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ORIGINAL PAPER

Smiling at moral misbehaviors: the effect of violation benignness and psychological distance

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Abstract
Why do certain moral violations elicit amusement while others do not? According to McGraw and Warren's (2010) benign-violation theory of humor, for a situation to elicit amusement it should involve a benign violation. Furthermore, the greater the psychological distance from the situation, the greater the amusement it will elicit. We tested this theory by recording spontaneous facial expressions and collecting self-ratings of amusement in response to classic scenarios of purity and harm violations, which we stated either from a psychologically close second-person perspective or a psychologically distant third-person perspective. A feature of these classic scenarios is that purity violations are relatively more benign (less malignant) than harm violations, which we independently found. The theory thus predicts more amusement elicitation for purity violations, which would be more pronounced when the hypothetical transgressor is a third party rather than the participant. We found that amusement was exclusively elicited by the more benign purity violations but no effect of psychological distance. Furthermore, the judged malignance of a violation was a strong predictor of amusement. Overall, the results partially support the benign violation theory of humor.

Keywords Smiling · Facial expression · Moral violation · Psychological distance · Humor

While walking with a friend on a snowy landscape you slip and fall down. Your friend probably laughs at your misstep, but you find it less funny. Why is this the case? According to the benign-violation theory (McGraw & Warren, 2010), humor has a dark ingredient. In order for a situation to elicit amusement, there must be a violation of some kind, but the violation must be relatively benign. For example, we find a situation funny when it causes little, if any, personal damage. Furthermore, its success depends on having the right balance of outcome severity and psychological distance. For example, McGraw et al. (2012) found that minor mishaps, such as stubbing one's toe, are funnier when they are recent than temporally distant. On the other hand, more serious accidents, such as being hit by a car, are funnier from a distance than up close. Similar results have been shown in response to pictures depicting a mild or severe abnormality, with pictures being described as either being close or distant from reality. A mild abnormality, such as the image of a man with icicles in his beard, was rated as funnier when the picture was described as real rather than fake. Whereas a severe abnormality, such as the image of a man with his finger protruding from his eye socket, was rated as funnier when described as fake rather than real.

Besides mishaps and accidents that involve physical suffering, amusement has also been studied in response to moral violations. McGraw and Warren (2010) studied amusement in response to moral violations that are relatively benign as opposed to similar situations that either do not involve a moral violation or involve a violation that causes harm. For example, people overall rated a man that rubs his genitals along a kitten's body as funnier when the kitten appears to enjoy the contact than when it does not. Furthermore, amusement ratings in response to benign moral violations increased as the perceived distance from the situation

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increased. Specifically, participants who, before rating their amusement with a benign moral violation, were primed to increase their psychological distance by plotting two distant points on the coordinate plane, reported higher amusement compared to participants that were primed to decrease their psychological distance by plotting two relatively closer points on the coordinate plane.

The main aim of the present research was to investigate whether the benign-violation theory of humor can be extended to spontaneous facial expressions elicited by moral violations. While our research aimed at testing two predictions derived by McGraw and Warren's (2010) theory, our methodology differs from theirs on two critical aspects. First, apart from their second study, McGraw and Warren (2010) measured emotions using self-reports. Here, we sought convergent evidence from self-reports and spontaneous facial expressions. One advantage of analyzing spontaneous facial expressions is that it allows examining participants' behavioral reactions free of potential demands created by explicitly asking participants to report their feelings. For example, a direct question about amusement in response to a moral violation could prompt participants to answer in a socially desirable manner (should such a situation amuse me?). However, spontaneous facial expressions also have disadvantages, such as they are not always a perfect proxy for emotions because emotions are not always accompanied by facial expressions (e.g., Durán et al., 2017). Therefore, in addition to facial expressions we also collected self-reported emotions. An advantage of self-reported emotions is that they allow a more nuanced classification of emotional states that could underlie a smile. Smiles could be indicative of positive emotions, such as amusement, but also of negative emotions such as embarrassment, shame, grin-and-bear-it or even distress (Ekman, 1992; Ekman & Friesen, 1982; Keltner, 1995; Keltner & Buswell, 1996; Singh & Manjaly, 2021). The use of self-reports helps to differentiate between these emotions.

