



## Research Papers

## Emotional processing in obsessive–compulsive disorder

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## ABSTRACT

The aim of the present study was to investigate whether there are differences in emotional processing among people with obsessive–compulsive disorder, using Lang's dimensional model of emotions. A total of 22 individuals with obsessive–compulsive disorder participated in the study and were compared to a control group ( $n=25$ ). All participants assessed a set of photographs with emotional content (pleasant, neutral, unpleasant, and with obsessive–compulsive content) using the Self-Assessment Manikin pictorial scales for rating emotional valence (pleasant/unpleasant), arousal (calm/aroused) and dominance (controlling/controlled). The results show significant differences in the processing of emotional images among individuals with obsessive–compulsive disorder and the high predictive value of dominance for diagnosis.

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## 1. Introduction

Cognitive theories of anxiety disorders have suggested that one of the most important factors underlying this kind of disorder is a deficit in information processing (Beck, Emery & Greenberg, 1985; Eysenck, 1992; Mathews & Mackintosh, 2000; Mogg & Bradley, 1998). In this regard, interest in the cognitive aspects of individuals with anxiety disorders has a long tradition (Rachman, 1980; Tuma & Maser, 1985). However, interest in the emotional processing of individuals with obsessive–compulsive disorder (OCD) is more recent (Vallejo & Berrios, 2006) and empirical studies are scarce.

More recent research has shown that patients with OCD present deficits in tasks designed to measure cognitive bias and distortion (e.g., the Stroop Test, Dichotic Listening, Dot Probe Task) (Steketee, Frost, Rhéaume, & Wilhelm, 2001). Studies on emotionally relevant information processing indicate that OCD patients could have increased sensitivity toward stimuli related to their fears (e.g., information relating to contamination) (Foa, Illai, McCarthy, Shoyer, & Murdock, 1993; Foa & McNally, 1986; Lavy, van Oppen & Van Den Hout, 1994; Tata, Leibowitz, Prunty, Cameron, & Pickering, 1996), although some studies suggest the opposite (Cohen, Lachenmeyer, & Springer, 2003; Unoki, Kasuga, Matsushima, & Ohta, 1999).

An important issue to take into account in research into emotional processing and OCD is the kind of emotional stimuli used. In general, lexical input with a single word is used to determine whether patients with OCD exhibit biased responses to specific stimuli (Foa et al., 1993; Lavy et al., 1994; Tata et al., 1996). Such lexical input cannot be equated with experiences from the real world, and therefore their capacity to induce emotional reactions is expected to be limited (Cohen et al., 2003).

An alternative with greater ecological validity is the use of affective images. Lang and colleagues have used affective images to test their Bioinformational Theory, showing that the emotional reactions induced by these images are similar to those that occur with real stimuli (Lang, Greenwald, Bradley, & Hamm, 1993). This model states that emotions can be described within an emotional space having three dimensions: emotional valence (pleasant/unpleasant), arousal (calm/aroused) and dominance (controlling/controlled) (Bradley & Lang, 1994; Lang, 2000; Lang et al., 1993). In this context, Lang's group developed a set of assessment instruments for use in experimental research. These instruments consist in the perception of visual and auditory affective stimuli and their evaluation using pictorial scales (the Self-Assessment Manikin). The two most widely used instruments are the International Affective Picture System (IAPS; Lang, Bradley & Cuthbert, 1999) and the International Affective Digitized Sounds (IADS; Bradley & Lang, 1999). Both instruments have been adapted to the Spanish population (Fernández-Abascal et al., 2008; Moltó et al., 1999; Vila et al., 2001).

On the other hand, it is also known that the emotional response is modulated by the image presented (Bradley, Cuthbert & Lang, 1996; Cobos, Sánchez, García, Vera, & Vila, 2002; Cobos, Sánchez,

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Pérez, & Vila, 2004; Lang et al., 1993; Vila et al., 2001) and that in OCD patients there is a tendency to overestimate threat, thereby increasing the likelihood of neutral-content stimuli being processed as threatening (Kozak, Foa, & McCarthy, 1987; Rhéaume, Ladouceur, & Freeston, 1996; Steketee & Frost, 1994).

The aim of the present study was to investigate whether there are differences in emotional processing among individuals with obsessive–compulsive disorder, using the bioinformational model of emotions (Lang, 1995). Based on the previous research findings outlined above, it was expected that people with OCD would assign lower scores on the dimensions of valence and dominance and higher scores on the dimension of arousal in response to emotional images.

## 2. Materials and methods

### 2.1. Participants

The sample consisted of 22 individuals with OCD (9 men and 13 women; mean age: 44.3 years) diagnosed by the Andalusian Health Service and private clinical psychology centres in Andalusia, Spain. In all cases, the diagnosis was confirmed using the structured clinical interview for DSM-IV Axis I disorders (SCID-I).

