



Perception of other people's mental states affects humor in social anxiety

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ABSTRACT

Background and objectives: The present study examined the relationship between social anxiety and the appreciation of specific types of humor. It was expected that social anxiety would hinder the enjoyment of jokes particularly if the resolution of incongruity involves processing social cues and assessing the (false) mental states of others. Fifty-six participants rated three types of cartoons and a control condition for comprehensibility and funniness.

Results: High degrees of social anxiety were associated with less enjoyment of cartoons that involved the interpretation of others' mental states (Theory of Mind), but not of semantic cartoons or visual puns. Furthermore, high social anxiety was related to longer response latencies of the funniness ratings, especially in the case of Theory of Mind cartoons.

Limitations: A possible limitation is that the present study was conducted in individuals with social anxiety in the non-clinical range.

Conclusions: The findings suggest that highly socially anxious people do not have a general humor processing deficit, but may feel threatened by tasks involving the mental states of others. The negative affect evoked by TOM humor may hinder the experience of funniness in highly socially anxious individuals, and it may also make it more difficult for them to rate their own amusement.

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Social anxiety disorders are highly prevalent in the general population with a 7–13.3% lifetime prevalence (Kessler et al., 1994). These disorders are characterized by the experience of extensive fear in social interactions and overly negative evaluation of social situations (Schneier, 2006; Stein & Stein, 2008). Although a number of psychological correlates of social anxiety have been described, relatively little is known about the more elementary processes of social and emotional cognition that may predispose one toward developing social anxiety, and experiencing significant distress and functional impairment in work and social domains (Lochner et al., 2003; Schneier et al., 1994).

Previous research has proposed that high levels of social anxiety may partly be attributed to social cognition deficits, which are manifested as a tendency toward inaccurate and distorted appraisals of the beliefs and intentions of others during interpersonal interactions (Hirsch & Clark, 2004; Stopa & Clark, 2000). Given that individuals with social anxiety tend to form inaccurate impressions about others, "Theory of Mind" (TOM) tasks may serve

as a potent probe of mentalizing abilities, because they require individuals to make inferences about beliefs, intentions, and behaviors of others.

Functional magnetic resonance (fMRI) studies have begun to characterize the neural correlates of "mentalizing" using TOM tasks, indicating that a network of cortical areas that includes the medial prefrontal cortex, the temporal-parietal junction, and the precuneus plays a key role in mentalizing and forming impressions of other people (Amodio & Frith, 2006; Frith & Frith, 2006; Gallagher & Frith, 2003; Rilling, Sanfey, Aronson, Nystrom, & Cohen, 2004; Van Overwalle, 2008). Sripada et al. (2009) showed that patients with clinically significant social anxiety exhibited less activation of parts of this network during mentalizing compared with the results of matched healthy controls.

Whereas Theory of Mind usually refers to inferences about the mental states of another person, some researchers include the understanding of one's own mental states as a part of the concept. Brain-based studies show that certain brain regions respond both when individuals are asked to infer the mental state of another individual and when they are asked to reflect upon their own mental state. These findings suggest that there may be a common biological basis related to a more elementary process of

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mentalizing about internal states; that is, about those of another person as well as about those of oneself (Gentili et al., 2009; Oberman & Ramachandran, 2007; Ochsner et al., 2004; Saxe, Moran, Scholz, & Gabrieli, 2006). This is supported by evidence that social anxiety is linked to deficits in a brain circuit that is related both to social cognition and the evaluation of one's own emotional state (Gentili et al., 2009).

Evidence also suggests that social anxiety is associated with an attentional bias to threat by preferentially allocating attention toward threatening social information and signs of disapproval from others (Alden & Taylor, 2004; Amin, Foa, & Coles, 1998; Bögels & Mansell, 2004; Pineles & Mineka, 2005; Taylor, Bomyea, & Amir, 2010). Individuals high in social anxiety exhibit a bias toward negative information processing that is similar to biases in all other anxiety disorders (e.g., Mathews & MacLeod, 2005). However, social anxiety may be specifically characterized by aberrant processing of positive social information. Social anxiety has been related to diminished attentional allocation for positive social cues (Perowne & Mansell, 2002; Silvia, Allen, Beauchamp, Maschauer, & Workman, 2006; Taylor et al., 2010) and negatively biased processing of positive social information (Alden, Taylor, Mellings, & Lapsa, 2008; Lapsa, Cassin, & Rector, 2010; Yoon & Zinbarg, 2007). It has also been proposed that social anxiety may be associated with a more general positive affect deficit, related to a tendency to suppress emotions (Kashdan & Collins, 2010; Watson & Naragon-Gainey, 2010).