Second in the present study we manipulated differently psychological distance. Instead of priming psychological distance by asking participants to plot two points on a Cartesian plane, we manipulated it by presenting a situation either from a second person perspective (the participant is portrayed as the transgressor) or a third person perspective (a third party is the transgressor). The need for testing socially-induced psychological distance manipulations within the benign-violation theory has been highlighted by Kant and Norman (2019). Perspective manipulations have been shown to affect responses in domains such as attitudes, behavior, and wise reasoning (for a review, see Kross & Ayduk 2017). For example, people demonstrate wiser reasoning when contemplating a hypothetical situation in which their best friend's romantic partner cheated on them, than when they themselves experienced this situation (Grossmann & Kross, 2014).

Previous findings using facial expressions

Preliminary evidence on facial expressions appears to support the benign-violation theory of humor. Franchin et al. (2019) examined facial expressions in response to purity violations, similar to the benign moral violations studied by McGraw and Warren (2010), and harm violations. The primary aim of Franchin et al. was to assess the Moral Foundations Theory (e.g., Graham et al., 2009) according to which violations of distinct moral foundations, such as the foundation of purity/degradation and care/harm, are associated with distinct emotional reactions, respectively disgust and anger. Although they found that harm violations predominantly elicit anger, disgust expressions in response to purity violations were rare. Rather, purity violations elicited more frequently anger and, pertinent to the present purposes, smiles. The presence of smiles in response to purity violations was not hypothesized by the authors, it was an unexpected finding.

Similar results were obtained in a study of Cannon et al. (2011), examining facial expressions using electromyography. The authors found that some highly negative reactions to purity violations were associated with an increased activity of the *zygomaticus* muscle, which is associated with smiling. Cannon et al. (2011) explained this effect as the result of cross-talk activity between the *zygomaticus* and the *levator* muscles, which is activated in extreme disgust facial expressions (see also, Vrana 1993). However, consistent with the benign-violation theory of humor, the authors also entertained the possibility that "participants may have found some of the more extreme purity behaviors amusing as well as disgusting" (Cannon et al., 2011, p. 330). Again, the presence of smiles was an unexpected finding and the preferred explanation was in terms of anatomy.

The present study

In contrast to the previous investigations, the present study aimed at systematically investigating spontaneous expressions of amusement in response to classic purity and harm violations. In order to achieve this, we manipulated psychological distance and measured facial expressions as well as self-reported emotional reactions. To the extent that the classic purity violations used in our study are more benign than the classic harm violations, we expected purity violations to elicit more smiles and higher self-reports of amusement than harm violations. Moreover, to the degree that

amusement is positively associated with psychological distance, we expected more smiles and higher self-reports of amusement in response to third-person than second-person purity violations. Finally, we also examined if and how the participants' sense of humor is associated with their emotional facial expressions and self-ratings in response to the violations.

Method

Participants

Sixty-eight native Italian speakers (44 females, 16 males, M_{age} = 23.65, age range = 19–42) participated in the study. Of these, eight participants were excluded from the analyses because of the low quality of the video recordings or difficulties in detecting their facial expressions (e.g., because participants had a bushy beard, sat far away from the screen, or their face was partially covered with their hands). Participants were randomly assigned to either the second person perspective condition (n = 30, 20 females) or the third person perspective condition (n = 30, 24 females). The sample size (N = 60) was a-priori determined based on a similar paradigm (see Franchin et al., 2019). The stopping rule involved cessation of data collection at n = 30 of usable adults per condition.

The recruitment was through course announcements in the Department of Psychology and Cognitive Science at the University of Trento. The study protocol was conducted in accordance to the principles expressed in the Declaration of Helsinki and was approved by the local ethical committee.

Materials and Procedure

The experiment was conducted in the laboratory, consisted of two phases, and took about 35 min to complete.

Phase 1: Spontaneous Facial Expressions. In the first phase, participants were informed that the general aim of the study was to investigate the cognitive processes involved while listening to certain behaviors. To avoid influencing their responses, we did not inform them about the specific hypotheses. We informed participants that a video camera (Sony Handycam, HDR-SR5) would record their upper part of the body. The camera was placed below the computer screen, at a distance of 50 cm from the participants.

Participants were asked to listen to 10 scenarios each describing a moral violation commonly used in research examining the Moral Foundations Theory (MFT; Graham et al., 2009). While completing the task, participants were asked to immerse themselves in the scenarios. While listening to the scenarios, participants' spontaneous facial expressions were video-recorded. Five of the moral scenarios described harm violations and five purity violations. Participants assigned to the second person perspective condition heard the moral violations described from the second person perspective, while participants assigned to the third person perceptive condition heard the same moral violations described from a third person perspective. For example, participants in the second person perspective heard the harm violation "*You* kick a dog in the head, hard", while those in the third person perspective heard "*Someone* kicks a dog in the head, hard" (see Table 1 for the full set of scenarios). We presented the scenarios in a pseudo-randomized order, using the program OpenSesame (version 2.9.7; Mathôt et al., 2012). The audio-recordings of the moral scenarios were produced by a male native Italian speaker who was asked to read them aloud in a neutral manner.