The control group consisted of 25 (6 men and 19 women) psychology students in their third and fourth year at the University of Malaga who had scored less than 10 on the Spanish version of the Padua Inventory of obsessive–compulsive symptoms (Mataix-Cols, Sánchez-Turet, & Vallejo, 2002). None presented OCD symptoms when being assessed nor had they presented with OCD in the past. This was confirmed using SCID-I.

### 2.2. Instruments

#### 2.2.1. Emotional images related to obsessive–compulsive disorder (IECO; Casado, Cobos, Godoy, Farias, & Vila, 2011)

A large number of photographs with obsessive–compulsive content was taken. The content of several OCD questionnaires (Yale-Brown Scale for Obsessive–Compulsive Disorder, Padua Inventory, Maudsley Obsessive–Compulsive Inventory) was taken into account in the process of making the pictures. This set included the following images, among others: a person washing their hands with a lot of foam in front of a bottle of bleach and another of alcohol; a person opening a door having wrapped the handle with the edge of their shirt; an extremely untidy table, etc. The images were divided into the following categories: abuse, blasphemy, contamination-washing, checking, untidiness, order, disease, doing harm, homosexuality, repetition, superstition, and others.

One hundred photographs were selected which showed greater convergent validity with other measures of obsessive–compulsive behaviour, better discriminated between individuals with severe or mild obsessive–compulsive symptoms and non-obsessional individuals (discriminative validity), and were rated by non-obsessional individuals as neutral images (neither pleasant nor unpleasant).

#### 2.2.2. International Affective Picture System (Lang et al., 1999)

Sixty pictures were selected from the IAPS on the basis of their valence and arousal ratings according to Spanish norms (Moltó et al., 1999; Vila et al., 2001). They included 20 images with pleasant content and high-arousal, 20 images with neutral content and low-arousal, and 20 images with unpleasant content and high-arousal.

#### 2.2.3. Self-Assessment Manikin (SAM; Lang, 1980)

The pictures were quantitatively assessed using the Self-Assessment Manikin. The SAM consists of human-like figures that depict the dimensions of valence, arousal, and dominance, with five

figures representing nine intensity levels within each dimension. The SAM valence rating ranges from a figure with a broad smile to a figure with a pronounced frown; the arousal rating ranges from a figure that appears agitated to a figure that looks drowsy; and the dominance–submissiveness rating ranges from a very large figure to a very small figure. This subjective assessment method has been extensively validated and is widely used in cue reactivity research (Bradley & Lang, 2000).

A computer-based version of SAM, created using E-prime software (Schneider, Eschman, & Zuccolotto, 2002), was used in this study. In this version, the scales are shown on screen immediately after the image has been presented. The participant indicated how he/she felt while watching the image by clicking on the appropriate dot for each scale.

#### 2.2.4. Padua Inventory (PI; Sanavio, 1988)

The Padua Inventory is used to assess OCD symptoms. Studies using the original PI scale found high internal consistency (around 0.90) and test-retest reliability ranging from 0.57 to 0.77 (Sternberger & Burns, 1990; Van Oppen, 1992). We administered the Spanish version created by Mataix-Cols et al. (2002). The Spanish version of the PI has been validated using clinical and non-clinical samples, demonstrating an internal consistency of 0.93 and test-retest reliability of 0.71 (Mataix-Cols et al., 2002).

#### 2.2.5. Clinical interview

The structured clinical interview for DSM-IV Axis I disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 1999) was used by two independent licensed clinical psychologists with more than 7 years' experience in clinical assessment and treatment to confirm the diagnosis of OCD in the clinical sample and its absence in the control group.

### 2.3. Procedure

Candidates were screened via the SCID-I and by completing the Padua Inventory; those selected were informed that the study involved assessing emotional photographs shown on a computer screen. Participants performed the experimental task individually in a psychology laboratory in subdued lighting seated 50 cm from a 17-in. computer monitor. The task consisted of 160 trials in which 100 IECO images and 60 IAPS images were presented randomly. Each image was shown for 6 s during each trial. Next, the three SAM scales appeared sequentially in the following order – valence, arousal and dominance – and the participant rated the image. Once the image had been rated a new trial commenced. E-prime software (Schneider et al., 2002) was used to sequence the experimental task, present the stimuli and record the responses.

### 2.4. Data analysis

Results were analyzed by first calculating the mean and standard deviation of the ratings assigned by the clinical (OCD) and control groups to the pleasant, neutral, and unpleasant images and those with obsessive–compulsive content. Next, between-group differences in valence, arousal, and dominance in relation to the four types of images were analyzed using the Student's *t*-test (adjusting the degrees of freedom when variances were not homogeneous). Since four comparisons were performed with the *t*-test for each emotional dimension, a minimum *p* value (alpha error) of at least 0.03 was required as well as a Cohen's  $\delta$  of 0.50 (equivalent to a medium effect size).

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