdain	Lamp	Death	Wastepaper	Relaxed	Scourer
Embarrassing	Blinds	Heart	bin	Content	Washing
Useless	Hall	Disease	Draft	Pleasant	machine
Fool	Television	Ambulance	Pencil	Safe	Tile
Humiliating	Wall	Attack	Sharpener		Apron
			Ballpoint		Cooker
			Inkwell		Stool

The lexical decision task was made up of a total of 96 awareness check trials distributed randomly throughout the 4 experimental blocks. Each block consisted of 4 presentations with 6 words in each. Here the stimuli were either words or rows of randomised letters without meaning (non-words) shown in white on a black background. The word or non-word remained on the screen for only 20 milliseconds, and was replaced by a mask of 'X's of equal length to the stimulus presented. The task consisted in deciding whether the stimulus was a word or a non-word. Prior to this, participants completed a practice phase using neutral stimuli (not used in the experimental phase): 48 colour-naming trials and 16 awareness check trials.

After each block of 24 colour-naming trials the computer presented 6 lexical decision trials. There were three rest periods during the entire task. The interval between stimuli was 1 second. Order of presentation of the experimental conditions was randomised.

PCs (Pentium 75) with colour monitors were used to show the words (with a letter size of 5mm). The computer distributed the words randomly, so that for each participant they appeared in a different order. There were two restrictions: neither the same word nor the same colour could not appear consecutively. The colours used were blue, red, green and yellow, on a black background. Participant's response was manual (with the option of using both hands if he or she so wished). For each colour of the emotional Stroop task there was a corresponding key of the same colour on the keyboard, and for the lexical decision task participants had to press the "yes" key if a word appeared and the "no" key in the event of a non-word being presented. The computer registered the latency time in milliseconds and the participant's performance (correct, error or omission).

Procedure

The experimental tasks were applied in two evaluation sessions with a time gap of one week between sessions. In the first session the card Stroop format was administered, and in the second session, the computerised version. At the beginning of each session the subjects completed the STAI and the BDI. The WAIS vocabulary test had been applied in a previous disorder assessment ses-

sion. After completing the STAI and BDI, participants were given the instructions for the emotional Stroop tasks. Each session lasted approximately 30 minutes.

RESULTS

Results obtained in the questionnaires:

The means and standard deviations obtained in the questionnaires can be seen in Table 2. For each questionnaire a Student *t* test for independent samples was applied. The results obtained showed that PDA patients scored lower in the WAIS than NC (t=2.352, d.f.=48, p<0.023), whereas in both evaluation sessions the patients obtained higher scores in the STAI-S (t=- 2.256, d.f.= 48, p<0.029 and t=-4.543, d.f.=48, p<0.000), in the STAI-T (t=-5.456, d.f.=48, p<0.000 and t=-4.887, d.f.=48, p<0.000) and in the BDI (t=-6.788, d.f.=48, p<0.000 and t=-5.092, d.f.=48, p<0.000).

Results obtained in the emotional Stroop task formats:

First of all, scores higher or lower than 3 SD from the group mean were excluded from the analyses. A total of three outliers were eliminated in both Stroop task formats (2 NC subjects and 1 PDA).

a) Results in the card Stroop task:

The means and standard deviations obtained by participants in the card Stroop format are shown in Table 3. Since each emotional card was paired with a neutral card in the order of presentation, comparisons between the six cards are not made at the same time. Instead, comparisons are made between each emotional card and its corresponding paired neutral card. A repeated-measures ANCOVA was applied for each of the comparisons, with Group as the between-groups factor (PDA *vs.* NC) and Emotional Valence as the within-group factor (emotional words *vs.* neutral words). As the two groups showed differences in the scores obtained in the WAIS, this score was used as a co-variable in all the statistical analyses. However, given that no significant effect was obtained in any of the interactions that affected this co-variable, it shall not be discussed further.

b) Results obtained in the computerised Stroop format:

Before proceeding to the corresponding statistical analyses of the data, the errors made in the task were analysed. A Student *t* test for independent samples was applied, with no significant differences being found with regard to errors made in the "masked" condition. Significant differences were found, however, in the "unmasked" condition (t=2.218, d.f.=48, p<0.033). In this case the NC participants made a higher percentage of errors than the PDA patients. No statistical analysis was carried out for omissions, since they were practically non-existent.

