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Social anxiety and perception of (un)trustworthiness in smiling faces

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ABSTRACT

In social environments the smile can be driven by different motives and convey different emotions. This makes a smiling face ambiguous and amenable to alternative interpretations. We investigated how social anxiety is related to trustworthiness evaluation of morphed dynamic smiling faces depending on changes in the eye expression. Socially anxious and non-anxious participants judged the un/trustworthiness of people with different smiles. Social anxiety was related to reduced trustworthiness of (a) faces with a neutral mouth unfolding to a smile when the eyes were neutral at the beginning or end of the dynamic sequence, and (b) faces with a smiling mouth when happy eyes slightly changed towards neutrality, surprise, fear, sadness, disgust, or anger. In contrast, social anxiety was not related to trustworthiness judgments for non-ambiguous expressions unfolding from neutral (eyes and mouth) to happy (eyes and mouth) or from happy to neutral. Socially anxious individuals are characterized by an interpretation bias towards mistrusting any ambiguous smile due to the presence of non-happy eyes.

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1. Introduction

Trusting other people is critical for successful social interaction. Judgments of un/trustworthiness (i.e., how much we can trust someone for a satisfactory or, rather, potentially harmful relationship) presumably entail a relevant component of social anxiety (Cooper et al., 2014), as they implicate social approach or avoidance (van't Wout and Sanfey, 2008). Social anxiety is characterized by persistent and intense fear and avoidance of negative evaluation from other people (American Psychiatric Association, 2013; Morrison and Heimberg, 2013). This means that socially anxious individuals are particularly sensitive to disapproval and rejection. Accordingly, social anxiety might drive *un*trustworthiness (or curtail trustworthiness) judgments as a preventive, self-protecting mechanism: To avoid negative social evaluation, socially anxious individuals could be biased to detect subtle facial cues indicative of untrustworthiness, or to interpret ambiguous cues as untrustworthy.

The predicted relationship between social anxiety and perception of untrustworthiness has been addressed in three prior studies, all of which used photographs of non-emotional expressions as stimuli. Meconi et al. (2014) found that untrustworthy faces elicited enhanced Sustained Posterior Contralateral Negativity (SPCN; a neural electrocortical correlate of visual working memory processing) amplitudes in socially anxious participants, who also encoded untrustworthy faces in working memory better than non-anxious participants. Willis et al. (2013) reported that individuals with high trait anxiety (which is related to social anxiety: see Section 2.1.2.) perceived faces as less trustworthy than low-anxiety individuals. In contrast, Cooper et al. (2014) found no significant relationship between social anxiety and trustworthiness judgments. Nevertheless, this might have been due to the use of a participant sample with normally distributed scores (i.e., relatively healthy undergraduates) instead of groups selected as a function of their extreme scores in social anxiety. In any case, such discrepancies suggest that this issue needs further investigation.

The three prior studies (Cooper et al., 2014; Meconi et al., 2014; Willis et al., 2013) are limited by the use of only neutral faces conveying no explicit emotion. We aimed to extend prior research by using *emotional*—yet *ambiguous*—expressions. More specifically, we focused on smiling faces with happy or non-happy (e.g., neutral, angry, etc.) eyes. The rationale for this approach is based on two major reasons that make the relationship between social anxiety and trustworthiness for smiling faces relevant. First, in spite of its appearance as a simple gesture in the mouth region, the smile is actually associated with very different emotions. Apart from enjoyment, a smile can be driven by motives such as

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dominance (i.e., a way of communicating and maintaining social status), sarcasm, and contempt, or nervousness, embarrassment, and appeasement, or it can convey mere politeness (Ambadar et al., 2009; Calvo et al., 2013a, 2013b; Niedenthal et al., 2010). This makes the smile amenable to multiple interpretations, which could be biased by social anxiety. As smiles can be seen negatively (e.g., arrogance, etc., or even mockery), it is possible that social anxiety preferentially activates such meanings, particularly those related to disapproval or negative evaluation. This would occur especially when information from other facial sources—mainly, the eyes—is not congruent with a smiling mouth. Given the ubiquity of the smile in social settings (Calvo et al., 2014; Somerville and Whalen, 2006), such an interpretative bias might have a profound influence on the development or maintenance of social anxiety, and thus have clinical implications because of the frequent exposure to this type of ambiguous stimuli.

Second, Gutiérrez-García and Calvo (2014) investigated whether social anxiety facilitates the discrimination between genuine and fake smiles. Socially anxious and non-anxious participants categorized as "happy" or "not happy" faces with either (a) a truly happy expression (i.e., congruent happy eyes and a smiling mouth), (b) truly non-happy expressions (e.g., congruent angry eyes and angry mouth), and (c) blended expressions with a smile but incongruent non-happy (e.g., angry, sad, etc.) eyes. No differences appeared for truly happy or non-happy faces, which reveals that social anxiety is not related to recognition sensitivity for prototypical expressions (see Staugaard, 2010; although effects depend on the type of evaluative judgment that is assessed: Lange et al., 2013). However, relative to non-anxious participants, those high in social anxiety were *more likely* to judge as "not happy" *all* the blended expressions with non-happy eyes, and were especially *faster* in judging as "not happy" the blended expressions with angry, fearful, or disgusted eyes (but not those with sad, surprised, or neutral eyes). These results suggest, respectively, that social anxiety inhibits a benign interpretation of *all* the ambiguous expressions with a smile, and speeds up the detection of those with *threatening* eyes (but see Jusyte and Schönenberg, 2014). The current study investigates whether such effects are associated with perception of *untrustworthiness* from ambiguous—due to non-happy eyes—expressions with a smile.