The presentation of each scenario involved the following sequence (see Fig. 1, and also see Franchin et al., 2019): a fixation cross in the middle of the screen (2 s), a blank screen (250 ms), the oral presentation of the moral violation (variable duration; from 4 to 16 s), the written request "Please, think about this behavior" (4 s), a second blank screen (250 ms), and finally the instruction "Please, wait!" (4 s). Participants were instructed to look at the screen, read the instructions, and listen to the 10 moral violations. The total duration of this task was approximately 5 min. After a short break, participants proceeded to phase 2.

Phase 2: Questionnaire. The second phase consisted of three parts and involved a paper-and-pencil questionnaire. In the first part, participants listened once again to each of the 10 moral scenarios and they were asked to answer several questions. Specifically, for each scenario they were asked to indicate the first emotion they felt (they could choose one of the following options: amusement, grin-and-bear-it, embarrassment, shame, disgust, anger, contempt and surprise), as well as to rate the intensity of that emotion on a 9-point scale (1 = *very weak*, to 9 = *very strong*).

In the second part, we measured participants' sense of humor using the *Situational Humor Response Questionnaire* (SHRQ; Martin & Lefcourt 1984). This questionnaire provides a quantitative measure of a person's sense of humor, by analyzing how humorous the person finds a number of situations. It consists of 18 items each representing a hypothetical situation that participants may or may have not experienced followed by five response options. An example item is: "If you arrived at a party and found that someone else was wearing a piece of clothing identical to yours …" (Options: I wouldn't have found it particularly amusing; I would have been amused, but wouldn't have shown it outwardly; I would have smiled; I would have laughed; I would have laughed). The SHRQ contains three final items that aim to provide a more general assessment of one's sense

Table 1 Moral scenarios by type of violation (harm vs. purity, see Graham et al., 2009)and perspective (third vs. second person)

	Third person	Second person
Harm	HM1. Someone kicks a dog in the head, hard	HM1. You kick a dog in the head, hard
	HM2. Someone shoots and kills an animal that is a member of an endangered species	HM2. You shoot and kill an animal that is a member of an endangered species
	HM3. Someone makes cruel remarks to an overweight person about his or her appearance	HM3. You make cruel remarks to an overweight person about his or her appearance
	HM4. Someone steps on an anthill, killing thousands of ants	HM4. You step on an anthill, killing thousands of ants
	HM5. Someone sticks a pin into the palm of a child they don't know	HM5. You stick a pin into the palm of a child you don't know
Purity	PM1. Someone signs a piece of paper that says: "I hereby sell my soul after my death, to whoever has this piece of paper"	PM1. You sign a piece of paper that says: "I hereby sell my soul after my death, to whoever has this piece of paper"
	PM2. Someone cooks and eats their dog, after it dies of natural causes	PM2. You cook and eat your dog, after it dies of natural causes
	PM3. Someone gets plastic surgery that adds a 2 inch tail onto the end of their spine	PM3. You get plastic surgery that adds a 2 inch tail onto the end of your spine
	PM4. Someone gets a blood transfusion of 1 L of disease-free, compatible blood from a convicted child molester	PM4. You get a blood transfusion of 1 L of disease-free, compatible blood from a convicted child molester
	PM5. Someone attends a performance art piece in which all participants (including that person) have to act like animals for 30 min, including crawling around naked and urinating on stage	PM5. You attend a performance art piece in which all participants (including yourself) have to act like animals for 30 min, including crawling around naked and urinating on stage

