Facial Emotion Recognition in Social Anxiety: The Influence of Dynamic Information

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Studies indicate that people with social anxiety show changes in perception of facial emotion. Here we investigated the recognition of static and dynamic facial expressions in 2 groups varying with regard to scores on the Social Phobia Inventory (SPIN) and classified as having high social anxiety (HSA; SPIN ≥19; n = 22) and low social anxiety (SPIN <19; n = 21). Facial expressions of happiness, sadness, fear, and anger in dynamic (videos) and static (photos) conditions were presented at 4 intensities (25%, 50%, 75%, and 100%). For each condition, recognition means were analyzed with an ANOVA of model: 2 groups (2 conditions [static and dynamic] × 4 emotions × 4 intensities). We found an interaction between the factors Group, Condition, Emotion, and Intensity. Post hoc analysis indicated that the HSA group had better scores in the static face of anger with 25% of emotion compared with controls. No difference between groups was found in the dynamic condition. The analysis of the confusion matrix of judgments indicated that the advantage of participants with social anxiety in the static condition was not explained by a general bias of attributing anger to facial expressions. The results suggest an advantage for individuals with social anxiety to recognize emotions in stimuli with less ecological validity (static faces). The use of dynamic faces may reduce or eliminate the differences between individuals with high and low social anxiety in the recognition of facial emotions.

Keywords: facial expressions, affective processing, social anxiety, emotion

Facial expressions are part of a complex interpersonal communication system that seems to be universal (Sauter, Eisner, Ekman, & Scott, 2010). In favor of the hypothesis of universality, studies show that facial expressions of the congenitally blind are similar to those of people with normal vision (Wolfe, 1990) and suggest that certain expressions are recognized in a similar way in different cultures (Ekman, Sorenson, & Friesen, 1969).

The ability to correctly interpret facial expressions can be affected by several psychiatric disorders, such as depression (Seidel et al., 2010), eating disorders (Ridout, Wallis, Autwal, & Sellis, 2012), and social anxiety disorder (SAD; Rapee & Heimberg, 1997; Yoon & Zinbarg, 2007).
According to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *American Psychiatric Association, 2013*), social anxiety disorder (SAD) is characterized by a sharp fear of facing social situations in which the individual is afraid of being negatively evaluated. Symptoms must last 6 months or longer and cause damage (severe, moderate, or mild) to the individual’s social life. The disorder has a prevalence of around 10% among university students in Brazil (Osório, Crippa, & Loureiro, 2007).

Individuals with social anxiety present sustained attention to emotionally charged images and difficulty in turning away from sources of danger (Rossignol, Campanella, Bissot, & Philippot, 2013). Social anxiety may also affect the discrimination of emotional states in others (Arrais et al., 2010; Rapee & Heimberg, 1997) and modulate the attribution of emotions to neutral faces (Alves, Rodrigues, de Souza, & Sousa, 2012). In the last study, in a forced choice task, the authors found that men attributed anger more often to neutral faces, whereas women attributed sadness more frequently compared with their respective controls (Alves et al., 2012).

Kolassa and Miltenor (2006) found that subjects with higher scores in the Social Phobia and Anxiety Inventory had increased amplitude of the N170 response in the temporal-parietal region during the recognition of anger. This pattern may be associated with direct signs of disapproval from others, causing fear in socially anxious people. Other electrophysiological studies have shown that subjects with social anxiety have increased amygdala activation when viewing faces with negative emotions (Amir et al., 2005; Demenescu et al., 2013).

Some findings based on cognitive and cognitive–behavioral models suggest that in addition to accurate assessment of negative (Winton, Clark, & Edelmann, 1995) and ambiguous (Garner, Baldwin, Bradley, & Mogg, 2009) emotions in others, subjects with SAD also display fear of receiving positive reviews (Weeks, Heimberg, & Rodebaugh, 2008; Weeks, Heimberg, Rodebaugh, & Norton, 2008), as these would generate the obligation and discomfort of having to continue to fulfill expectations of success (Wallace & Alden, 1997). Therefore, there appears to be a subjective bias of social interpretation of positive stimuli (Campbell et al., 2009).