Accordingly, variations in cues of facial happiness (e.g., a smiling mouth but non-happy eyes) leading to ambiguity constitute a reasonable ground for investigating the role of social anxiety in judging trustworthiness. In two experiments, we presented 2-s video-clips displaying dynamic facial expressions to high or low socially anxious participants, who judged how trustworthy the person showing each expression was. As stimuli, we used morphed faces in motion, to mimic real-life expressions and to increase sensitivity of measures (Krumhuber et al., 2013; Recio et al., 2013). Experiment 1 investigated the relationship between social anxiety and trustworthiness evaluation of faces in which the eyes *and* the mouth unfolded—together or independently—from neutral to happy or vice versa. Experiment 2 investigated such a relationship for faces in which changes occurred *only*—and subtly —in the eye expression (unfolding from happy to angry, sad, fearful, disgusted, surprised, or neutral) while the mouth remained smiling. Whereas Experiment 1 was focused on changes in the smiling mouth and happy eyes in relation to a neutral face, Experiment 2 was concerned with changes in non-happy eyes in the presence of a static smiling mouth. Thus a wide range of types of smiling faces were examined.[2]

We predicted that individuals with social anxiety, relative to non-anxious controls, would be likely to judge as less trustworthy smiling faces with non-happy eyes, and that this would occur especially when the eyes convey anger or disgust. As socially anxious individuals are particularly sensitive to critical or disapproving attitudes from other people, such ambiguous or incongruent smiles would be interpreted as untrustworthy by virtue of their association with dominance, mockery, or contempt. In contrast, for genuinely happy faces with congruent eyes and mouth, no differences in trustworthiness will appear as a function of social anxiety, thus showing no deficit in expression identification or a general interpretative bias.

2. Experiment 1: faces with neutral or happy eyes and neutral or smiling mouth

2.1. 1. Methods

2.1.1. Participants

A pool of 354 psychology undergraduates initially responded to various social anxiety questionnaires (see below). We selected 48 participants with high scores and 48 participants with low scores on the Brief Fear of Negative Evaluation (BFNE) scale (Leary, 1983). Next, within each high or low BFNE group, we formed two subgroups of 24 students each by matching (in pairs) them in sex (15 females and 9 males in each subgroup) and BFNE scores. Finally, we randomly assigned each subgroup either to Experiment 1 or 2, so that the samples were comparable. The participants' age ranged between 20 and 25 years.

In Experiment 1, 24 participants in the social anxiety group were selected if their BFNE scores were ≥ 40; and another 24 in the non-socially-anxious group, if their BFNE scores were < 30 (see Table 1). About two weeks before the experiment, the BFNE scale, the trait scale of the State-Trait Anxiety Inventory (STAI-T; Spielberger et al., 1983), the Social Interaction Anxiety Scale (SIAS), and the Social Phobia Scale (SPS; Mattick and Clarke, 1998) were administered to the 354 students in various classrooms. Each participant used an anonymous code. The study was approved by the local ethics committee and conducted in accordance with the Declaration of Helsinki.

2.1.2. Measures

The BFNE scale (Leary, 1983) was the primary measure of social anxiety. This 12-item scale assesses fear of negative evaluation by others, as a major component of social anxiety. Responses range from 1 (*not at all characteristic of me*) to 5 (*extremely characteristic of me*) for representative items such as "I am afraid others will not approve of me". The BFNE is a well-validated scale (Spanish version by Gallego et al., 2007), with high test-retest reliability ($r=.75$; Leary, 1983), factorial and construct validity in undergraduate (Rodebaugh et al., 2004) and clinical samples (with mean scores for social phobia patients of $M=47$, Weeks et al., 2005; and $M=43$ in Spanish clinically-diagnosed social phobic undergraduates, Gallego et al., 2007).

The SIAS and the SPS (Mattick and Clarke, 1998) are companion scales designed to measure fear of social interaction and fear of being observed, respectively. Each questionnaire is a 20-item measure that uses a scale ranging from 0 (*not at all characteristic of me*) to 4 (*extremely characteristic of me*), with participants indicating the extent to which the statement applies to them (e.g.,

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[2] Among the multiple possible combinations (type of eye and mouth expression, type of change, etc.), we had to select a manageable number of them that were theoretically relevant as well as plausible in real life. Although the ecological validity of some of the resulting expressions (see Sections 2.1.3. and 3.1.2. *Stimuli*)

(*footnote continued*)
may be uncertain (see Section 4), such combinations were necessary for systematically examining the role of the eyes and the mouth.