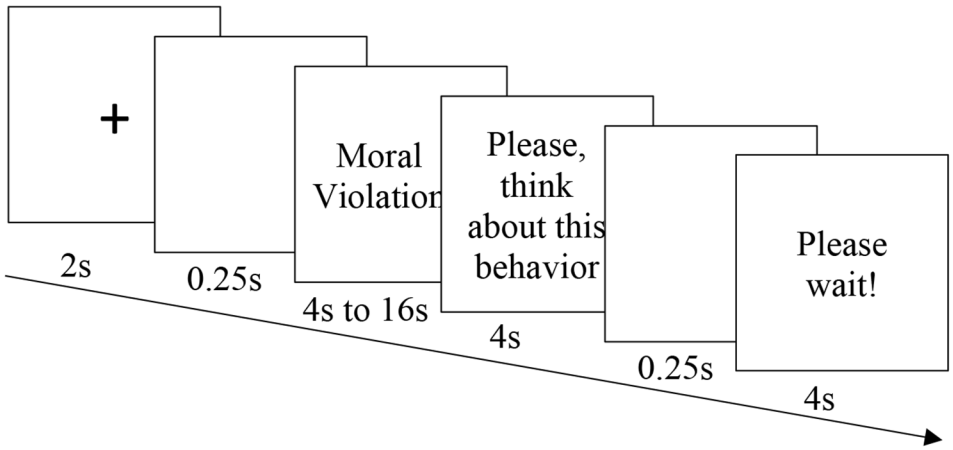

Fig. 1 Study procedure

of humor. An example is: "How would you rate yourself in terms of your likelihood of being amused and of laughing in a variety of situations?" (Options: My most outstanding characteristic; Above average; About average; Less than average; Very little).

After a short break, we administered the third part. The 10 moral scenarios were presented for a third time in a different pseudo-randomised order. After listening to each scenario, participants were asked to respond, in a booklet, to the following questions (Gray & Keeney, 2015): (1) "How morally wrong is this action?" (1 = not at all wrong, to 7 = very wrong), (2) "How severe is this action?" (1 = not at all severe, to 7 = very severe), (3) "How atypical (bizarre, weird, odd) is this action?" (1 = not at all atypical, 7 = very atypical), (4) "How harmful (this implies physical and/or emotional) is this action? (1 = not at all harmful, to 7 = very harmful), and (5) "How impure is this action?" (1 = not at all impure, to 7 = very impure). At the end of the experiment, participants were asked to guess the purpose of the experiment. None guessed it correctly.

Coding of facial expressions

We analysed facial expressions using the Facial Action Coding System (FACS; Ekman et al., 2002), which is an objective coding system of facial expressions. FACS allows the analysis of minimal units of facial activity, known as action units (AUs), which are anatomically separate and visually distinguishable. The main expression of interest was smiles. The coding procedure used here was identical to

the procedure used in Franchin et al. (2019). We coded the presence of AUs that are diagnostic of smiling but for completeness, we also coded AUs associated with anger, disgust, contempt, sadness, fear, and surprise. Specifically, we coded: AU1 (inner brow raiser), AU2 (outer brow raiser), AU4 (brow lowered), AU5 (upper lid raiser), AU6 (cheek raiser), AU7 (lids tight), AU9 (nose wrinkle), AU10 (upper lip raiser), AU11 (nasolabial furrow deepener), AU12 (lip corner puller), AU13 (sharp lip puller); AU14 (dimpler), AU15 (lip corner depressor), AU16 (lower lip depress), AU17 (chin raiser), AU18 (lip pucker), AU20 (lip stretch), 22 (lip funneler), AU23 (lip tightener), AU24 (lip presser), AU28 (lip suck), AU25 (lips part), AU26 (jaw drop), AU27 (mouth stretch). Table 2 summarizes the AUs of interest and illustrates our classification scheme.

Following Franchin et al. (2019), we dealt with potential classification ambiguities by employing a similarity-based rule. Whenever the facial expression displayed by a participant (the particular combination of AUs) fully matched that of a specific emotion (i.e., it contained all the AUs associated with a variant of that emotion) but only partially matched another emotion, we classified it as an expression of the emotion it fully matched. Whenever a facial expression partially matched two or more emotions, then we counted it as an expression of the emotion that it matched more closely. In cases where none of the AUs exhibited by a participant were core components of an emotion of interest (e.g., AU18; AU26 + AU28), we did not classify the resulting facial behavior as an expression of a particular emotion.

Two certified FACS coders, who independently watched the videos and coded the AUs, performed the analysis of all video recordings. The main coder was naïve to the aim of the experiment, but the secondary coder was not. To ensure an unbiased classification, the raters codified the items without listening to the scenario. The time window in which facial expressions were to be coded by the two raters, were prepared by another researcher who specified three times for each item: beginning of the item, end of the item as well as the end of the period reserved to think about each transgression. Both coders viewed the video-recordings in slow motion using the software VLC Media Player, and listed the presence of every single AU on a coding sheet. The coders focused on the first facial expression that participants displayed after listening to a statement describing a moral violation. The window of analysis started with the oral presentation of a moral violation and continued until the instruction "Please think about this action" disappeared from the screen.

