

# Can Social Agents elicit Shame as Humans do?

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**Abstract**—This paper presents a study that examines whether social agents can elicit the social emotion shame as humans do. For that, we use job interviews, which are highly evaluative situations per se. We vary the interview style (shame-eliciting vs. neutral) and the job interviewer (human vs. social agent). Our dependent variables include observational data regarding the social signals of shame and shame regulation as well as self-assessment questionnaires regarding the felt uneasiness and discomfort in the situation. Our results indicate that social agents can elicit shame to the same amount as humans. This gives insights about the impact of social agents on users and the emotional connection between them.

**Index Terms**—Social Agents, Emotions, Shame, Job Interview Training, Experiment

## I. INTRODUCTION

When interacting with a technical device, we are not just using it. More often than we realize, we tend to humanize those devices. We react towards them in a social way as we would towards other people since we apply learned social behaviors automatically [1]. Social training systems rely on this fact. In order to practice challenging social situations realistically, users' emotions have to be considered. Social training systems are created to learn social requirements [2]–[5]. They use information about the user in order to find appropriate user-specific strategies. This information includes emotional reactions based on the analysis of expressed social signals (e.g., facial expressions, body movement). Training systems that consider the elicitation of shame, come with a broader range to train users. However, only a few of the existing systems represent the internal emotion shame, which is of great importance for social situations due to its interpersonal nature. That is, shame arises only in the presence of other people [6]. In training systems, social agents are used to confronting users with challenging situations. Whether social agents can elicit interpersonal emotions like shame as humans do, is unclear. Therefore, this work investigates if social agents can elicit shame in humans and compares this with a human that elicits shame. We use the setting of a job interview, a highly evaluative situation [7]. Participants are confronted with a human or a virtual agent in the role of a job interviewer in shame-eliciting or neutral interviews. We compare externally assessed observational behavior data

regarding social signals of shame and shame regulation as well as subjective self-assessed discomfort in the situation in four conditions.

## II. BACKGROUND ON SHAME

We follow a model of emotions that differentiates between internal and external emotions [8]. External are *communicated* emotions that are encoded non-verbally in sequences of social signals, e.g., vocal or facial expressions (cf. [9]). Internal emotions are situational and structural emotions. *Situational* emotions represent information that is linked to a topic or situation that has been experienced. *Structural* emotions represent information about the appraisal of one's own attributes and actions. Therefore, they are related to the self-image and inform oneself about its general state. Shame belongs to the class of structural emotions. Hence, it is not directly encoded in a specific facial expression compared to, e.g., joy that has such a specific facial expression [9].

### A. The Social Emotion

Shame is a negative emotion that arises when we determine that our deeds, feelings or behavior do not meet certain social values, norms, rules or demands. That means shame is not elicited by a specific event but by our evaluation of this event [10]. When being ashamed, memories of similar situations are activated unconsciously. They determine the evaluation and thus the experience and behavior in this situation [11].

For adults, negative emotions like shame do rarely become conscious [8], [12] and are regulated unconsciously [13]. Usually, shame is not related to particular behavior cues (e.g., compared to joy). Most likely, shame often is (unconsciously) regulated immediately. Emotion regulation makes an unpleasant situation emotionally bearable [14]. Due to a high level of attention that is focused on the self, people typically feel exposed and wish to hide or disappear in a shameful situation [15]. As shame can be perceived as an attack on one's self-concept, it is experienced as strongly unpleasant [16]. Shame is one of the most intensive [17] and most aversive emotions because the whole self is implicated in the feeling of shame [18]. Shame has several useful functions. It is, e.g., linked to the self and promotes the development of independence and development in general. Importantly, shame regulates social behavior, which facilitates social integration [15].

Shame has a highly interpersonal nature. Humans can experience it only after they have discovered in early childhood

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that not only oneself but also other individuals are capable of emotions [12], [19]. Consistently, shame is triggered by utterances and deeds of others, which implies an understanding and a particular sensitivity towards opinions and feelings of others. Of particular importance are individuals with which we have a personal relationship and whose opinion we value [15]. Shame only emerges when we care about the interaction partner's opinion of us due to a connecting emotional bond. Thus, the self feels dependent and fears rejection by the other [20]. Shame is a protective mechanism that evolved due to the social nature of humans. The display of open shame is a way to communicate the awareness of a faux pas in order to restore or sustain one's social reputation and to avoid rejection [21].

