



Laughter perception in social anxiety



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ABSTRACT

Background: Laughter is a powerful signal of social acceptance or rejection while the fear of being embarrassed and humiliated is central in social anxiety (SA). This type of anxiety is associated with cognitive biases indicating increased sensitivity to social threat as well as with deficits in emotion regulation. Both are thought to be implicated in the maintenance of social anxiety.

Method: Using laughter as a novel stimulus, we investigated cognitive biases and their modulation through emotion regulation and cue ambiguity in individuals with varying degrees of SA ($N = 60$).

Results: A combination of a negative laughter interpretation bias and an attention bias away from joyful/social inclusive laughter in SA was observed. Both biases were not attributable to effects of general anxiety and were closely correlated with the concept of gelotophobia, the fear of being laughed at.

Discussion: Thus, our study demonstrates altered laughter perception in SA. Furthermore, it highlights the usefulness of laughter as a highly prevalent social signal for future research on the interrelations of interpretation and attention biases in SA and their modulation through emotion regulation.

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1. Introduction

Social anxiety (SA) is a very common phenomenon among the general population that expresses itself in a tendency to feel tense and worried in social situations caused by a fear of embarrassment and humiliation due to the evaluation by others. SA is observed in a spectrum of varying intensities in the population (Stein et al., 2010). Different theoretical models have been proposed (Clark and Wells, 1995; Rapee and Heimberg, 1997) suggesting that biases in information processing may play a causal role in the maintenance process of SA. According to these models, biases in the interpretation of (i.e., interpretation bias) as well as the attention towards (i.e., attention bias) social cues confirm the negative impression the socially anxious person has of him-/herself as a social object. Thus, they maintain the symptoms of anxiety. Both types of information processing biases in SA are supported by empirical evidence: Several studies showed that socially anxious persons are hyper-vigilant towards threatening cues (Asmundson and Stein, 1994; Garner et al., 2006; Gilboa-Schechtman et al., 1999; Mattia et al., 1993; Mogg and Bradley, 2002). Moreover, they tend to interpret ambiguous or neutral stimuli as threatening regardless of whether social stimuli are presented in form of verbal (Amir et al., 2005)

prosodic (Quadflieg et al., 2007) or facial (Heuer et al., 2010; Winton et al., 1995) expressions.

Previous research on information processing biases in SA has been confined to a limited number of social cue types such as verbal (Amir et al., 2008), prosodic (Quadflieg et al., 2007) and facial (Machado-de-Sousa et al., 2010; Staugaard, 2010) expressions. However, there are further social communication signals like laughter that occur frequently in everyday life. These have not yet received attention in SA research even though especially laughter can be assumed to have great potential as a tool for the investigation of information processing biases in SA.

Laughter is an ancient social communication signal which as tickling laughter is already present in nonhuman primates (Davila Ross et al., 2009). In humans it evolved into different laughter types (e.g. joyful or taunting laughter) which serve different social functions such as group bonding (Provine, 2013), but also social segregation (Eibl-Eibesfeldt, 1970). Tickling laughter, on the other hand, is an evolutionary older type of laughter. It is confined to bodily interactions serving the reinforcement of play behavior (Panksepp and Burgdorf, 2003) and contains less complex social information.

It could be shown that these different laughter types are distinguishable based on the vocal signal alone (Szameitat et al., 2009). Nevertheless, the laughter signal is not unambiguous. It can remain difficult to distinguish between the different types especially when there is little or no contextual information. This very ambiguity makes laughter as stimulus material for SA research

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very attractive as it is suitable to evoke typical behavioral correlates of SA through the transmission of ambiguous social information to socially anxious individuals whose central fears pertain to humiliation, criticism and rejection.

Furthermore, the ambiguity of the originally audiovisual laughter signal can be further increased by removal of sensory redundancy through unimodal (i.e., auditory) presentation. Since a negative interpretation bias in SA means that socially anxious persons tend to interpret specifically ambiguous stimuli as threatening, it can be presumed that this bias is more prominent for unimodally presented laughter stimuli as compared to multimodal presentations.

Cognitive reappraisal can be used as a strategy to modulate negative self-impressions and perceived danger in social situations. It represents an emotion regulation strategy that is intended to change an emotional response by reinterpreting the meaning of the emotion-provoking stimulus (e.g. by imagining that the anxiety-provoking cue is not directed at oneself; Gross, 1998). Non socially anxious individuals use cognitive reappraisal strategies to decrease negative emotional experience (Lazarus and Alfert, 1964). For individuals with SA several studies on cognitive reappraisal suggest that their ability to effectively implement cognitive reappraisal strategies may be impaired (Goldin et al., 2009a, 2009b; Werner et al., 2011). These results support cognitive models that posit emotion regulation deficits as a further core feature of SA (Hermann et al., 2004; Hofmann, 2004).

