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Shorter communication

Socially anxious individuals lack unintentional mimicry

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ABSTRACT

So far, evidence for unskilled social behavior in high socially anxious individuals (HAs) is equivocal. One reason may be that shortcomings are often not directly observable. An important shortcoming would be a lack of unintentional mimicry because it communicates sympathy and rapport with the interaction partner. Therefore, we tested whether HAs show less unintentional mimicry of others. Twenty-nine HAs and 43 low socially anxious individuals (LAs) - all female - watched a virtual man (avatar) who displayed a fixed set of head movements while giving an opinionated speech. Four raters scored whether the participants mimicked the avatar's movements within 4 s. The results indicate that HAs did indeed mimic significantly less than LAs. Lacking such pro-social behavior, HAs may indeed be evaluated as less sympathetic by others, confirming their fears of being disliked.

While most humans enjoy social interactions (Aronson, 1999), they are feared by individuals suffering from social anxiety. Individuals with high levels of social anxiety (HAs) are preoccupied with their own performance in social situations and fear possible scrutiny by others (DSM-IV; American Psychiatric Association, 2000). Moreover, HAs are regarded as less pleasant to interact with than individuals with generally low levels of social anxiety (LAs; Heerey & Kring, 2007), and they often lack social skills (Bögels, Rijsemus, & De Jong, 2002; Voncken & Bögels, 2008). So far, the exact properties of the unskilled social behavior in HAs are largely unknown. One reason may be that some of the shortcomings are reflected in automatic, very subtle behavior patterns which are not easily observed.

Behavioral mimicry is such an automatic social behavior. It refers to changing ones' behavior unintentionally in order to match that of the other person in a social interaction (Chartrand & Bargh, 1999; Dijksterhuis & Bargh, 2001). Bavelas, Black, Lemery, MacInnis, and Mullet (1986) suggested that mimicry communicates affiliation, liking of, and rapport with the mimicked interaction partner. Early work (e.g., La France & Broadbent, 1976) as well as more recent findings (Lakin, Jefferis, Cheng, & Chartrand, 2003) provided evidence of a relationship between mimicry and rapport. This relationship is bi-directional: being mimicked creates an affiliation with the interaction partner, and individuals are more inclined to mimic a person they like better. In an immersive virtual environment (IVE), Bailenson and Yee (2005) found that people react more positively to a mimicking virtual man (a so-called avatar) than to an avatar that did not mimic. Vrijsen, Lange, Dotsch, Wigboldus, and Rinck (in press) extended these findings to a sub-clinical socially anxious population and found that, as expected, LAs regard a mimicking avatar as more positive than a non-mimicking one, but HAs did not. IVEs are very suitable for examining subtle behavioral mechanisms such as unintentional mimicry. Here, the avatar's movements as well as the testing environment can be fully controlled, and the IVE tracking system is able to measure the participant's movements with high precision.

The results of Vrijsen et al. (in press) suggest that socially anxious individuals do indeed display a problem with an important social behavior, namely the processing of unintentional mimicry. This led us to expect that they might also have problems with showing unintentional mimicry themselves. If they do not notice mimicry by others or appreciate it less than LAs, will they also show less of it themselves? In this case, the HAs' mimicry reception problem (Vrijsen et al., in press) would be accompanied by a corresponding display problem. And if HAs do not display an appropriate amount of mimicking behavior, they may unintendedly contribute to being regarded as socially unskilled and uncomfortable to interact with. Thus, by not mimicking, HAs might initiate and maintain the fulfillment of their own threatening prophecy: I am not liked. The current study was designed to test this hypothesis. As in the studies by Bailenson and Yee (2005) and Vrijsen et al. (in press), we used an IVE to control the interaction partner's behavior and to measure the participants' unintentional mimicry precisely.

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Methods

Participants

Dutch female undergraduates of Radboud University Nijmegen were screened using the Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987). Participants scoring lower than 14 or higher than 26 on the anxiety subscale of the LSAS (constituting the lowest and the highest quartile of the distribution; in line with Lange, Heuer, Reinecke, Becker, & Rinck, 2008, Experiment 3) were invited to participate in the study. This resulted in 29 HAs (mean age = 19.8 years) and 43 LAs (mean age = 20.7 years). In addition, the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) was administered at the time of testing. As expected, there was no overlap in SIAS scores between the HAs (SIAS > 25) and the LAs (SIAS < 20). All subjects gave informed consent, and they received course credit in return for their participation.