### *B. Measurements: Questionnaires and Observational Data*

Psychometric measures include questionnaires in which participants self-assess their shame or related regulation. The assessment via questionnaires has several restrictions [22]. As shame is one of the most aversive emotions [18], it might even happen that participants do not want to disclose themselves.

One method of avoiding the problems of self-assessment is the observational coding of shame and related regulation. Shame or its regulation manifests less in specific verbal or facial expressions but in sequences of nonverbal behavior [23]–[25]. Characteristic shame and its regulation signals are, e.g., averting or lowering gaze and head [10], [15], [17]. In the job interview, interviewees avoid eye contact with the interviewer when answering shame eliciting questions [26]. These shame signals issue from the wish to disappear and protect oneself from the other person's gaze in whose presence the shameful event happened [10]. The wish to hide due to a shame experience can also be expressed by (partially) covering the face with the hands [27], [28] as well as “shrinking”, collapse or forward-leaning of the upper body [10], [20]. On the verbal level, the inability to speak or silence is found as a shame signal [10], [20].

### *C. Job Interviews*

In this work, we exploit the use case of a virtual job interview to find out whether social agents can elicit shame as humans do. The job interview is a predestined situation for the investigation of this research question because job interviews are high-stakes situations [7], [29]. This means that the interview is a highly evaluative situation with significant pressure on interviewees to put their best foot forward as the professional future of the interviewee depends on the outcome of the interview. From the start of the interview, interviewees need to present themselves in a favorable light under the evaluative eyes of the interviewer(s) [7]. For instance, interviewers seem to be affected by applicants' clothing in the interview [30] and even the initial handshake in an interview can influence interviewers impression of an applicant [31]. This means initial impressions of applicants form after few seconds and these can affect interview performance ratings. Throughout the interview, interviewees need to present themselves and their professional career in a favorable light and

they are exposed to critical questions by the interviewer [32]. For example, interviewers can have the CV of the applicant on their desk to check for incoherence [33]. Furthermore, there are interviewers who deliberately challenge applicants with intimidating questions and behavior (so-called stress-interview methods; [34], [35]). Throughout the interview, interviewees' cognitive load remains high [36] as they need to listen to questions, search in their mind for appropriate responses all while keeping a professional nonverbal display. Taken this all together, it is not surprising that interview anxiety is a common phenomenon applicants experience during job interviews [7]. Moreover, all of the aforementioned aspects of the job interview process (high-stakes situation, evaluative situation, high cognitive load) might also account for the fact that interviewees can experience shame in job interviews [37] and respond with shame related behavioral strategies. For instance, imagine an applicant in a job interview. The applicant knows that with succeeding in this interview he or she will finally get a job after a lengthy application process. If the applicant is now confronted with a challenging interview question or comment (e.g., that an answer was not very impressive), he or she might expect a rejection by the interviewer. In this case, shame related withdrawal or avoidance behavior seems to be one possible outcome of this situation [37].

### *D. Human-Computer-Interaction*

As described, in the field of emotion psychology, shame is characterized as an emotion that arises in interpersonal situations. The requirement for experiencing shame is therefore the presence of a counterpart. In psychological literature, this counterpart is assumed to be a human. However, studies in the field of computer science found evidence that computers can be seen similar to a human counterpart as social actors [38].

Few studies examine whether shame can be elicited by a robot [39], [40]. Humans can feel shame in the presence of a robot when doing intimate actions [40]. In the setting of a health examination, participants should undress and insert a thermometer into their rectum. They showed significantly more shame in front of a humanoid robot than in front of a technical box.

In [39] participants should perform eight extraordinary and shameful tasks on the orders of a NAO robot or a human, e.g., tearing a page out of a book, removing a booger from their nose. The author found a significant increase in the reported shame after fulfilling the tasks, either given from a humanoid robot or a human. Moreover, the elicited shame was independent of the instructor.

Both presented studies show that humanoid robots can elicit shame in human interaction partners. Moreover, one study shows that the amount of elicited shame is the same with a robot and a human. However, none of the experiments compared if humans show the same level of shame towards social virtual agents and humans. They also do not include observational data of shame and shame regulation, whereas it is mentioned as future work [39].

### III. RELATED WORK

Social training systems rely on the fact that computers can evoke emotions. They have seen rapid evolution in recent years due to advances in the areas of social signal processing as well as improvements in the audio-visual rendering of virtual agents. Such systems complement or even substitute traditional training approaches. Techniques for the recognition of human socio-emotional behaviors and their synthesis using virtual agents have been employed in various cases: They can be used to practice social skills in group interactions [5], [41], [42], to experience difficult face-to-face interactions [2], [43] or for a personal therapeutical usage [3], [4].