The inter-rater reliability (Cohen's Kappa) was based on the classification of the AUs, and it was calculated on all data-points (i.e., 600 items). This analysis showed high consistency between the two coders for the classifications of AU1, AU2, AU4, AU6, AU9, AU10, AU11, AU12, AU13, AU15, AU18, AU20, AU23, AU28 ($\kappa \geq 0.80$), and a good consistency for the classification of AU5, AU7, AU14, AU17, AU24, AU 25, AU26 ($0.66 \leq \kappa \leq 0.79$). Inconsistencies were resolved through discussion.

Table 2 The facial expressions of interest, the coding scheme used (AU = Action Unit), and representative references

Expression	Coding Scheme	References
Smiling	AU12, AU6 + AU12	Ekman et al., 1980; Ekman et al., 1990
Disgust	AU9 + AU10, AU9, AU10	Ekman et al., 1980; Rozin et al.,1994
Anger	AU4 + AU7 + AU23/AU24, AU4 + AU7, AU4 + AU5, AU7 + AU5, AU7 + AU23, AU7 + AU24, AU7 + AU17, AU4, AU7, AU23, AU24	Durán et al., 2017; Ekman et al., 2002b; Matsumoto et al., 2008
Contempt	unilateral AU14	Ekman & Friesen 1986; Matsumoto, 1992
Surprise	AU1 + AU2 + AU5 + AU25	Durán et al., 2017; Reisenzein, 2000
Sadness	AU1 + AU4 + AU15	Durán et al., 2017
Fear	AU1/2 + AU4 + AU5 + AU20	Durán et al., 2017

Note. This scheme was extrapolated from the description of the coding procedure adopted by Franchin et al. (2019). For the complete description of the coding procedure, see the original paper. The reported references are only representative

Predictions

Based on the benign-violation theory of humor, and assuming that the classic purity violations we studied are relatively more benign than the classic harm violations we used (Gray & Keeney, 2015), we predicted a higher percentage of smiles, and more selections of amusement, in response to purity than harm violations. Furthermore, for purity violations we predicted comparatively more smiles, and more selections of amusement, when they were stated in the third person than in the second person. For harm violations, however, we expected no difference in the presence of amusement across the two conditions. Consistent with previous literature, we expected that expressions of amusement would be rare, and that the predominant expression would be anger.

Results

Manipulation test

Our prediction that purity violations induce more amusement than harm violations rests on the assumption that the particular purity violations we used are perceived to be more benign than the particular harm violations we used.

To test this working assumption, we examined participants' responses to three questions that appear to measure the opposite of benignness, that is, malignance: "How morally wrong is this action?" (1 = not at all wrong, to 7 = very wrong), "How severe is this action?" (1 = not at all severe, to 7 = very severe), and "How harmful (this implies physical and/or emotional) is this action? (1 = not at all harmful, to 7 = very harmful). As expected, participants rated the purity violations as less morally wrong (M_{Purity} = 3.36, M_{Harm} = 6.20; $t(59) = 17.72$, $p < .001$, Cohen's $d = 2.29$), less severe (M_{Purity} = 2.89, M_{Harm} = 5.86; $t(59) = 17.60$, $p < .001$, Cohen's $d = 2.27$), and less harmful (M_{Purity} = 2.98, M_{Harm} = 6.03; $t(59) = 18.07$, $p < .001$, Cohen's $d = 2.33$), than the harm violations. Furthermore, the three measures exhibited a high internal consistency (Cronbach's alpha = .929). We thus created an index by taking the mean across these three measures, which we used in later analyses. To the extent that this index encapsulates how malignant a violation is, we predicted a negative association between how scenarios scored on this index and amusement elicitation.

Descriptive statistics

Figure 2 shows the mean percentage of smiling and other facial expressions exhibited in response to the different conditions. Figure 3 shows the corresponding results for the self-reported emotions. The most frequent facial expression in response to both harm and purity violations was anger. Anger was also the most frequent self-reported emotion for harm violations whereas for purity violations the most frequently selected emotions were surprise and disgust. Below we focus on facial expressions and self-reports of amusement as this was the emotion of interest.

