

Saved by the Blush: Being Trusted Despite Defecting

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This study examined whether blushing after a sociomoral transgression remediates trustworthiness in an interdependent context. Participants ($N = 196$) played a computerized prisoner's dilemma game with a virtual opponent who defected in the second round of the game. After the defection, a photograph of the opponent was shown, displaying a blushing or a nonblushing face. In a subsequent Trust Task, the blushing opponent was entrusted with more money than the nonblushing opponent. In further support of the alleged remedial properties of the blush, participants also indicated that they trusted the blushing opponent more, expected a lower probability that she would defect again, and judged the blushing opponent more positively.

Keywords: blushing, signalling, trustworthiness, embarrassment, appeasement

Most people blush at least occasionally. Despite its common nature, the majority of people consider blushing a highly undesirable response, and a considerable number of people apply for extreme options such as a surgical intervention to remove the possibility to blush (Nicolaou, Paes, & Wakelin, 2006). Given its negative appreciation, the question why people blush in the first place arises. In his famous chapter about the blush, Darwin concluded that blushing is merely an epiphenomenon of social attention without any clear function (Darwin, 1872/1989). However, because facial expressions play such a crucial role in communication, it is tempting to assume that also facial blushing is de facto a functional signal. Accordingly, Castelfranchi and Poggi (1990) argued in their essay "Blushing as a discourse: Was Darwin wrong?" that blushing after a transgression signals that someone cares about the others' evaluations. In that way, blushing serves as an acknowledgment of wrongdoing and as an apology. This, then, may restore the trustworthiness of the offender and decrease the expectancy that the blushing individual will defect again. In interdependent contexts, it is critically important to determine who feels guilty about a transgression and will cooperate in the future. The blush may be an important source of information here,

especially because it is a signal that cannot be voluntarily produced (Frank, 1988).

To date, only a few studies have examined the blush as a distinct signal of sincere regret. Three vignette studies showed that blushing after a mishap or a social transgression served a remedial function. Blushing agents were judged more positively and were perceived as more trustworthy than their nonblushing counterparts (de Jong, 1999; de Jong, Peters & de Cremer, 2003; Dijk, de Jong & Peters, 2009). However, to demonstrate that blushing really facilitates social interactions, it would be critical to show that people not only report that they trust the blushing actor more but also act accordingly.

One previous study had been set up to test the effects of blushing in a more real-life interactional setting (de Jong, Peters, De Cremer, & Vranken, 2002). In that previous study, a homogeneous group of individuals sharing the important social goal of cooperation had been selected (i.e., prosocials; van Lange & Kuhlman, 1994), and these individuals participated as pairs in a prisoner's dilemma game (PDG).¹ While playing the PDG, one of the prosocial participants was forced to defect instead of to cooperate. As expected, this led to a significant blush response in the defecting participant. Unexpectedly, this blush response did not seem to create a higher level of cooperation in the observers of the blush. It even appeared that the more the defector blushed, the less positively she was judged by the opponent. de Jong and colleagues (2002) argued that perhaps in an ambiguous context an observer

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We thank Addie Johnson for her helpful comments on a previous version of the manuscript. The first author was supported by a fellowship of from the Dutch Organization for Scientific Research (NWO, Grant No. 016.005.019)

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¹ In a PDG, two agents each make a decision to cooperate or defect. Payout for each agent depends on his or her own decision and that of the other agent. Agents make their decision without knowing the other agent's decision. When both agents cooperate, the division of money is equal. When one agent defects, whereas the other agent cooperates, the defector earns more than is received in the case of a joint cooperation; the cooperator earns little or nothing. When both agents defect, they both earn little, but usually more than the cooperator in case of a one agent cooperating and the other agent defecting.



Figure 1. The expressions used in the study.

infers the worst of the possible motives that a blushing defector might have had. That is, an observer might wonder why, if the defector is really innocent, would she blush? This negative effect of blushing in contexts where there is uncertainty about the actor's motives was confirmed in a later vignette study; after clear-cut transgressions blushing had appeasing properties, whereas in more ambiguous situations blushing appeared to negatively influence an observer's judgment of the blushing actor (de Jong et al., 2003). However, in this previous interaction study, the blush was clearly not isolated from other concomitant behavior that could also have influenced the observers' judgments. For example, it has been noted that the blush is often accompanied by mental confusion (Darwin, 1989/1872; Neto, 1996), which might have caused the blushing participants to behave socially inadequate (cf. Bögels & Voncken, 2008).