Humor is an important component of social interaction, generating laughter, amusement, exhilaration, mirth and other positive emotions (Martin, 2007; Ruch, 2007). Interestingly, humor processing has not yet been used to study more elementary cognitive or emotional characteristics in social anxiety. Previous research on general anxiety and humor shows that anxiety is negatively correlated to the self-reported use of more adaptive humor styles (affiliative and self-enhancing humor), but positively related to self-defeating humor, a maladaptive humor style (e.g., Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003). Although some studies show that humor reduces anxiety (e.g., Martin et al., 2003), only people with low or normal anxiety levels seem to benefit from the use of humor. In highly anxious individuals, humor may even have a detrimental effect. For instance, highly anxious students scored lower on a humorous test than on a non-humorous test, suggesting that anxious people may react negatively to humor (Townsend & Mahoney, 1981).

In the present study, an experimental paradigm in the context of positive emotions was used to test inferences about individual differences in social cognition and the perception of one's own emotions. Participants with varying degrees of social anxiety were presented with humorous stimuli that varied in the social cognition requirements to understand the joke, and rated the cartoons for comprehensibility and positive emotions (i.e., funniness). By these means we aimed at using humor to probe some of the cognitive mechanisms of social anxiety.

The degree to which someone is able to experience amusement evoked by a joke or funny event depends on multiple factors. On the one hand, different people perceive humorous stimuli differently, and this depends on a variety of personality characteristics. Examples include 1) experience seeking (e.g., Forabosco & Ruch, 1994; Ruch & Hehl, 2007), 2) sense of humor (e.g., Martin et al., 2003; see also Martin, 2007), 3) emotional responsiveness (Herzog & Anderson, 2000), or 4) temperamental mood states such as cheerfulness, seriousness and bad mood (Ruch, Köhler, & van Thriel, 1996, 1997). Furthermore, cognitive skills such as cognitive flexibility (Shammi & Stuss, 2003) or the ability to ascribe mental states to other people (Theory of Mind; Samson & Hegenloh, 2010) seem to influence humor processing.

On the other hand, stimuli characteristics also seem to play an important role: content-related characteristics such as joke cruelty,

hostility or aggression, and the joke target were addressed in several studies (Ferguson & Ford, 2008; Herzog, Harris, Kropscott, & Fuller, 2006; Samson & Meyer, 2010; Zillmann & Cantor, 1976). The formal or structural aspects of jokes and cartoons, such as the resolvability of the incongruity (incongruity-resolution and nonsense humor, e.g., Ruch, 2007) and the cognitive rule upon which the punch line is based (Attardo, Hemplmann, & DiMaio, 2002; Attardo & Raskin, 1991), seem to be relevant as well. It is assumed that in order to understand a punch line, one has to bring two initially incongruent scripts into congruence. This is possible by recognizing the cognitive rule (also called logical mechanism) that describes how to resolve the incongruity.

Recently, several studies addressed the impact of different cognitive rules on the humor response: it was shown that the neural activation patterns during processing of cartoons differed according to the cognitive rules specifying how the incongruity was to be resolved: visual puns (PUN) are based on visual ambiguity (one visual element represents two meanings simultaneously), semantic cartoons (SEM) include several cognitive rules (exaggeration, analogy, etc.), whereas Theory of Mind (TOM) cartoons are based on the false beliefs of one of the characters portrayed in the cartoon (Samson, Zysset, & Huber, 2008). One can argue that social cognition is increasingly required on a continuum from visual puns (not at all), to semantic cartoons (sometimes, mental states of others play a role but are not in the main focus of the joke), to TOM cartoons. In TOM cartoons, it is crucial to take into account the (false) mental states of the characters in the cartoon in order to understand the punch line. Usually, normal healthy participants rate visual puns to be the least funny, whereas TOM cartoons are perceived to be the funniest jokes. This pattern in the funniness response cannot be found in individuals with Asperger's syndrome who are known to have social cognition difficulties (Samson & Hegenloh, 2010).

Consequently, participants in the present study were exposed to PUN, SEM, and TOM cartoons, as well as to cartoon-like pictures (control condition; see methods section and Fig. 1). The comprehensibility rating refers to the cognitive process of detecting and resolving the incongruity in the cartoons (i.e., detecting the punch line). The funniness rating is related to the perception and appreciation of humor and enjoyment. As it implicates the participants' reflection on their own emotional state, the response latencies to the funniness rating may reflect how difficult it is to perceive and judge one's own mental state.

The aim of the present study was to examine whether the impact of social anxiety on humor appreciation may depend on the degree of social cognition involved in assessing humorous stimuli. We assumed that the degree of social anxiety may selectively predict the appreciation of TOM humor, where it is essential to take into account other people's thoughts and beliefs. These might be potentially threatening and negatively interpreted by socially anxious individuals. By contrast, we expected that humorous stimuli that do not require assessing the mental states of others, such as visual puns, may be equally enjoyed by individuals with low and high social anxiety. Referring to their possible deficit in the evaluation of their own emotions (Gentili et al., 2009), it was assumed that individuals high in social anxiety may take more time to perceive their own emotional states such as amusement and exhilaration. Finally, if social anxiety is related to more general positive emotional dysfunction, appreciation of all types of humor might be reduced.

1. Method

1.1. Participants

Fifty-six participants (28 men, 28 women) aged 18–53 years ($M = 24.3$, $SD = 6.3$) completed the experiment. They were

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