In order to check the effectiveness of the *backward masking* procedure, we analysed the results obtained in the lexical decision task. For this purpose we applied a Student *t* test for one sample (all participants) using 0.50 as the test value. In order to conclude that the procedure had been effective, no significant differences should appear between the participants' actual performance and the performance expected by chance (50% of trials with correct or erroneous responses). However, the results of the analysis showed significant differences (t=5.507, d.f.=49, p<0.000), though the direction of the difference indicates that participants make more mistakes in the "masked" condition than those that would be expected by chance (participants made a mean of 57.58 errors in a total of 96 trials). Therefore, despite having found that participants' performance in the lexical decision task differed from that which would be expected by chance (since the participants made many more errors), it could be concluded that the masking procedure was effective in presenting words outside of a person's conscious awareness.

With regard to the response latencies obtained in the computerised format, we applied a repeated-measures ANCOVA with Emotional Valence (panic threat, social threat, positive and neutral) and Masking Condition ("masked" *vs.* "unmasked") as within-group factors and Group (PDA *vs.* NC) as the between-groups factor. The

Table 2
Means and Standard Deviations obtained in the questionnaires

	PDA Group		NC Group	
	SESSION 1	SESSION 2	SESSION 1	SESSION 2
STAI-S	**M=24.12** SD=11.58	**M=22.84** SD=10.55	**M=17.72** SD=8.19	**M=11.60** SD=6.47
STAI-T	**M=34.52** SD=9.53	**M=33.20** SD=9.55	**M=20.56** SD=8.53	**M=19.92** SD=9.66
BDI	**M=16.08** SD=7.39	**M=13.96** SD=8.53	**M=4.176** SD=3.85	**M=4.16** SD=4.46
WAIS	**M=49.84** **SD**=9.93		**M=55.60** **SD**=7.17	

Table 3
Response latencies (in seconds) obtained in the card emotional Stroop task

	WORDS					
	PANIC-NEUTRAL		SOCIAL-NEUTRAL		POSITIVE-NEUTRAL	
PDA	**M=93.12** D.T.=18.55	**M=82.44** D.T.=15.18	**M=83.56** D.T.=17.78	**M=82.20** D.T.=17.88	**M=86.60** D.T.=17.64	**M=86.72** D.T.=18.52
NC	**M=79.00** D.T.=16.95	**M=74.60** D.T.=15.09	**M=73.24** D.T.=14.78	**M=74.20** D.T.=15.39	**M=78.20** D.T.=15.95	**M=79.28** D.T.=16.99

score obtained in the WAIS was used as co-variable. Once again we found no significant effect in any of the interactions that affected the co-variable, and we shall therefore not discuss it further. Neither were significant differences found for the main effect "emotional valence" or the main effect "masking condition". Lastly, none of the expected interaction effects were significant.

As can be seen in Table 4, participants' performance was different in each of the masking conditions ("masked" versus "unmasked"). Therefore, we carried out two repeated-measures ANOVAs (one for each condition), using as within-group factor the Emotional Valence (panic threat, social threat, positive and neutral), and as between-groups factor the Group (PDA versus NC). Once again, however, no statistically significant effects were found in either of the two conditions.

DISCUSSION

In general, according to the results obtained in the work presented here, it can be concluded that patients with PDA are characterised by "selective strategic" processing of the threatening information related to their disorder, to use the terminology of MacLeod and Rutherford (1992). This processing leads them to give priority attention to that information, which is emotionally negative for them, as compared to NC individuals. However, the effect of emotional interference was only significant when the patients did the Stroop task in card format. It was not significant in the case of the computerised format in the "unmasked" condition, even though the predicted tendency was observed. Therefore, this first conclusion needs to be examined more closely.