Therefore, in the present study, participants played a prisoner's dilemma game on a computer with a virtual opponent, and after

each round a photograph of the virtual opponent was shown on the screen (cf. Dijk et al., 2009). Using a virtual interaction rather than a real interaction allowed tight experimental control of the facial expression of the opponent (blush or no blush), while controlling for possible concomitant behaviors that might confound the influence of blushing on the observers' judgments. To test the influence of context there were two conditions. In one condition, any ambiguity with regard to the opponent's motive for defecting was prevented by informing the participant that their opponent was instructed by the experimenter to defect. In the other condition, this additional information was omitted. In this condition, the opponent's motive for defecting thus remained ambiguous. Furthermore, the use of photographs allowed to test if the supposed remedial effect of the blush also holds on top of a facial display that is already known to be appeasing, such as embarrassment (Keltner, Young, & Buswell, 1997). During the PDG, the virtual opponent always defected in the second round, and in half of the cases she blushed afterward. To test whether blushing affects the observers' tendencies to (not) trust or forgive the opponent after this defection, participant's trust-related behavior was measured in a subsequent Trust Task.

To summarize, the present study tested the following three hypotheses: First, a blush after defecting in the unambiguous condition increases trust. Second, after a defection in an ambiguous context a blush decreases trust. Third, the trust-saving effects of a blush after a transgression are additive to the trust-saving effects of other appeasing displays.

Method

Participants

Description. Participants ($n = 196$) were first-year psychology students who cooperated for course credits. Approximately 20% were men. The mean age of the participants was 19.88 years, range 17 to 44 years.

Exclusion criteria. The study was completed online by 327 participants. Because we did not conduct the study in a controlled lab-setting, we asked the participants (as a final question) to indicate if their data were accurate. Participants who stated that their data were not accurate ($n = 17$) were excluded from the study. Furthermore, the study aimed to measure if blushing after a transgression enhances subsequent trust-related behaviors. However, the defection of the opponent would probably not be per-

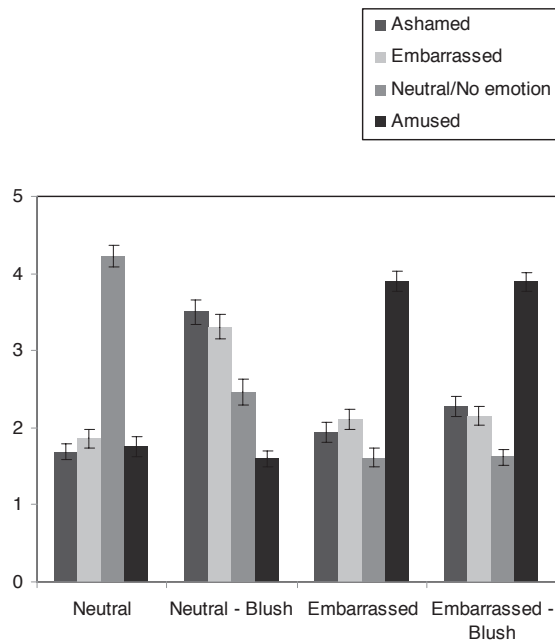


Figure 2. The mean values (with standard error bars) of emotions that were attributed to the four expressions (neutral, neutral-blush, embarrassment, embarrassment-blush).

| Moral Task Payout Table | | You | |
|----------------------------|-----------|-------------------------------|-------------------------------|
| | | Cooperate | Defect |
| Other | Cooperate | You get \$3 Other gets \$3 | You get \$5 Other gets \$0 |
| | Defect | You get \$0 Other gets \$5 | You get \$1 Other gets \$1 |

| Trust Task Payout Table | |
|---|--|
| You start with 10 dollars and make the first decision; the other person makes the second decision. | |
| <ul style="list-style-type: none"> You will end up with: \$10 minus what you give to the other person, plus what he/she gives back to you | |
| <ul style="list-style-type: none"> The other person will end up with: 3 times what you give to him/her, minus what he/she gives back to you | |

Figure 3. The Moral Task and Trust Task payout tables.

ceived as a transgression if the participant already defected him/herself. Therefore, an additional 114 participants were excluded because they defected before the virtual opponent defected² (cf. de Jong et al., 2002).