The Logue system [5] attempts to improve public speaking skills by giving the speaker additional information via an augmented reality interface. Using a head-mounted display and various sensors providing behavioral feedback, while speaking the user gets information about normative shortcomings in the nonverbal behavior in an unobtrusive way. Providing real-time visual feedback on presenters' openness, body energy, and speech rate during public speaking, the system enables the user to adapt his behavior regarding listeners' needs.

In the anti-bullying game FearNot! [42] interactive stories in a virtual school with embodied conversational agents in the role of bullies, helpers and victims are created. Children run through various bullying episodes, interact with the virtual agents after each episode and provide advice to them.

A difficult face-to-face situation that can be trained with social training systems is the job interview [2], [43]. MACH [43] includes a virtual agent that reads facial expressions, speech and prosody and responds with verbal and nonverbal behaviors in real-time. In EMPAT [2], the job interview training includes a complete experience of a job interview process in a 3D environment. The virtual agent takes the role of the interviewer or other employees. After the interview experience, trainees can review their performance along with feedback on their behavior with a virtual coach. Additionally, virtual job interviewers can adapt their behavior depending on the trainees' automatically assessed shame regulation [44].

Conati and Maclaren [45] present an interactive agent system that is able to model user emotions in a specific computer game. The emotion model uses the users game actions as input to increase the agents capability to effectively respond to the users emotions. It includes the OCC emotions shame and pride but does not connect the emotions with social signals.

SimSensei Kiosk [3] is an implemented virtual human interviewer designed to create an engaging face-to-face interaction where the user feels comfortable talking and sharing information. The virtual human Ellie conducts semi-structured interviews that are intended to create interactional situations favorable to the automatic assessment of distress indicators, defined as verbal and nonverbal behaviors correlated with depression, anxiety, or post-traumatic stress disorder.

All these social training systems are designed to help people to enhance their skills in difficult social situations by analyzing their behavior. Although many of the difficult social situations

tackled in the mentioned social training systems are related to shame, none of the presented systems includes this social emotion. They rather focus on external emotions that are communicated via verbal and nonverbal behaviors, e.g., sadness or joy. For more complex emotions, like the emotion shame, a model of emotions that differentiates between external and internal emotions has to be applied (see Sec. II).

### IV. STUDY OUTLINE

In this study, we examine the effect of the interview style (shame-eliciting vs. neutral) as well as the job interviewer (human vs. virtual agent) on the affective reaction of interviewees. For that purpose, we conduct job interviews framed in a job interview training. Our dependent variables include observational data regarding the social signals of shame and shame regulation as well as self-assessment questionnaires regarding the felt uneasiness and discomfort in the situation. The shame-elicitation is a precondition to find out if the interviewer has an influence on the affective shame reaction. Hence, we formulate the following two-step hypotheses:

*Hypothesis 1a and 1b:* The felt uneasiness in the situation, measured with the construct of creepiness, and the observed social shame signals are influenced by the interview style. Participants feel more uneasy in the shame-eliciting interview compared to the neutral interview (1a). Participants show more shame signals in the shame-eliciting interview compared to the neutral interview (1b).

*Hypothesis 2a and 2b:* In the shame-eliciting interviews, the interviewer does not have an effect on the affective reaction. The observed social shame signals are not influenced by the interviewer. Participants show the same amount of shame signals in the interview with the virtual agent compared to that with the human interviewer (2a). The experienced discomfort in the situation is not influenced by the interviewer. Participants evaluate the interview with the virtual agent similarly unpleasant to that with the human interviewer (2b).

Before starting the experiment, we obtained a positive vote of the ethical review board consisting of psychologists and legal experts accompanying the project.

### V. METHODS

We used a 2 (shame-eliciting vs. neutral) x 2 (human vs. agent) between-subjects design to examine if a social agent is able to elicit shame in users. For the shame-eliciting condition, five shame-eliciting situations were embedded in a job interview. In the neutral condition, the job interview followed a standard procedure. In the human condition, the job interview was conducted face-to-face by a human interviewer. In the agent condition the job interviewer was a social agent presented in life-size on a screen.