A possible explanation for these results resides in the different form of presentation of the words in each of the two formats. Whereas in the card format the participant was presented with all the words of an emotional category together, in the computer format the words were presented one by one on the computer screen, and at random (the order of presentation of the words of different emotional categories was also randomised). Thus, it may be the case that presenting all the words of an emotional category in a block produces greater activation than presenting a mixture of words of differing emotional valence. A plausible explanation could be that the card Stroop format is a more sensitive measure for showing this type of bias. However, in spite of this "greater sensitivity" to anxious psychopathology that seems to characterise this task format, MacNally et al. (1994) point out that it has the disadvantage of not clearly identifying the source of the interference –which may be due to an attentional bias, to a spreading of the activation among representations related to threat, to post-attentional ruminations on the significance of the card, or to some combination of these factors. Thus, this format includes multiple interference sources, and does not simply assess a "pure" attentional bias towards threat. In fact, in the study by MacNally et al. (1994) a computerised version was used, with the words being presented one by one, but eliminating the inter-stimulus intervals and presenting words of the same emotional category consecutively. It was found that PD patients showed greater interference for the emotional words than NC individuals. Thus, our information seems to suggest that the card Stroop task is more sensitive to the psychopathology of PD, but that the biases produced in this disorder are not restricted to the earliest stages of the processing.

In the card Stroop task, in addition to the earliest stages of the processing, later stages are also involved. While attentional biases appear to occur in the initial stages, cognitive avoidance may be influential in later stages (Ruiter and Brosschot, 1994). Thus, although attentional bias may be playing a decisive role in the emotional Stroop interference effect, this effect cannot be exclusively attributed to the attentional bias, and may be mediated by cognitive avoidance or even by processes such as response inhibition (Cloitre, Heimberg, Holt and Liebowitz, 1992). In other words, Stroop interference could also be the result of an attempt by the individual to avoid processing the stimulus because of its emotional content.

There is, however, a problem with these justifications. Of the five studies that have also used the computerised

Table 4
Response latencies (in milliseconds) obtained in the computerised emotional Stroop task

	UNMASKED CONDITION				MASKED CONDITION			
	Panic Threat	**Social Threat**	**Positive**	**Neutral**	**Panic Threat**	**Social Threat**	**Positive**	**Neutral**
PDA	**M=770.2** SD=91.7	**M=760.8** SD=89.7	**M=765.1** SD=88.9	**M=765.8** SD=79.4	**M=757.9** SD=104.3	**M=754.2** SD=105.2	**M=749.6** SD=94.8	**M=746.9** SD=100.4
NC	**M=709.8** SD=92.6	**M=717.2** SD=107.6	**M=716** SD=98.2	**M=720.4** SD=113.6	**M=739.2** SD=141.5	**M=729.5** SD=140.4	**M=732.8** SD=141.3	**M=727.3** SD=138.7

format and presented the words from different emotional categories in random order, two of them found that PD patients show selective processing of threatening information (MacNally et al., 1994; Maidenberg et al., 1996). The difference between these two studies and ours is that in the present work, due to limitations with regard to technical resources, the participant was asked for a manual response (pressing a coloured key), whereas in the other studies the participant's response was verbal. It may be that if a verbal response is requested, the Stroop interference is greater due to the fact that the stimuli used in the task are words (verbal stimuli) (Martínez and Marín, 1997). However, several studies carried out in this area have reached the conclusion that neither response mode nor the stimulus/mode interaction are factors that account for the interference effect (e.g., Rose, Wilsoncroft and Griffiths, 1980; Logan, Zbrodoff and Williamson, 1984; Virzi and Egeth, 1985). Therefore, although the interference effect in the computerised format using a manual response by the participant may (as in our study) have been smaller, this effect should have been found. Lastly, it is important to bear in mind that the other three studies that used computerised presentation with PD found, as we did, difficulty in demonstrating the existence of an attentional bias through this Stroop format. In the first of them, the expected Group x Valence interaction does not reach statistical significance, even though it approaches it (MacNally, 1990). In the second, by the same author, a significant interaction effect is found only when a series of 'X's (i.e., non-words) is used as neutral stimulus material (MacNally et al., 1992). Finally, in the third study (Quero, Baños and Botella, 1996) the Group x Valence effect is only found when the words used for the analysis were exclusively those that had been judged most negatively by the patients.