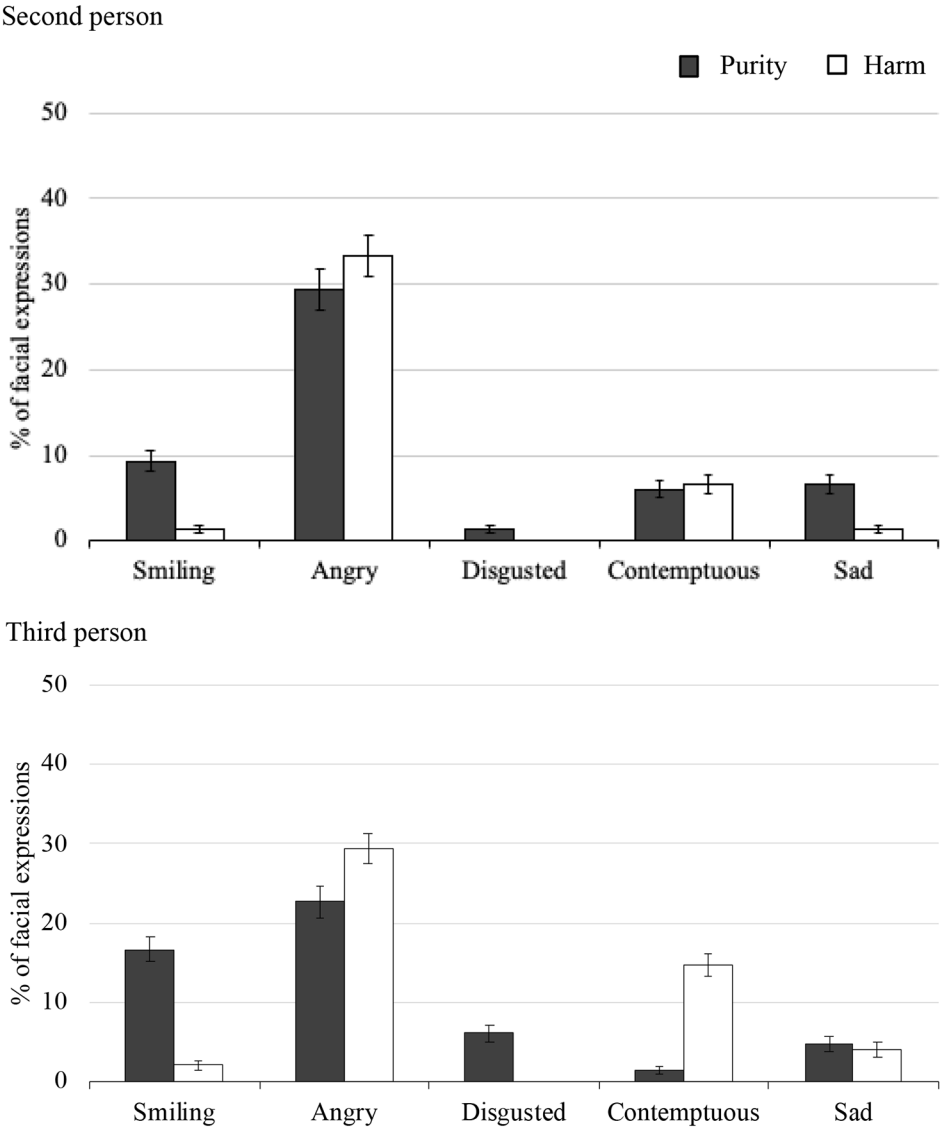

Fig. 2 Percentage of smiling and other facial expressions by type of violation (harm, purity) and perspective (second, third)
Note. There were no expressions of surprise or fear. Error bars indicate standard error.