Gamble and Rapee (2010), while studying attentional bias, found that SAD is characterized by a premature monitoring of social signs with no bias in posterior processing. Socially anxious individuals tend to be more accurate in recognizing expressions of happiness, sadness, and fear (Hunter, Buckner, & Schmidt, 2009), with increased scrutiny for anger, happiness, and neutral faces in brief stimulus presentation times (Mogg, Philippot, & Bradley, 2004).

In the field of emotional recognition, the exclusive use of static facial expressions (photos) with full emotional intensity in studies has been under debate over the past years, as there are indications that such stimuli could decrease the ecological validity of experimental tasks (Ambadar, Schoolder, & Cohn, 2005; Torro-Alves, 2013). In everyday situations, facial expressions are presented at different intensities and people are more likely to come across subtle (low intensity) emotional displays (Ekman, 2004). In high-intensity expressions, a complete contraction of muscles is observed, whereas only minor changes on the face can be noticed in subtle expressions (Matsumoto & Hwang, 2014), and these elements affect recognition accuracy. The higher the emotional intensity of the stimulus and the longer its exposure time, the faster and the more accurately the observer will be able to judge the expression (Guo, 2012).

The manipulation of emotional intensity has been used to analyze interpretation biases in social anxiety disorder, allowing for an increase in the external validity of emotional expression perception capacity (Philippot & Douillet, 2005; Schofield, Coles, & Gibb, 2007). Making use of dynamic emotional intensity degrees, Joormann and Gotlib (2006) found that subjects with SAD needed less emotional intensity to recognize expressions of anger compared with patients with major depression and healthy subjects. The study assessed the recognition of three emotions (joy, anger, and sadness) that gradually increased in intensity from a neutral face to one with 100% of emotion, in 2% increments.

Studies in healthy volunteers show that the effectiveness in the recognition of facial expressions is proportional to the time of presentation and intensity of emotion (Gao & Maurer, 2010), and that adding movement favors less intense expression recognition (Torro-Alves, Bezerra, Claudino, & Pereira, 2013). Recio, Schacht, and Sommer (2013) demonstrated facilitation in most dynamic expressions (moving faces) com-
pared with static facial displays. Fujimura and Suzuki (2010) suggested that dynamic information may assist recognition according to the physical properties of the face shown, for example, the mouth movement in the expression. Ambadar et al. (2005) compared the recognition of static and dynamic expressions, and found that the addition of movement to subtle expressions favors recognition of all basic expressions except joy. In subtle expressions, adding motion can reduce the ambiguity and improve the judgment of emotion (Bould & Morris, 2008). Trautmann, Fehr, and Herrmann (2009), comparing the pattern of brain activation for dynamic and static facial expressions of happiness and disgust, observed that the moving stimuli evoked more diffuse brain activation.

In the field of social anxiety, we found few studies investigating the influence of movement on the recognition of facial emotions (i.e., Joormann & Gotlib, 2006). This is an important topic because changes in emotional recognition may affect social interactions and thus contribute to the maintenance of symptoms in social anxiety disorder (Beard & Amir, 2010). In the present study, we compared the recognition of dynamic and static facial emotions at different intensities (25%, 50%, 75%, and 100%) in volunteers with high and low social anxiety. Our hypothesis was that the performance in emotion recognition would differ between groups and be influenced by stimuli intensity and condition of presentation (static or dynamic).

Method

Participants

One hundred forty-six university students filled out the Social Phobia Inventory (SPIN; Osório, Crippa, & Loureiro, 2009) in the initial screening phase. All participants were invited to take part in the second phase of study, but only 43 volunteers attended the experimental session. According to the SPIN cutoff score of 19, the participants were divided in two groups (Connor et al., 2000). The first group was formed by 22 individuals with high social anxiety (HSA; SPIN ≥19), and the second group consisted of 21 individuals with low social anxiety (LSA) and no personal and/or family history of psychological, psychiatric, or neurological disorders (control group; SPIN <19). All volunteers had normal or corrected visual acuity in both eyes and were aged 18 to 31 years. Table 1 presents information on the mean age and social anxiety scores of both groups. No statistically differences between males and females were found with regard to age and SPIN scores (p > .05), but we observed that the HSA group were older compared with the low social anxiety group (p = .023).

The study was conducted in accordance with Resolution No. 466/12 of the National Health Council (2012), which deals with the participation of human subjects in research, and was approved by the Research Ethics Committee of the Center for the Health Sciences of the Federal University of Paraíba, João Pessoa – PB (Protocol 0164).