Design

The study consisted of a 2 Response (Blush vs. No Blush) × 2 Emotion (Embarrassment vs. Neutral) × 2 Context (Informed vs. Uninformed) between-subjects design.

Response × emotion. After the virtual opponent defected in the second round of the PDG, the computer randomly showed a photograph of the opponent with one of four possible displays: (1) a neutral face, (2) a neutral blushing face, (3) an embarrassed face, or (4) an embarrassed blushing face (see Figure 1). The model in the picture was instructed to display embarrassment (a non-Duchenne smile [in which there is no activation of the m. orbicularis oculi], lip press, gaze downward, face touching and a head movement slightly downward); or a neutral face (which consisted of a relaxed look, straightforward) (see Keltner, 1995; Keltner & Buswell, 1996). The photographs were manipulated with the program Paint Shop Pro 7 to color them with a lifelike blush. All pictures were of the same person and were selected from a previous study in which they were successfully recognized as being neutral or embarrassed (Dijk et al., 2009). To check whether the facial expressions were still perceived as neutral or embarrassed in the present context, participants rated the face that was shown after defection on four emotions (ashamed, embarrassed, neutral, amused). As can be seen in Figure 2, the neutral faces were rated as being neutral, and the neutral-blush faces were rated mostly as being ashamed or embarrassed. However, the embarrassed and the embarrassed-blush faces were rated as being amused, not as being embarrassed. We will later return to this unexpected result.

Context. Participants were randomly assigned to an informed or an uninformed version of the PDG. In the informed context, participants read: “Because of the study we sometimes give your opponent several assignments. In your case we instructed the other

person to defect in at least one of the rounds, independently of what you choose. The other person does not know that you received this information. Thus, the other person does not know that you know that he or she has to defect.” In the uninformed context, participants did not receive this information.

Task

In the morally framed PDG, participants played two rounds of decision making (cooperate or defect) with a virtual opponent. They were explicitly instructed: “In this study, we ask you to imagine performing two tasks, both with the same person,” thus they were aware that the opponent was not a real person³ (cf. Parise, Kiesler, Sproull, & Waters, 1996). The decisions were made simultaneously, and the participants made their choice without knowing what choice their virtual opponent made. Payouts are displayed in Figure 3. To frame the PDG as a moral test, participants were informed that the task was a test of moral worth (i.e., cooperation being the moral option), and that the test was set up to examine how people behave in situations where one can either cooperate or defect.

Procedure and Measures

The experiment was completed online. Participants logged into a system for subject-pool management (www.sona-systems.com),

² Indeed, for these participants the blush did not affect the main outcome measures of trustworthiness, but for participants who cooperated in the first round of the prisoner’s dilemma the blush did increase trustworthiness (see results section).

³ Although they knew that they had to imagine that they played with the opponent, we did not explicitly inform them that they will not receive the money during the study. However, at the end of the study we informed them about this as follows: “In this study you imagined doing two tasks with an imaginary person. During the study, it was suggested that the other person would give money to you. Because the other person is not real, the other person cannot give any money to you.”

which directed them to the study website. The first page of the study consisted of information about the study. Participants provided informed consent by clicking on a button to begin the study. Before they started the PDG, participants were reminded that the first task was a test of moral worth, and that they should behave like they would normally do in situations in which someone can cooperate or defect. Furthermore, about half of the participants received the extra information that their opponent had to defect in at least one of the two rounds of the PDG. They played two rounds of the PDG. The virtual opponent always cooperated in the first round and always defected in the second round, irrespective of what the participant choose. After seeing the payouts of the simultaneous decisions, participants clicked on the screen to see a picture of their opponent's reaction. After the first round (in which the opponent cooperated) the opponent always looked neutral. After the second round (in which she always defected) the opponent had one of four possible displays: neutral-blush, neutral, embarrassment-blush, or embarrassment (see Figure 1). Text under the picture explained that this was the last round of the Moral Task and that now they were going to play the Trust Task with this same person, which was already explained to them during the instructions.