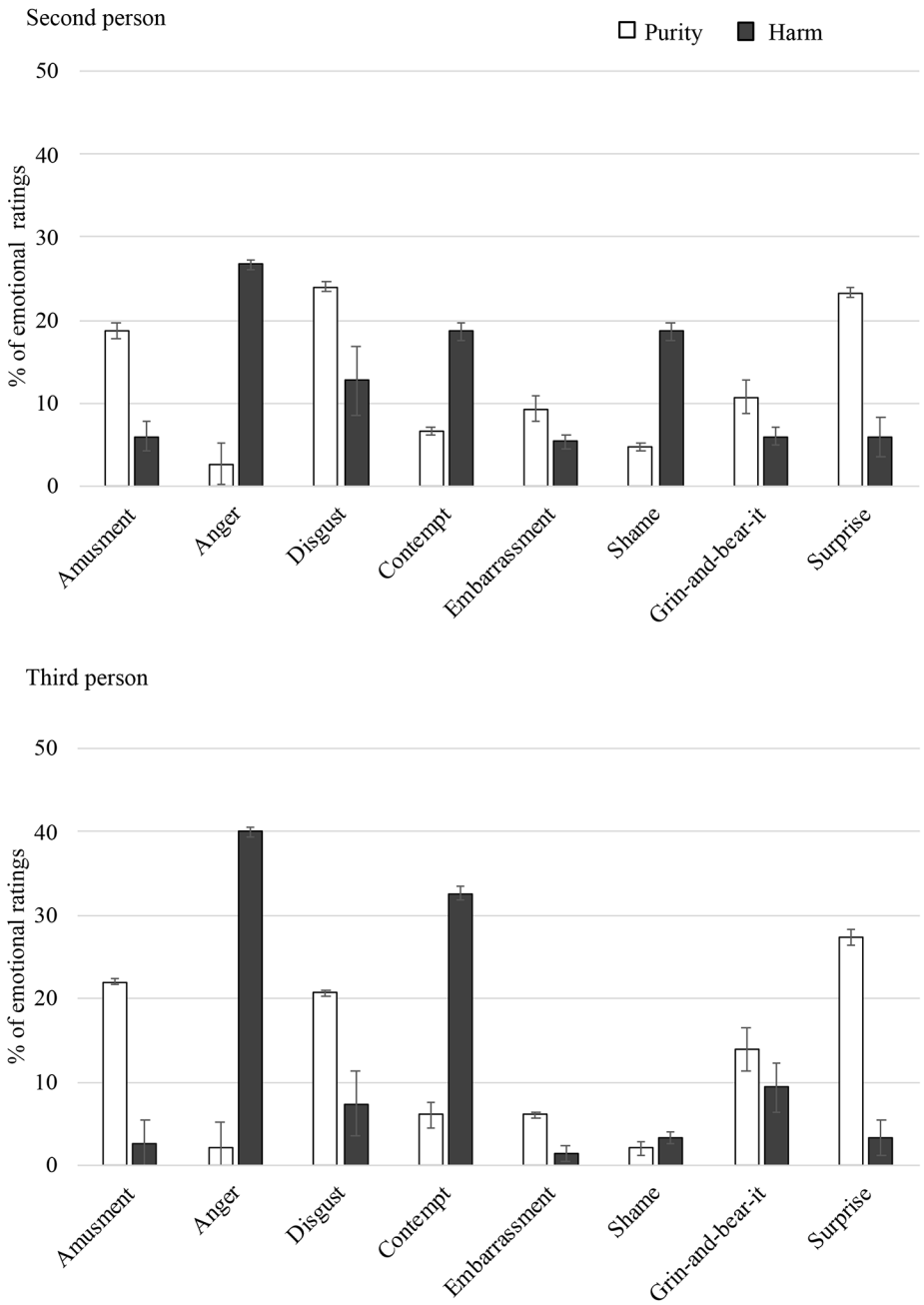

Fig. 3 Percentage of times each emotion was chosen by type of violation (harm, purity) and perspective (second, third) *Note.*Error bars indicate standard deviation.

Facial expressions: smiles. Consistent with our main prediction, there were 39 smiles in response to purity violations, while only 5 in response to harm violations. Thus, a smile was eight times more likely in response to purity than harm violations. This result was not due to lack of facial expressivity in response to harm violations. Overall, there were 156 emotional expressions in response to purity violations, and 139 in response to harm violations. The ratio of smiles to negative emotional expressions was much higher for purity violations (1 smile for every 3 negative expressions) than for harm violations (1 smile for every 27 negative expressions). If we split the smiles by perspective, we observe 14 smiles in response to second person purity violations compared to 25 smiles in response to third person purity violations. Table S1 in the Supplementary Materials presents the frequencies of all facial expressions of interest by Violation Type (harm, purity) and Perspective (second, third).

Similar results emerge if we focus on the participants. Out of the 60 participants, 30 smiled in response to one or more purity violations, whereas only 5 smiled in response to one or more harm violations. If we split the smiles in

response to purity violations by perspective, 19 out of 30 participants smiled to third person violations, while 12 out of 30 participants smiled to second person violations ($\chi^2 = 3.27$, p = .070). For harm violations, 3 participants smiled when they were stated in the third person compared to 2 when they were stated in the second person.

Self-reports: choice of amusement. We now consider participants' selections of "amusement" as the first-felt emotion in response to the scenarios. For a full report on self-rated emotions, see Supplementary Materials, Table S2. The pattern of findings was similar to that found with facial expressions. There were 61 selections of amusement in response to purity violations, while only 13 in response to harm violations. Thus, amusement was about 5 times more likely to be selected in response to purity than harm violations. For self-reported emotions, we did not perform further analyses to examine potential differences in emotional expressivity between purity and harm violations, because participants were forced to select one emotion for each violation. Every time amusement was not selected as the first-felt emotion, a negative emotion was selected. Turning to perspective, we observed 28 selections of amusement in response to second person purity violations compared to 33 selections in response to third person purity violations. For harm violations, selections of amusement were rare: only 9 for second person violations, and 4 for third person violations.