Materials

We used facial expressions of happiness, anger, fear, and sadness in addition to emotionally neutral facial displays in the composition of the experimental stimuli photographs extracted from the NimStim Face Stimulus Set (Tottenham et al., 2009). The pictures chosen as stimuli for the task had the following codes: 01F_AN_C, 01F_FE_C, 01F_HA_C, 01F_NE_C, 01F_NE_O, 01F_SA_C, 16F_AN_O, 16F_FE_O, 16F_HA_O, 16F_NE_O, 16F_NE_C,

Table 1
Sample Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Low social anxiety (control group)</th>
<th>High social anxiety (anxiety group)</th>
<th>Comparison between groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td>$t^2$</td>
</tr>
<tr>
<td>$n$</td>
<td>9</td>
<td>12</td>
<td>.429</td>
</tr>
<tr>
<td>Age (years)</td>
<td>21.78 (±1.99)</td>
<td>23.08 (±4.14)</td>
<td>—869</td>
</tr>
<tr>
<td>SPIN</td>
<td>13.22 (±8.53)</td>
<td>10.25 (±4.88)</td>
<td>1.011</td>
</tr>
</tbody>
</table>

Note. SPIN = Social Phobia Inventory.

The software Morpheus 4.0 was used to produce the faces with intensities corresponding to 25%, 50%, 75%, and 100% of maximum emotional intensity (see Figure 1). Adobe Photoshop (Version 7.1) was used to adjust and correct the images in static stimuli. The static versions of the facial stimuli were presented in Experiment 1.

We used Adobe Premiere Pro CS3 for the creation of the dynamic stimuli used in Experiment 2. The process of creating videos of facial expressions involves ordering the photos (morphings) and setting the time criterion of transition from one image to another. Pilot studies indicated that the frequency of 25 frames per second was sufficient to induce the perception of facial movement. Thus, videos were generated from morphing sequences, which began at 1% and increased progressively by 1% to the points corresponding to 25%, 50%, and 75% of maximum emotional intensity (see Figure 2). The length of the videos was directly related to the number of frames, each second of video consisting of 25 intensities of facial expressions. Thus, videos were generated with total duration times of 1, 2, 3, and 4 s, and ended with faces displaying 25%, 50%, 75%, and 100% of the maximum emotional intensity, respectively. In both experimental sessions, the software SuperLab 4.0 was used for the presentation of the stimuli and collection of participants’ responses.

Procedure

Experiment 1. In an individual session, participants were given instructions to indicate the perceived emotion in images using the numeric keypad on their computer. Photographs presented the four facial expressions (fear, anger, sadness, and happiness) of two male and female models at four intensities (25%, 50%, 75%, and 100%), totaling 64 stimuli. Each picture was presented once, in a random order. After the stimulus presentation, a screen with emotional labels was presented with free response time for the participant. The sequence of the response options on the screen was kept constant throughout the experiment. After the response to the stimulus, a fixation point was presented for 1 s before the presentation of the next stimulus.

Experiment 2. In Experiment 2, similar to the first one, the participant sat at the computer and was instructed to watch the videos of facial expressions in different lengths and then identify the corresponding emotional expression on the keyboard. Throughout the experiment, videos of four facial expressions of two male and two female models in four emotional intensities were presented. Consequently, the session included the presentation of 64 stimuli: 4 facial expressions × 4 video durations (1, 2, 3, and 4 s) × 4 models (2 female faces and 2 male faces). Each video was shown only once during the experiment and the order of presentation was random.

To follow the pattern of Experiment 1, the static and dynamic stimuli were presented for the same duration of dynamic stimuli (25% = 1 s, 50% = 2 s, 75% = 3 s, and 100% = 4 s). The sequence of presentation is shown in Figure 2.

Results

The software SPSS 21.0 was used for data analysis. The means of recognition of facial...
expressions were calculated and submitted to an ANCOVA model: 2 experimental groups (HSA and controls) × (2 conditions [static and dynamic] × 4 emotions [happiness, sadness, fear, and anger] × 4 intensities [25%, 50%, 75%, and 100%]). The variable Experimental Group was taken as a between-subjects factor and Condition, Emotion, and Intensity as repeated measures (within-subjects) factors. Considering that groups differed in age, as shown in Table 1, we included this variable as a covariate in the statistical model. In addition, we carried out an analysis of response bias using a confusion matrix with the participants’ emotional judgments.