#### A. Pre-Study

In order to develop realistic statements of job interviewers that elicit shame in interviewees, we conducted a qualitative pre-study. We described six situations reflecting different associations to the self that might elicit shame [11]. Twenty-six

( $M_{age} = 21.70$ , 20 female) students were asked the open question how they would react to the six situations. A qualitative analysis of the answers showed that people reported a shame-or shame regulation-reaction

Table I  
SHAMEFUL SITUATIONS IN THE MAIN STUDY.

| Elicitor   | Situation  |
|--|--|
| Personal attractiveness                            | After greeting the interviewer, he says “Where did you get this outfit? Somehow it doesn’t really fit you.”  |
| Sense of self                                      | After you have presented your experience, the interviewer reacts as follows: “All the other applicants have already said what you said. You haven’t exactly stood out”.  |
| Competition  | To your answer the interviewer says: “Well, that answer was not very impressive. I’ve heard better from the other applicants.”   |
| Matters of personal size, strength, ability, skill | During the conversation, the interviewer looks again in your application documents and says: “You have indicated SKILL as one of your strengths. This I really cannot see on the basis of our present conversation.” |
| Wishes and fears about closeness                   | At the end the interviewer says: “Now that I know you a bit better, I have to say that in my opinion, you will probably never find a company you will fit into.”   |

Note. SKILL was replaced by the individual strength given two days before.

### B. Participants

We gathered data from 122 participants. Due to technical problems resulting in a low quality of the video recordings, we had to exclude 19 participants. The remaining 103 participants (71 female, 32 male) were equally distributed over the four conditions. They were recruited via flyers and mailing lists at the campus on condition that they were fluent in German. Psychology students could choose between course credit and 5€ for participation, students from other faculties were rewarded with 5€. Participants’ age was between 18 and 39 years ( $M = 23.91$ ,  $SD = 4.01$ ) studying on average in the 4.70 semester ( $SD = 4.10$ ). On average, participants attended 3.61 job interviews ( $SD = 3.59$ ) prior to the experiment. There was no significant difference between the four experimental groups regarding gender, age, semester and job interviews experience.

### C. Procedure

Two days before the experiment, the participants received an email containing the link to the demographic questionnaire that they had to complete on the same day. At the interview day, the participants were welcomed in the experimenter’s room and informed about the procedure of the experiment. Next, they were introduced to the role-play of the job interview. Participants were told to imagine that they applied for a

student assistant position at their favorite university chair (i.e., a chair where they could also imagine to work after graduating). Participants were told that a female interviewer would conduct interviews to get to know them better. In the agent conditions, we added the information that the interviewer was a social agent. Participants were also informed that the interview would be a structured interview in order to ensure comparability (i.e., no follow-up questions by the interviewer and no questions from the interviewee are allowed [46]). Then, the experimenter guided the participants in front of the door of the office where the interview was conducted. Participants were equipped with a microphone and entered the office of the interviewer alone. In the room, they experienced the respective interview with either the agent or the human interviewer. After the interview, the participants left the office and were received by the experimenter and guided back to the experimenter’s room. There, they answered the post-questionnaires on a tablet PC. Finally, the participants were debriefed and paid. The whole procedure took around 30 minutes.

### D. Material and Experimental Setup

In this study, participants were confronted with a job interview conducted either by the interactive social agent Susanne (Fig.1 down) or a human interviewer (Fig.1 up). Susanne is a high-quality agent with a natural human appearance and verbal as well as nonverbal dialogue skills [47]. The natural interaction between user and agent is based on a real-time system consisting of three components: 1) a real-time social signal interpretation framework, 2) a behavior and interaction modeling and execution tool that can be controlled remotely, and 3) a 3D virtual environment rendering engine [2].

This system enables us, e.g., to create a natural conversation flow: the social agent continued to talk when it detected silence. After the participant stopped talking, the social agent continued with her next question. Moreover, the verbal and non-verbal behavior was scripted in a natural way. The social agent supported its verbal expression with gestures and facial expressions, e.g., smiling, nodding, showing palms. Also, it provided feedback channeling with smiling and nodding while the participant was talking. The human interviewer was an experienced amateur theater player who was trained to show the same behavior as the social agent.

Due to the need for comparable interactions for each participant, the job interview was structured. After welcoming, the interviewer asked the participant to sit down and to connect the head-mounted microphone. The interview started with the presentation of the open position and a question about the resume of the participant and participant’s fit to the job. This was followed by biographical, situational, and social questions, e.g., exploring participants’ proactivity, organizing ability, ability to take criticism. In the end, the interviewer thanked the participant for attending the interview and instructed participants to leave the room in order to be guided to complete the final questionnaires.

The interview took place in a lab at a university chair, looking like a typical office with a size of about 20m<sup>2</sup>.