The Trust Task was our main dependent measure and was set up to evaluate how much the participants trusted the opponent as a consequence of the opponent's response (blush or no blush) after defecting in the PDG. In the Trust Task, participants decided how much money (0 to 10 euros) they wanted to give to the virtual opponent. They were further informed that the amount of money that the opponent received would be tripled, and that the opponent could return to the participant any amount of the money that she earned. In the Trust Task the joint outcome is maximized by giving the opponent all of the money (i.e., $3 \times 10 = 30$), participants were informed as follows: "If you totally trust the other person, you both can earn the most money. That is, you would give the other person all 10 dollars. The other person would receive three times the 10 dollars, that is, 30 dollars. The other person could choose to give half of the money back to you, so you would each receive 15 dollars." Furthermore, we informed participants: "However, if you do not trust the other person that much, you can give a smaller amount or nothing at all." This was followed by an example what happened when giving 7 dollars. Payouts for the task are displayed in Figure 3.

After deciding how much money they wanted to give the person in the Trust Task, they were immediately asked to estimate the probability that the opponent would defect if they were to play a third round of the PDG (0% to 100%). Then the participants' judgment of the actor was assessed by presenting six 7-point scale questions (all but *general evaluation* ranged from 1 = not at all to 7 = very much). (1) How *trustworthy* do you think the other person is? (2) When the other person defected in the Moral Task, do you think the other person *sincerely regretted* defecting? (3) What is your *general evaluation* of the other person?" (1 = very negative, 7 = very positive) (4) How *sympathetic* do you think the other person is? (5) When the other person defected in the Moral Task, do you think she was concerned about *other people's judgment*? (6) When the other person defected in the Moral Task, how likely do you consider the probability that she just *pretended to be ashamed* for defecting?

After these questions we asked the participants what they thought the study was about. Then, we asked them to what extent the opponent had displayed shame, embarrassment, a neutral face, or amusement after she defected in the second round of the PDG (scale 1 = absolutely not, 5 = a lot). Furthermore, we asked participants about their age and gender. Finally, we asked them to indicate if their data were accurate.

Results

Behavioral Measure: Trust Task

To examine if blushing has "trust-saving" properties, we analyzed the amount of money that participants gave the opponent in the Trust Task that followed the defection in the second round of the PDG. The analysis of variance (ANOVA) consisted of a 2 Response (blush vs. no blush) \times 2 Emotion (embarrassment vs. neutral) \times 2 Context (informed vs. uninformed) between-subjects model. Means and standard deviations are displayed in Figure 4. A significant main effect of Response indicated that participants gave more money to blushing than to nonblushing opponents, $F(1, 188) = 4.28, p = .04, \eta_p^2 = 0.02$. There was also a significant main effect of Emotion, $F(1, 188) = 15.13, p < .001, \eta_p^2 = 0.07$. However, unexpectedly, this effect indicated that participants gave the opponent more (instead of less) money when she looked neutral than when she appeared embarrassed. The main effect of Context and all interactions were not significant, $p > 0.10$.

Expected Future Defection

For the estimates of the probability that the opponent would defect again (see Figure 4), the analyses again showed a main effect of Response $F(1, 188) = 8.70, p = .004, \eta_p^2 = 0.04$, indicating that participants who saw a blushing opponent rated the likelihood of defection as lower than participants who saw a

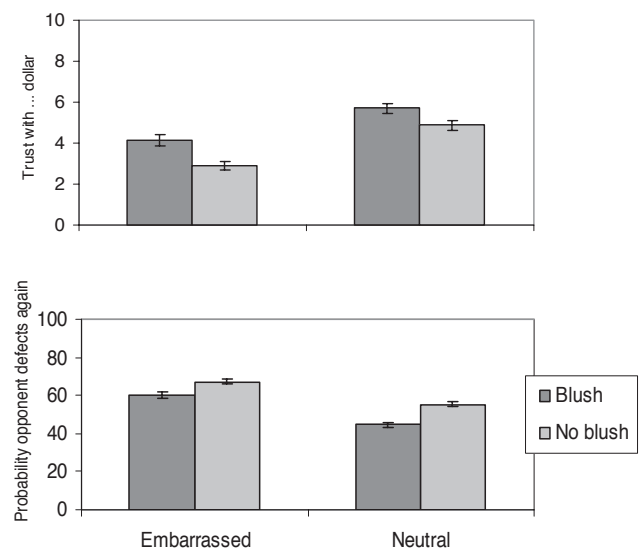


Figure 4. The mean values (with standard error bars) of the money given in the Trust Task and the estimated probability that the opponent would defect again.