Moving on to the remaining hypotheses, the results indicate, as we expected, that the cognitive bias, when it appears, is specific to the threat content related to the disorder. Patients showed an interference effect only for panic threat words, and not for social threat words. This result provides empirical evidence in support of the *specificity* hypothesis, and serves to clarify to some extent the contradictory results obtained prior to this study. While some studies obtain results supporting this hypothesis (e.g., MacNally, Riemann and Kim, 1990), others suggest that PD patients are characterised by an attentional bias towards threat in general (e.g., Maidenberg, Chen, Craske, Bohn and Bystritsky, 1996). We tend to the opinion that it makes sense to speak of specificity with respect to this disorder, especially if we take into account that, in the previously-mentioned study (Quero et al., 1996), the patients only demonstrated selective processing towards those threatening words that they themselves had judged as most negative.

As far as the *emotionality* hypothesis is concerned, our results indicate that it does not account for the interference found, since PDA patients did not show greater response latencies for positive versus neutral words, in comparison to NC participants. The four studies that explore the *emotionality* hypothesis in PD offer contradictory results. Mathews and Klug (1993), MacNally et al. (1994) and Maidenberg et al. (1996) use as positive stimuli words related to panic-threat stimuli (close antonyms to the panic threat words), and in two of these studies the data are not consistent with the "emotionality" hypothesis (MacNally et al., 1994; Maidenberg, 1996). However, the work of Mathews and Klug (1993) does provide empirical evidence in support of this hypothesis. The study by MacNally et al. (1992) is the only one which, like the present work, uses positive words in general as positive stimuli. However, unlike our study, it finds that PD patients selectively process positive information. We therefore believe it imperative to carry out more studies with PD patients, both with positive words related to panic threat words (i.e., close antonyms) and with positive words in general, in order to clarify the role played by emotionality in the Stroop interference effect.

Finally, with respect to the last hypothesis of this work, our results do not allow us to conclude that PDA patients selectively attend to threatening information when this is presented outside of conscious awareness, as appears to occur in other anxiety disorders (e.g., Van den Hout et al., 1997). The present work is the first to use the *backward pattern masking* procedure with PDA patients, and, as we have already mentioned, it may be that the response mode (manual in this case) and the mode of presentation of the words (different content or emotional category and randomised) have an influence. We should also point out that educational background may influence the results obtained, particularly in a task requiring the use of a computer, and especially considering that most of the participants in our sample had a low or medium level of education. In fact, the studies carried out with high trait anxiety individuals and that show the existence of a selective processing of threatening information have employed university students accustomed to using a computer. We hope that further studies will serve to throw more light on this matter, since it may be the case that the computerised format does not constitute a good measure of attentional biases in populations with low educational level.

ACKNOWLEDGEMENTS

This work was partially sponsored by a research grant under the auspices of project GV-2421/94 financed by the Generalitat Valenciana and project PB94-1093 financed by the Ministry of Science and Education (Ministerio de Educación y Ciencia) (DGICYT).

REFERENCES

American Psychiatric Association (1994*). Diagnostic and Statistical Manual of Mental Disorder* (4ª ed.). Washington, DC: Author.

Beck, A.T.; Ward, C.H.; Mendelson, M.; Mock, J. and Erbaugh, J. (1979). An Inventory for Measuring Depression. *Archives of General Psychiatry, 5,* 462-467.

Carter, C.; Maddock, R. and Magliozzi, J. (1992). Patterns of abnormal processing of emotional information in panic disorder and major depression. *Psychopathology, 25,* 65-70.

Cloitre, M.; Heimberg, R.; Holtz, C. and Liebowitz, M. (1992). Reaction time to threat stimuli in panic disorder and social phobia. *Behaviour Research and Therapy, 30,* 609-617.