In the present study, we used novel, ecologically valid multimodal laughter stimuli to study social information processing biases in SA and the effects of cognitive reappraisal on biased perception. Participants with varying degrees of SA were asked to judge the communicative intentions (social inclusion, exclusion) expressed in different laughter types (joyful, taunting and tickling laughter) while imagining themselves in one of two situations: (1) being the intended target of the laughter, or (2) watching an actor rehearse laughter for a play (i.e., a condition which equals a cognitive reappraisal strategy).

Based on the literature referenced above, we established the following hypotheses:

First, we expected laughter to be rated as more socially rejecting with increasing severity of SA. Second, we hypothesized that this negative interpretation bias would decrease under cognitive reappraisal conditions. Third, the negative interpretation bias was expected to be stronger for unimodal auditory laughter stimuli due to the higher level of ambiguity. Fourth, we hypothesized a linear relationship between SA and faster response times to taunting laughter than to joyful laughter due to the attention bias towards threatening cues.

Finally, we tested a potential interindividual correlation of the hypothesized interpretation and attention biases.

Additionally, it was an aim of the study to relate laughter perception biases in the context of SA to the novel concept of gelotophobia (Titze, 2009) which can be described as a specific fear of being ridiculed and laughed at.

2. Method

2.1. Participants

Sixty individuals (30 women, 30 men; $M_{\text{age}} = 24.2$ years, $SD = 3.2$, all native speakers of German) took part in the study. They were recruited by public announcements (bulletins and email via the distribution list of the University of Tübingen) inviting persons who perceived themselves as either very shy or outgoing. All participants reported normal hearing and normal or corrected-to-normal vision. None had a history of neurological or psychiatric

illness, or substance abuse or was on any medication at the time of data acquisition. Prior to their inclusion in the study, all participants were examined using the Structured Clinical Interview for DSM-IV (Wittchen et al., 1997). Fourteen participants met the clinical criteria of social anxiety disorder (4 women, 10 men). The socio-demographic and psychometric characteristics of the study sample are shown in Table 1. The study was approved by the Ethics Committee of the University of Tübingen and was performed in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki). Written informed consent was given by all subjects before inclusion in the study. The participants received a monetary compensation for their participation.

2.2. Stimuli

The stimulus material consisted of 60 short video sequences of laughing faces (duration = 1.5 s). Three different types of laughter (joyful/friendly [JOY], tickling [TIC] and taunting/unfriendly [TAU] laughter) were portrayed in the video sequences. The stimulus set was balanced for laughter type (JOY = 18, TIC = 20, TAU = 22), recognition rates of the three laughter types (unbiased hit rates \pm SEM (Wagner, 1993): JOY = 0.45 ± 0.03 , TIC = 0.52 ± 0.03 , TAU = 0.47 ± 0.04), and the genders of the actors (female = 27, male = 33). For further information regarding the generation and evaluation of the stimulus material see Supplemental Material.

2.3. Experimental design and task

Stimuli were presented employing an LG Flatron L1953PM 17-inch flat screen and a Sennheiser HD 515 headphone (Sennheiser electronic GmbH & Co. KG, Wedemark-Wennebostel, Germany). The participants were seated in a comfortable position approximately 70 cm from the screen wearing headphones. The volume of sound presentation was adjusted to a comfortable volume for each participant. The screen had a resolution of 800×600 pixels and presented visual stimulus components were approximately the same size as a real face.

The main experiment was divided into two sessions with a short break in between. To modulate the ambiguity of the laughter signal, participants were presented with either audiovisual (AV) or audio (A) recordings of laughter. During each session all stimuli were presented under two different sensory conditions: unimodal auditory (A) and bimodal audiovisual (AV). In one session, the participants were asked to imagine they were directly addressed by the presented laughter (SELF). During the other session they were instructed to imagine they were watching an actor practicing a specific type of laughter (i.e., an imaginary technique which can be used as cognitive reappraisal for emotion regulation, OTHER). The

Table 1
Socio-demographic and psychometric data.

	Mean (SD)
Age (years)	24.2 (3.2)
MWT-B	31.2 (2.8)
BDI-II	4.0 (4.1)
LSAS	29.6 (25.9)
STAI state (X1)	34.6 (8.3)
STAI trait (X2)	44.7 (2.9)
Gelotophobia	1.9 (0.7)

MWT-B = "Mehrfachwahl-Wortschatz-Intelligenz-Test", a test of premorbid intelligence; BDI-II = Beck Depression Inventory; LSAS = Liebowitz Social Anxiety Scale; STAI = State-Trait Anxiety Inventory; Gelotophobia was assessed using the PhoPhiKat-45.

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