Procedure

After being re-tested with the LSAS and the SIAS, the participant sat down at a table and was instructed to pay attention to the speech of an avatar who would soon appear seated across the table. The experiment took place in the Radboud Immersive Virtual Environment Research lab (RIVERlab1). The participant wore a head-mounted display (HMD), which displayed the virtual environment. She could move her head and body freely, while the sensor positioned on the HMD recorded her position and orientation with 6 degrees of freedom at 120 Hz. The participant's exact head movements were automatically calculated, using this information. A Caucasian, male avatar gave an opinionated speech of 214 s about donating money to charities. Meanwhile, he moved his head 10 times at pre-defined points, synchronized with the speech (3× nodding, 6× head-shaking, 1× wobbling). These head movements were the critical, to-be-mimicked behavior. The avatar opened his mouth depending on the amplitude of his voice.

After the task, the participant was asked to write down what she recalled of the speech, to support the cover story as well as to serve as an indicator of attention. In the speech, 18 key topics were predefined and the free recall protocol was analyzed according to how many of these topics the participant wrote down. In addition, the participant's attitude towards the avatar and his speech was measured on a 6-items questionnaire, previously used by Vrijsen et al. (in press). The questionnaire yielded a Cronbach's alpha of $r = 0.88$. The questions (about sympathy, convincing, etc.) were answered on a 7-point Likert scale, ranging from 1 'not at all' to 7 'very much'. The participant was also asked for some biographical data and what she believed the purpose of the study was. The recorded head movements of the participants were saved as video clips.

Four raters (blind to the participants' anxiety level) scored each video according to how many of the 10 head movements the participants mimicked. The raters were instructed to only consider movements of the same type occurring within 4 s after each preset avatar-movement (totaling 40 s) as mimicry, independent of the magnitude of movement displayed and whether the movement was mirrored or not. So if the avatar nodded his head, the raters would indicate mimicry occurrence solely if the participant would also nod her head within 4 s. The 4 s window for mimicry was based on the finding that mimicry occurring later than 4 s is often not perceived as mimicry, but rather as random behavior (Bailenson, Beall, Loomis, Blascovich, & Turk, 2004). Interrater correlations were excellent at $r = 0.93$.

Design

The dependent variable "frequency of mimicry" was compared between groups (HAs versus LAs). Additionally, the free recall data were analyzed to compare HAs' and LAs' memory for the key topics of the speech. To ensure that the HAs did not just move less than LAs throughout the interaction, we compared their standard deviations of all head movements. In addition, the orientation in the vertical plane was tested to ensure that the HAs did not avoid looking at the avatar's face. Participants' height functioned as a covariate here. *T*-tests were used for group comparisons and effect size scores *d* were computed according to Cohen (1988).

Results

HAs mimicked the avatar significantly less ($M = 1.01$, SD = 1.22) than LAs ($M = 1.73$, SD = 1.58), $F(1,70) = 4.24$, $p < 0.05$, $d = 0.49$. Overall mimicry rates were low, as in previous studies (Chartrand & Bargh, 1999). Neither evaluation of the avatar, $F(1,70) = 2.61$, ns, $d = 0.39$, nor evaluation of his speech differed significantly between groups, $F(1,70) = 3.73$, ns, $d = 0.46$, see Table 1 for means. Moreover, HAs ($M = 5.07$, SD = 3.22) and LAs ($M = 5.07$, SD = 3.47) did not differ in how much information they recalled of the speech, $F(1,70) = 0.00$, ns, $d = 0.00$.

HAs did not differ from LAs with regard to how much they moved their head up and down, $F(1,68) = 0.29$, ns, $d = 0.13$, or sideways, $F(1,68) = 0.08$, ns, $d = 0.06$ (see Table 2). Moreover, HAs did not differ from LAs with regard to the duration of having the avatar's face in view, $F(1,68) = 1.99$, ns, $d = 0.34$. Therefore, the observed difference in mimicry can hardly be explained by different magnitudes of movements or attention during the entire interaction.

Table 1
Mean evaluation (and standard deviations) of the avatar and of the speech of the avatar per subject group.

	Group	
	HA	LA
Avatar evaluation	5.49 (0.97)	5.10 (1.02)
Speech evaluation	5.67 (0.84)	5.21 (1.09)

Table 2
Mean standard deviations of horizontal and vertical head movements (in centimeters), and mean orientation per subject group (including standard deviations).

	Group	
	HA	LA
Head movements		
Horizontal	1.56 (1.75)	1.40 (0.69)
Vertical	0.79 (0.89)	0.84 (0.63)
Orientation	87.99 (4.98)	89.37 (3.76)

Discussion

In a previous study (Vrijsen et al., in press), we found that when HAs are mimicked, they – unlike LAs – do not report enhanced liking of the interaction partner. Instead, they evaluate him similar to a non-mimicking person. The current findings indicate that HAs differ in displaying a standard, apt behavioral response to their interaction partner by mimicking him or her less. HAs not only lack appreciation of the interaction partner's mimicry, they also show less unintentional mimicry themselves during a one-on-one interaction. A categorical dislike of the interaction partner cannot