In the analysis, a statistically significant effect was found for the main factors Emotion, $F(3,38) = 2.898$, $p = .040$, and Intensity, $F(3,38) = 4.785$, $p = .010$, but not for Condition, $F(1,40) = 0.710$, $p = .404$, and Group, $F(1,40) = 0.430$, $p = .516$. A post hoc analysis with Bonferroni correction indicated that more mistakes were made to expressions at the intensity of 25% compared with the other intensities ($p < .001$). The intensity of 50% differed significantly from the intensity of 75% ($p = .034$) and 100% ($p < .001$). With regard to the emotions, the post hoc analysis indicated that recognition scores for happiness were greater when compared with anger ($p < .001$) and sadness ($p < .001$). Anger had a better recognition rate compared with sadness ($p < .001$). Other comparisons between emotions were not significant ($p > .05$).

We also observed an interaction between the factors Intensity and Experimental Group, $F(3,38) = 4.076$, $p = .019$, and between the factors Experimental Groups, Condition, Intensity, and Emotion, $F(9,32) = 2.279$, $p = .038$. A post hoc analysis with Bonferroni correction showed that HSA participants had better scores in the static face of anger with 25% of emotion compared with controls ($p < .05$; see Figure 3).

In the dynamic condition, groups had a similar performance in the recognition of all emotions ($p < .05$). Other interactions were not significant.

A complementary analysis was carried out through the construction of a confusion matrix with the judgment of emotions, considering the different intensities (25%, 50%, 75%, and 100%) and presentation conditions (static and dynamic). Table 2 shows the emotions represented in the face (posed emotion) and the emotions attributed by the participants to them (recognized emotion). Underlined values show the percentages of emotional recognition, that is, correct answers, whereas nonunderlined values represent errors and possible judgment biases. When we consider the advantage of individuals with HSA in identifying the expression of anger at the intensity of 25% in the static condition, we can raise the question of whether they tend to attribute anger to all expressions and, therefore, would also present higher recognition rates for this emotion.
In the confusion matrix, we found good performance of participants at the intensities of 75% and 100%, above 88% of correct recognition in all cases. When both groups judged happiness, sadness, and fear, they did not tend to attribute anger to the faces. In all cases, the attribution of anger was inferior to 3%. Fear was the most confused expression, interpreted as sadness in 9.5% of the presentations in the static condition by the control group. For the HSA group in the dynamic condition, fear was recognized as sadness in 9.1% of the stimuli presented.

For the intensity of 50%, we found little decrease in emotion recognition rates. The dynamic version of sadness was comparatively less recognized, being correctly identified by participants with social anxiety 81.8% of the time. For this intensity, we found no systematic attribution of anger to facial expressions by the HSA group. Only in the judgment of static faces of sadness, individuals with social anxiety attributed more often anger than the control group (HSA = 7%, controls = 3.6%); however, they also attributed anger less often than controls in the dynamic condition (HSA = 4.5%, controls = 4.8%). The ANOVA showed no differences between groups for the intensity of 50%.

Faces with 25% of emotional intensity were associated with low recognition rates and, con-
Table 2
Confusion Matrix in Judgments of Dynamic and Static Facial Expressions Presented at the Intensities of 25%, 50%, 75%, and 100%