Figure 1. Setup in both conditions.

The experimental setup consisted of a PC running MS Windows 10™ (Intel Core i7 CPU@3.5GHZ, 16GB Memory, NVIDIA GTX 990 graphics cards) connected to a TV screen (43 inches), showing the virtual interviewer at a realistic size in a 3D environment (Fig. 1). Each participant was seated at a table in front of the display at a distance of 119 cm. In the human interviewer condition, the screen was removed and the interviewer was placed at the table. The interviewer was wearing a head-mounted microphone. Participants in all conditions were wearing a head-mounted microphone in order to cancel any environmental sounds and were video recorded using a Microsoft Kinect 2 camera.

#### E. Measurements

As the measurement of negative emotions like shame is challenging (see II-B), we use a hybrid approach with dependent variables from two different sources: externally assessed observational behavior data as well as subjective self-report data. Externally assessed behavior data included the analysis of the video recordings regarding the social signals of shame and shame regulation. Subjective data consisted of self-report questionnaires for uneasiness of the situation and discomfort in the shame-eliciting situations.

*Demographics* included age, sex, job interview experience, field of study, favorite university chair as well as strengths and

weaknesses that they would mention in a job interview.

*Uneasiness in the situation* was measured with ten items from the Creepiness of Situation Scale [48]. Creepiness is defined as uneasy feelings involving ambiguity (e.g., not knowing how to behave or how to judge a situation) within a given situation. A sample item is “During this situation, I had a queasy feeling.” Items were answered on a Likert-type scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Cronbach’s Alpha was .88.

*Discomfort in shame situation.* To find out if participants experienced the shame-inducing situations as unpleasant, we included five items reminding them of the five shame-inducing situations (e.g., “The comment of the interviewer regarding the fact that your outfit did not really fit you.”). Participants were asked to evaluate this situation on a 5-point-scale from 1 (*very unpleasant*) to 5 (*very pleasant*). Cronbach’s Alpha was .78.

*Observational coding of shame.* We include the following five social signals related to shame and shame regulation: averting gaze, averting head, hand-to-head movement, shrinking and keeping silence (see II-B). Each of the five shame eliciting situations was either coded with 1 (*shame signal present*) or 0 (*shame signal absent*) for each social signal. This results in a range from 0 to 25 for the sum of all shame signals in all situations (e.g., when a participant shows one shame signal in each situation, his value is five). The relevant time slots for the observational coding of shame and shame regulation, started once the interviewer finished with her shame-eliciting sentence and ended when the interviewer started again to talk. In the neutral interviews, we formulated neutral statements and defined the time slots similarly.

## VI. RESULTS

In order to test our hypotheses, we chose a two-step approach for the analysis. First, we checked for the impact of interview style in general to examine the effect of the shame-eliciting interview. In the second step of the analysis, we examined whether the interviewer (human vs. social agent) had a significant influence. Hence, two multivariate analyses of variance (MANOVA) were calculated.

The first MANOVA included the dependent variables uneasiness in the situation and the observational coding of shame to test whether the interview style had an effect. The multivariate result was significant for interview style, with Pillai’s trace = .21,  $F(2,98) = 12.82$ ,  $p < .001$ ,  $\eta_p^2 = .21$ ). Hypothesis 1a postulated a greater uneasiness of the participants on the shame-eliciting condition compared to the neutral condition. The statistical analysis revealed a significant difference between the two conditions. Participants reported higher values of uneasiness in the creepiness scale in the shame condition ( $M = 4.45$ ,  $SD = 1.05$ ) compared to the neutral condition ( $M = 3.69$ ,  $SD = 1.16$ ;  $F(1,99) = 12.26$ ,  $p < .001$ ,  $\eta_p^2 = .110$ ). Thus, hypothesis 1a was supported by our data. Hypothesis 1b proposed a similar pattern of difference between the shame-eliciting and the neutral situation regarding the shame signals. As hypothesized, a significant difference between the two conditions was found ( $F(1,99) = 14.54$ ,  $p < .001$ ,  $\eta_p^2 = .128$ ).

Participants showed a greater amount of observational shame signals in the shame-eliciting ( $M = 7.66$ ,  $SD = 2.67$ ) condition compared to the neutral condition ( $M = 5.87$ ,  $SD = 2.15$ ). Overall, we found supporting evidence that the interview style has an effect on participants affective reaction.