nonblushing opponent. Consistent with the findings of the behavioral measure of trust, participants who saw an embarrassed opponent rated the likelihood of defections as higher than participants who saw a neutral opponent $F(1, 188) = 19.66, p < .001, \eta_p^2 = 0.10$. The main effect of Context and all interactions were not significant, $ps > 0.10$.

Judgments

All judgment variables were subjected to a 2 Response (blush vs. no blush) \times 2 Emotion (embarrassment vs. neutral) \times 2 Context (informed vs. uninformed) between-subjects ANOVA. Table 1 displays the means and standard deviations.

Trustworthy. Participants judged a blushing opponent as more trustworthy than a nonblushing opponent, $F(1, 188) = 6.91, p = .01, \eta_p^2 = 0.04$, and neutral opponent as more trustworthy than an embarrassed opponent $F(1, 188) = 13.24, p < .001, \eta_p^2 = 0.07$. Furthermore, participants found the opponent more trustworthy in the informed than uninformed context, $F(1, 188) = 3.80, p = .05, \eta_p^2 = 0.02$. No interaction was significant, $p > .10$.

Sincere regret. The significant main effects of Response, $F(1, 188) = 16.58, p < .001, \eta_p^2 = 0.08$, and Emotion, $F(1, 188) = 31.34, p < .001, \eta_p^2 = 0.14$, were qualified by a significant Response \times Emotion interaction $F(1, 188) = 13.156, p < .001, \eta_p^2 = 0.07$. Post hoc between-subjects *t* tests showed a significant increase in perceived regret for blushing as compared to not blushing in the neutral displays, $t(95) = 4.90, p < .001$, but no effect of blushing for the embarrassed displays $t(97) = 0.34, p = .74$. Furthermore, for the nonblushing opponents there was no significant difference between embarrassment and neutral in the rated amount of regret $t(87) = 1.44, p = .16$; for the blushing opponents perceived regret was higher for neutral than embarrassed displays, $t(105) = 6.76, p < .001$. The main effect of Context and interactions with Context were not significant, $p > .09$.

Sympathetic. Participants who saw a blushing opponent judged her as more sympathetic than did participants who saw an opponent who did not blush, $F(1, 188) = 12.83, p < .001, \eta_p^2 = 0.06$, and participants judged a neutral opponent as more sympathetic than an embarrassed opponent, $F(1, 188) = 9.10, p < .001, \eta_p^2 = 0.05$. The main effect of Context and all interactions with Context were not significant, $p > .10$.

General evaluation. Participants who saw a blushing opponent judged her more positively than participants who saw an

opponent who did not blush, $F(1, 188) = 13.94, p < .001, \eta_p^2 = 0.06$, and participants judged a neutral opponent more positively than an embarrassed opponent, $F(1, 188) = 7.69, p = .01, \eta_p^2 = 0.04$. The main effect of Context and all interactions were not significant, $p > .10$.

Others' judgments. Participants who saw a blushing opponent thought she was more worried about others' judgments than participants who saw an opponent who did not blush, $F(1, 188) = 18.91, p < .001, \eta_p^2 = 0.09$, and participants believed that a neutral opponent worried more about others' judgments than an embarrassed opponent $F(1, 188) = 21.93, p < .001, \eta_p^2 = 0.10$. The main effect of context and all interactions were not significant, $ps > .10$.