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Posed emotion</th>
<th>Static expression</th>
<th></th>
<th></th>
<th>Dynamic expression</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td>Anxiety</td>
<td>Control</td>
<td>Anxiety</td>
<td>Control</td>
<td>Anxiety</td>
</tr>
<tr>
<td>25%</td>
<td>H 48.8</td>
<td>26.2</td>
<td>17.9</td>
<td>7.1</td>
<td>64.3</td>
<td>22.6</td>
<td>9.5</td>
</tr>
<tr>
<td></td>
<td>S 6.0</td>
<td>66.7</td>
<td>19.0</td>
<td>8.3</td>
<td>3.6</td>
<td>68.7</td>
<td>10.8</td>
</tr>
<tr>
<td></td>
<td>F 0.0</td>
<td>17.9</td>
<td>76.2</td>
<td>6.0</td>
<td>1.2</td>
<td>18.1</td>
<td>77.1</td>
</tr>
<tr>
<td></td>
<td>A 2.4</td>
<td>34.5</td>
<td>29.8</td>
<td>33.3</td>
<td>0.0</td>
<td>22.1</td>
<td>11.6</td>
</tr>
<tr>
<td>50%</td>
<td>H 91.7</td>
<td>4.8</td>
<td>2.4</td>
<td>1.2</td>
<td>91.6</td>
<td>3.6</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td>S 3.6</td>
<td>85.7</td>
<td>7.1</td>
<td>3.6</td>
<td>1.2</td>
<td>86.0</td>
<td>5.8</td>
</tr>
<tr>
<td></td>
<td>F 0.0</td>
<td>3.6</td>
<td>95.7</td>
<td>1.2</td>
<td>1.2</td>
<td>6.0</td>
<td>92.2</td>
</tr>
<tr>
<td>75%</td>
<td>H 95.2</td>
<td>3.6</td>
<td>1.2</td>
<td>0.0</td>
<td>98.8</td>
<td>0.0</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>S 1.2</td>
<td>91.7</td>
<td>6.0</td>
<td>1.2</td>
<td>1.2</td>
<td>88.0</td>
<td>8.4</td>
</tr>
<tr>
<td></td>
<td>F 0.0</td>
<td>9.5</td>
<td>88.1</td>
<td>2.4</td>
<td>1.2</td>
<td>6.1</td>
<td>91.5</td>
</tr>
<tr>
<td></td>
<td>A 0.0</td>
<td>4.8</td>
<td>1.2</td>
<td>94.0</td>
<td>0.0</td>
<td>2.4</td>
<td>4.7</td>
</tr>
<tr>
<td>100%</td>
<td>H 100.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>95.2</td>
<td>3.6</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>S 1.2</td>
<td>95.2</td>
<td>3.6</td>
<td>0.0</td>
<td>0.0</td>
<td>96.4</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td>F 1.2</td>
<td>3.6</td>
<td>94.0</td>
<td>1.2</td>
<td>1.1</td>
<td>5.7</td>
<td>92.0</td>
</tr>
<tr>
<td></td>
<td>A 0.0</td>
<td>2.4</td>
<td>1.2</td>
<td>96.4</td>
<td>0.0</td>
<td>4.9</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Note. Values correspond to the mean percentages of attribution of happiness (H), sadness (S), fear (F), anger (A) to faces (posed emotion). Underlined values = percentage of correct responses; nonunderlined lines = percentage of errors.
Discussion

This study compared the performance of individuals with HSA and a control group (LSA) in a task of recognizing static and dynamic facial expressions of emotion. We used facial displays of happiness, sadness, fear, and anger presented at different emotional intensities (25%, 50%, 75%, and 100%).

In the statistical analysis, we found that differences between groups only occurred in the identification of static faces of anger at the intensity of 25% (Experiment 1). At this intensity (25%), stimuli were presented for a shorter time, which may have negatively interfered with the performance of controls, as shown in previous studies (e.g., Gao & Maurer, 2010; Guo, 2012). When facial movement occurred (Experiment 2), we found a general improvement of the control group, which presented recognition rates similar to those obtained by the HSA group.

Our results could be associated with a greater ecological validity of dynamic expressions, which seem to be more natural and realistic in the expression of emotions than static faces (Recio et al., 2013; Torro-Alves et al., 2013). Comparatively, photographs are considered less natural (Ambadar et al., 2005) and possibly are not recognized as easily. In our sample, participants with HSA stood out in the most difficult condition of face recognition, that is, during the presentation of static expressions of low emotional intensity.

Many studies have shown that the addition of subtle movement to emotional expressions decreases ambiguity and hence favors the judgment of the observer (e.g., Ambadar et al., 2005; Bould & Morris, 2008). In this case, we can hypothesize that differences between participants with HSA and controls in emotion recognition can be mitigated by the judgment of stimuli with greater ecological validity. Movement would reduce the ambiguity and biases in the emotional evaluation process. We should emphasize, however, that there were also no differences between groups in the recognition of facial expressions of high emotional intensity (50%, 75%, and 100%), which suggests that there is a decrease in emotional ambiguity in these stimuli.