Ehlers, A.; Margraf, J.; Davies, S. and Roth, W.T. (1988). Selective processing of threat cues in subjects with panic attacks. *Cognition and emotion, 2,* 201-219.

Hayward, P.; Ahmad, T. and Wardle, J. (1994). Into the dangerous world: An *in vivo* study of information processing in agoraphobics. *British Journal of Clinical Psychology, 33,* 307-315.

Hope, D.A.; Rapee, R.M.; Heimberg, R. G. and Dombeck, M. (1990). Representations of the self in social phobia: Vulnerability to social threat. *Cognitive Therapy and Research, 14,* 177-189.

Logan, G.D., Zbrodoff, N.J. and Williamson, J. (1984). Strategies in the color-word Stroop task. *Bulletin of Psychonomic Society, 22,* 135-138.

MacLeod, C. and Hagan, R. (1992). Individual differences in the selective processing of threatening information, and emotional responses to a stressful life event. *Behavior Research and Therapy, 30,* 151-161.

MacLeod, C. and Rutherford, E. (1992). Anxiety and the selective processing of emotional information: mediating roles of awareness, trait and state variables, and personal relevance of stimulus materials. *Behavior Research and Therapy, 30,* 479-491.

Maidenberg, E.; Chen, E.; Craske, M.; Bohn, P. and Bystritsky, A. (1996). Specificty of attentional bias in panic disorder and social phobia. *Journal of Anxiety Disorders, 10,* 529-541.

Martínez, F. and Marín, J. (1997). Influencia del nivel de alexitimia en el procesamiento de estímulos emocionales en una tarea Stroop. *Psicothema, 9,* 519-527

Mathews, A. and Klug, F. (1993). Emotionality and interference with color-naming in anxiety. *Behaviour Research and Therapy, 31,* 57-62.

Mathews, A. and MacLeod, C. (1985). Selective processing of threat cues in anxiety states. *Behaviour Research and Therapy, 23,* 563-569.

Mattia, J.I.; Heimberg, R.G. and Hope, D.A. (1993). The revised Stroop color-naming task in social phobics. *Behavior Research and Therapy, 31,* 305-313.

McNally, R.J.; Amir, N.; Louro, C.E.; Lukach, B.M.; Riemann, B.C. and Calamari, J.E. (1994). Cognitive processing of idiographic information in panic disorder. *Behaviour Research and Therapy, 32,* 119-122.

McNally, R.J.; Riemann, B.C, and Kim, E. (1990). Selective processing of threat cues in panic disorder. *Behaviour Research and Therapy, 28,* 407-412.

McNally, R.J.; Riemann, B.C.; Louro, C.E.; Lukach, B.M and Kim, E. (1992). Cognitive processing of emotional information in panic disorder. *Behaviour Research and Therapy, 30,* 143-149.

Quero, S.; Baños, R. and Botella, C. (1996). Sesgos atencionales y de memoria en el trastorno de angustia. *Análisis y Modificación de Conducta, 22,* 409-433.

Rose, W.T.; Wilsoncroft, W.E. and Griffiths, K.S. (1980). Effects of motor and verbal practice on the Stroop task. *Perceptual and Motor Skills, 50,* 647-650.

Ruiter, C. de and Brosschot, J.F. (1994). The emotional Stroop interference effect in anxiety: Attentional bias or cognitive avoidance? *Behaviour Research and Therapy, 32,* 315-319.

Spielberger, C.D.; Gorsuch, R.L. and Lshener, R.E. (1970). *Manual of the State-Trait Anxiety Inventory*. Palo Alto. CA.: Consulting Psychologists Press.

Stroop, J.R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology, 18,* 643-662.

Van den Hout, M.; Tenney, N.; Huygens, K. and de Jong, P. (1997). Preconscious processing bias in specific phobia. *Behaviour Research and Therapy, 35,* 29-34.

Virzi, R.A. and Egeth, H.E. (1985). Toward a translational model of Stroop interference. *Memory and Cognition, 13,* 304-319.

Yela, M and Cordero, A. (1996). *Adaptación española de la escala de inteligencia de Wechsler para adultos.* Madrid: TEA.