Pretend. In general, participants did not believe that the opponents who did not blush could more easily pretend to be ashamed, $F(1, 188) < 1$. However, the Response \times Emotion interaction approached the conventional level of significance, $F(1, 188) = 3.24, p = .07, \eta_p^2 = 0.02$. Post hoc *t* test showed that the effect of Response was significant for the neutral display, $t(95) = 2.12, p = .03$, but not for the embarrassed display, $t(95) = -0.05, p = .56$. Thus, the absence of a main affect of Response might be due to the unexpected negative effect of showing embarrassment in this context. A main effect of Emotion, $F(1, 188) = 5.68, p = .02, \eta_p^2 = 0.03$, indicated that participants believed that the embarrassed opponent could more easily pretend to be ashamed than the neutral opponent. The main effect of Context and all other interactions were not significant, $p > 0.10$.

Discussion

The main results can be summarized as follows. (i) Blushing restored the trustworthiness of the virtual opponent after she defected in the PDG: Participants entrusted the blushing opponent with more money in the subsequent trust task, expected a lower probability that she would defect again if they were to play another round of the PDG, and rated her as more trustworthy than the nonblushing opponent. (ii) Blushing led to a more positive evaluation of the opponent's dispositional characteristics: she was judged as more sympathetic and received a more positive general evaluation (iii). Participants perceived the suppressed smile and gaze aversion of the embarrassment display more as amusement than as embarrassment. Displaying this expression decreased the trustworthiness of the opponent and she was judged less positively than when she looked neutral. The blush, nevertheless, maintained its remedial value on this display. (iv) Adding or omitting infor-

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Table 1
Means (and Standard Deviations) of the Questions That Examined the Participants' Judgments of Their Opponents

| | Neutral | | Embarrassment | |
|--------------------|-------------------|----------------|-------------------|----------------|
| | No blush (N = 45) | Blush (N = 52) | No blush (N = 44) | Blush (N = 55) |
| Trustworthy | 3.58 (1.44) | 4.21 (1.26) | 3.09 (1.05) | 3.44 (1.30) |
| Sincere regret | 2.71 (1.56) | 4.37 (1.74) | 2.25 (1.47) | 2.35 (1.34) |
| Sympathetic | 3.13 (1.10) | 4.06 (1.29) | 2.86 (1.26) | 3.25 (1.32) |
| General evaluation | 3.42 (0.99) | 4.25 (1.22) | 3.16 (1.16) | 3.58 (1.21) |
| Others' judgments | 3.24 (1.53) | 4.37 (1.69) | 2.48 (1.09) | 3.13 (1.47) |
| Pretend* | 3.42 (1.35) | 2.81 (1.30) | 3.57 (1.92) | 3.78 (1.78) |

* A higher score indicates that the participants believed more that the opponent could just pretend to feel regret.

mation to dissolve the potential ambiguity with regard to the opponent's motive for defecting did not influence the pattern of results.

In line with previous studies (e.g., de Jong, 1999; Dijk et al., 2009), the results support the alleged remedial function of blushing; blushing improved judgments of the transgressing opponent. Most important, the present study showed that the remedial effects were not restricted to subjective measures but were also evident in the observer's behavior. Blushing positively affected trust-related behavior toward the defector in an interpersonal context. When the virtual opponent blushed after she defected she was entrusted with more money in a subsequent Trust Task than when she did not blush. This sustains the tenability of the hypothesis that blushing can function as a signal that restores trustworthiness after a social transgression. Results further showed that blushing positively affected the expectations of the opponent's future behavior. That is, by blushing the opponent appeared to show that, although she cannot present herself as irreproachable on this occasion, she is at least disturbed by the transgression and may be cooperative some other time (cf. Goffman, 1959).

Consistent with the notion that blushing signals that one is worried about others' judgments (Castelfranchi & Poggi, 1990), participants believed that the blushing opponent was more worried about the other's judgment than the nonblushing opponent. Furthermore, blushing on a neutral face led to the impression that the opponent sincerely regretted the defection and was not just pretending to regret the defection. Blushing, therefore, may have a special role within the submissive and placatory behavioral signaling system, because blushing may be a valid signal of sincere concern about other's judgments and a valid signal that one is committed to shared social values (cf. Frank, 1988; Ockenfels & Selten, 2000). By signaling regret, blushing might contribute to the prevention of social exclusion after a transgression (e.g., Castelfranchi & Poggi, 1990; Leary & Meadows, 1991; de Jong, 1999). Interestingly, although blushing clearly influenced the behavior and the judgments of the participants, none of the participants noted afterward that the study had been about blushing. This might indicate that the signal value of the blush may operate at a more implicit level. An interesting next step would be to investigate if people need to be aware of the blush in order to have signal value.