The increased accuracy in the recognition of anger observed here in individuals with high scores in social anxiety is consistent with earlier evidence in the field. For example, Mogg et al. (2004) and Joormann and Gotlib (2006) suggest that individuals with SAD are more sensitive to expressions of anger. The expression of anger conveys hostility and can be associated with behaviors of withdrawal or escape. According to the cognitive models of social anxiety, people affected by SAD have a negative bias in the interpretation of ambiguous information of the social environment (Beard & Amir, 2010; Yoon & Zinbarg, 2007) and a pattern of hypervigilance in the processing of threatening information of their surroundings (Mogg & Bradley, 1998). Expressions of anger could therefore act as fundamental clues in environmental assessment, which would explain the more accurate recognition of this emotion by HSA individuals.

Horley, Williams, Gonsalvez, and Gordon (2004), in a study of eye tracking, observed that the expression of anger (characterized as threatening) induces a state of hypervigilance in SAD. Mogg et al. (2004) found that individuals with SAD were more attentive compared with controls for expressions of anger displayed for a short time (500 ms). Again, the expression of anger seems to attract more attention than other emotions of positive or negative valence.

In the present study, we carried out an analysis of emotional judgment biases through a confusion matrix. We reasoned that if participants with social anxiety tend to attribute anger to all facial expressions, they would also present higher accuracy in the recognition of anger. For the intensities of 50%, 75%, and 100% in the static and dynamics conditions, the analyses showed that participants presented high recognition rates (above...
80%) and, therefore, reduced judgment bias. For the intensity of 25%, more errors were made, but they were insufficient to explain the better performance of HSA participants in the static condition. We found only a small difference between groups in respect to the attribution of anger to other emotions (fear, sadness, and happiness; HSA [24.1%] – controls [21.4%] = 2.7%), whereas HSA participants had a better performance in anger recognition (66.3%) compared with control participants (33.3%) in the static condition (see Table 2). For dynamic faces, we cannot rule out the possibility of a minor bias in anger attribution, but no significant differences between groups were found in the ANOVA. Thus, we consider that the advantage of participants with social anxiety in the static condition cannot be explained by a general bias in anger attribution to facial expressions.

One limitation of our study refers to the experimental design. In both conditions (static and dynamic), stimulus presentation time varied as a function of the emotional intensity. Faces with lower intensities were presented more quickly, whereas faces with greater intensities were presented for longer periods, following the times: 25% = 1s; 50% = 2s; 75% = 3s; 100% = 4s. This experimental design was used to keep the number of 25 frames per second constant in dynamic expressions; nevertheless, this introduced a confounding factor in the interpretation of the results. Considering that presentation time and emotional intensity varied concurrently, we cannot determine whether the differences between groups were due to the isolated effect of only one of these variables or to their combined effect. Although each study has its own design, there is evidence that emotional recognition is influenced by both emotional intensity (e.g., Hess, Blairy, & Kleck, 1997; Marneweck, Loftus, & Hammond, 2013) and presentation time (e.g., Neath & Itier, 2014). This may have influenced the results of our experiment. A suggestion for future studies is to determine the isolated and combined effects of the variables “emotional intensity” and “stimulus presentation time” on participants’ judgments. For example, in a possible experimental design, participants could perform the recognition task under three different conditions: (a) varying emotional intensity and keeping presentation time constant, (b) keeping emotional intensity constant and varying presentation time, and (c) simultaneously changing emotional intensity and presentation time.

In conclusion, our results suggest a possible general advantage in the recognition of facial expressions of emotion by subjects with HSA scores, but also that this advantage is dependent on certain conditions of stimulus presentation. In the static condition, participants with HSA were better at recognizing subtle expressions of anger compared with controls. Furthermore, no differences were found between groups in the evaluation of dynamic faces. The results therefore suggest that the use of stimuli with greater ecological validity (moving expressions) can reduce or eliminate the differences among individuals with social anxiety and controls in the recognition of facial emotion. These findings are relevant to provide information about changes in emotional recognition, which can affect social interactions and contribute to the maintenance of social anxiety disorder symptoms (Beard & Amir, 2010).

Future studies should work with additional systematic manipulation of variables, such as the time of stimulus presentation in static and dynamic conditions. Likewise, the influence of movement in the recognition of expressions of disgust and surprise (not evaluated in this study) should also be investigated, both in the context of social anxiety and in other clinical populations, as results in this area may provide clues about the onset and maintenance of the functional deficits seen in these patients.

References


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