The second MANOVA included the dependent variables discomfort in shame situation and the observational coding of shame to support the hypothesis that the interviewer does not have an effect in the shame-eliciting interview. We could not find a significant difference between the human or virtual interviewer (Pillai's trace = .06,  $F(2,47) = 1.40$ ,  $p = .256$ ).

As hypotheses 2a and 2b are testing for a non-existent difference, in addition to the classical statistical test, the MANOVA, we report also Bayes Factors allowing to express preference for either the null hypothesis or the alternative [49].

Hypothesis 2a expected no effect of the interviewer on the shame signals in the shame-eliciting condition. In the human condition participants showed  $M = 7.28$  ( $SD = 1.90$ ) shame signals; in the social agent condition participants showed  $M = 8.04$  ( $SD = 3.26$ ) shame signals. The Bayes factor was in favor for the null hypothesis ( $JSZ-B_{01} = 3.02$ ,  $Scaled-Information-B_{01} = 2.29$ ) supporting hypothesis 2a.

Hypothesis 2b stated that participants do not show a difference in the discomfort depending on the interviewer in the shame-eliciting condition. In the human condition discomfort was  $M = 2.15$  ( $SD = 0.59$ ); in the social agent condition discomfort was  $M = 1.93$  ( $SD = 0.51$ ). Also here, the Bayes factor was in favor of the null hypothesis ( $JSZ-B_{01} = 1.91$ ,  $Scaled-Information-B_{01} = 1.42$ ). Hypothesis 2b was supported.

## VII. DISCUSSION

The aim of this study was to find out whether social agents can elicit the interpersonal emotion shame, an emotion that is usually dependent on the presence of other people [15]. In shame-eliciting and neutral job interviews, participants were confronted with either a human or a social agent in the role of a job interviewer. The main finding of this study was that social agents attacking the self of participants can elicit the same level of shame as humans. The present study thereby confirmed previous findings showing that it is possible to elicit shame with non-human entities [39], [40] as well as that the level of shame is independent of the shame-eliciting entity [39]. We applied a two-step approach to test our analysis: Firstly, we compared the shame-eliciting with the neutral interviews in order to find out whether shame could be elicited with our setup. Results indicated that in fact, participants experienced a higher level of shame in the shame-eliciting interview showing corresponding values in both the self-assessment and the observational coding of shame and shame regulation signals. In the second step of our analysis, we searched to examine the shame-eliciting situation further. Therefore, we tested whether there was a difference between the human and the social agent in the shame-eliciting condition. Participants showed the same amount of social signals of shame and shame regulation signals in the shame-eliciting interviews regardless of the interviewer (human or social

agent). These findings could be supported by revealing no difference depending on the interviewer in participants' self-assessment questionnaire concerning discomfort. Participants reported the same experienced discomfort with the social agent and the human interviewer in the shame-eliciting situations. Overall, those findings are remarkable. Shame has a highly interpersonal nature, meaning that it arises in the presence of other people [15]. Some researchers go even beyond that. They claim that shame only emerges when we care about the interaction partner's opinion of us because of an emotional bond connecting us. Thus, the self feels dependent and fears rejection by the counterpart [20]. It seems that a social agent in the role of a job interviewer is able to represent an entity with those attributes. A social agent can take on a considerable role for a human user by making the human feel dependent and fear the reaction of the social agent.

## VIII. CONCLUSION, LIMITATIONS, AND FUTURE WORK

In this work, we showed that a social agent is able to elicit the interpersonal emotion shame in a human. With those results, we found evidence that social agents are able to elicit emotions in users that are usually caused by the evaluation of other people. This finding goes beyond the Media Equation [1] or the fact that non-human entities can evoke feelings of eeriness [50]. People are not only treating computers as real persons after a schema anchored in us through learning processes. They are not only reacting automatically in a socially adequate way, e.g., saying "You're welcome" after someone thanked you. It rather seems that social agents are able to affect us on an emotional level and elicit a social emotion. We enter into an emotional connection with them by allowing them to attack our selves.

We used a job interview to find out whether social agents can elicit shame. The job interview is a high-stakes situation [7], [29] meaning that it is highly evaluative with significant pressure. Therefore, it might be that the situation itself was very "powerful" to elicit shame per se regardless of the interviewer. However, we could show that the shame-eliciting interview significantly invoked more shame than the neutral interview. Nevertheless, future work should examine the elicitation of shame or other social emotions in other use cases. Moreover, it still remains unclear why humans emotionally care about the opinion of a social agent. Future work, therefore, could examine the reasons and determinants behind the willingness of humans to connect emotionally to a social agent.

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