Embarrassment is typically elicited by transgressions of conventions that govern social interactions (Modigliani, 1968; Keltner & Buswell, 1996) and evokes emotions in other people, such as amusement, which might help to appease the transgression (Keltner et al., 1997; Semin & Manstead, 1982). Nevertheless, in the present study, an embarrassed opponent received a poorer judgment and was trusted less. A possible explanation is that, although the display was based on research into the display of embarrassment (Keltner, 1995; Keltner & Buswell, 1996) and recognized correctly as embarrassment in a previous study (Dijk et al., 2009), in the present context, the suppressed smile and gaze aversion led to the conclusion that the opponent was amused more than embarrassed. The fact that the display was not recognized as intended is consistent with recent findings that observers perceive a facial display to be associated with different emotional states depending upon the context (Aviezer et al., 2008). Keltner (1995, Study 1) initially identified facial action units for the embarrassment display by analyzing the facial displays of participants who reported feeling embarrassed while doing an embarrassing task. In support-

ing research the displayer had no context (Keltner, 1995, Studies 2, 3 and 4; Keltner & Buswell, 1996), was undergoing an interactive IQ test (Keltner, 1995, Study 5), or had experienced an embarrassing mishap (Dijk et al., 2009). The unexpected findings of the current study suggest that the same display may be perceived as amusement after defecting in a morally framed PDG. Furthermore, the negative effect of this display showed that perceived amusement after defecting is not considered to indicate trustworthiness. Since cheating and not helping others are related to guilt more than to embarrassment (Keltner & Buswell, 1996), displaying guilt in such a context might be more appropriate. Guilt, however, might be more difficult to operationalize using photographs, since there appears to be no distinct facial display of guilt (Keltner & Buswell, 1996). Nevertheless, embarrassed opponents who blushed were trusted more and received more positive judgments than embarrassed persons who did not blush. Thus, the blush maintained its remedial value even on this less appropriate display.

The present study could not replicate the finding that ambiguity about the opponent's motives led to the perception that the blush indicates the worst possible motives (de Jong, et al., 2002; de Jong et al., 2003). That is, when the participants were informed that the opponent had to defect and when they did not receive this information, a blush led to a more positive judgment. This clearly differs from the study that tested the effect of blushing in a morally framed PDG in an interactional context (de Jong et al., 2002), which could indicate that in this previous interaction the concomitant behaviors of the blushing person negatively affected the judgment of the observer. The confounding of blushing, with its concomitant behaviors, directly points to one limitation of the present study. Testing the communicative value of the blush using a computerized PDG with a virtual opponent enabled us to control the social context and the expression of the blushing person. The study did not test which behaviors and expressions normally coincide with the blush. For example, naturally blushing persons may infrequently have a neutral facial expression. Furthermore, the fact that the opponent was virtual might have weakened the results (however, see Parise et al., 1996). An important next step might be to extend these findings to more dynamic (realistic) manipulations of the blush. Although it would not be feasible to employ trained actors who could blush on command, it might be possible to extend the current "virtual partner" paradigm by employing real-time video presentations of blushing virtual partners.

A second limitation of the study was the use of only a female model. Men displaying a blush might be judged differently in both the amount and type of emotion attributed to them and the blush's appeasing effects (cf. Keltner, 1995; Hess, Adams, & Kleck, 2004). Furthermore, since our sample consisted mostly of women, this leaves open the possibility that the enhancement of trustworthiness by the blush might be driven by the fact that female participants may generate a feeling of empathy/identification toward the female virtual opponent. To evaluate the generalizability of the blush's trust-restoring consequences, it might be useful to replicate these findings with a more balanced design employing both male and female models and participants.

To conclude, this study showed that blushing has remedial value after a social transgression. It enhances the blusher's perceived trustworthiness and positively affects other's judgments of them.

Most important, this study is the first to show that blushing per se also increases trust-related *behavior* toward a blushing transgressor.

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Received September 15, 2009

Revision received May 25, 2010

Accepted July 13, 2010 ■