Similar results emerge if we focus on the participants. Out of the 60 participants, 40 reported amusement in response to at least one purity violation, whereas only 10 did so in response to harm violations. Furthermore, if we split the data by Perspective, 20 out of 30 participants selected amusement in response to third person purity violations, and 20 out of 30 in response to second person purity violations. For harm violations, there were 3 reports of amusement when they were stated in the third person compared to 7 when they were stated in the second person.

Main analyses

We conducted logistic mixed models in Jamovi (version 2.3). For smiles the dependent variable was whether (yes/no) a participant smiled in response to a particular scenario, while for self-reports whether (yes/no) a participant selected "amusement" as the first-felt emotion. In each case, we started with a simple model, model 1, that includes type of item (harm, purity), perspective (second, third), and type*perspective as fixed factors, and participant and item as random factors. In model 2 we added the malignance index as a covariate, to test more directly the hypothesis that amusement is related to the perceived benignness/malignance of a violation. In model 3 we added atypicality as a second covariate, because atypicality is preferentially related to classic purity than classic harm scenarios and it could contribute to expressions of amusement (Gray & Keeney, 2015). Finally, in model 4 we included as a third covariate participants' mean score on the Situational Humor Response Questionnaire (SHRQ, Martin & Lefcourt 1984). The aim was to examine whether this individual difference scale is predictive of smiles, and whether the main results for scenario type and perspective remain when individual differences in humor are taken into consideration.

Facial expressions: smiles

Model 1. The model 1 specification was as follows: Smiles ~ 1 + Type of item + Perspective + Type of item*Perspective + (1 |Participant) + (1 |Item). The fixed effects accounted for 25.4% of the total (expected) variance of smiles, while the fixed and random effects together accounted for 39.4% of the total (expected) variance of smiles. As predicted, there was a significant main effect of type of item (beta = -2.27, $\chi^2 = 11.03$, $p < .001$) reflecting the fact that there were more smiles in response to purity than harm scenarios. However, there was no main effect of perspective (beta = -0.564, $\chi^2 = 1.17$, $p = .28$) and no type*perspective interaction (beta = 0.298, $\chi^2 = 0.09$, $p = .76$).

Model 2: Malignance. The model 2 specification was as follows: Smiles ~ 1 + Type of item + Perspective + Malignance index + Type of item*Perspective + (1 |Participant) + (1 |Item). The fixed effects now accounted for 30.4% of the total (expected) variance of smiles, and together with the random effects for 45.6% of the total (expected) variance of smiles. As anticipated, there was a significant main effect of the malignance index (beta = -0.39, $\chi^2 = 8.23$, $p = .004$) reflecting the fact that smiles were rarer for items scoring higher in malignance. Importantly, with the malignance index added in the model, the effect of type of item became non-significant (beta = -1.196, $\chi^2 = 2.38$, $p = .12$). Once again, there was no main effect of perspective (beta = -0.411, $\chi^2 = 0.578$, $p = .44$) and no type*perspective interaction (beta = 0.051, $\chi^2 = 0.002$, $p = .96$).

Model 3: Malignance, atypicality. The model 3 specification was as follows: Smiles ~ 1 + Type of item + Perspective + Malignance index + Atypicality + Type of item*Perspective + (1 |Participant) + (1 |Item). The fixed effects accounted for 30.6% of the total (expected) variance of smiles, while the fixed and random effects together for 45.1% of the total (expected) variance of smiles. The results were similar to those of model 2. There was a significant main effect of the malignance index (beta = -0.44, $\chi^2 = 9.37$, $p = .002$), and no effect of type of item (beta = -0.549,

$\chi^2 = 0.41$, $p = .52$), perspective (beta = -0.446, $\chi^2 = 0.664$, $p = .41$) or type of item*perspective interaction (beta = -0.051, $\chi^2 = 0.02$, $p = .95$). In addition, there was no main effect of atypicality (beta = 0.19, $\chi^2 = 1.96$, $p = .16$).

Model 4: Malignance, atypicality, SHRQ. The model 4 specification was as follows: Smiles ~ 1 + Type of item + Perspective + Malignance index + Atypicality + SHRQ + Type of item*Perspective + (1 |Participant) + (1 |Item). The fixed effects accounted for 35.2% of the total (expected) variance of smiles, and together with the random effects for 45.7% of the total (expected) variance of smiles. The results were similar to those of model 3. There was a significant main effect of the malignance index (beta = -0.39, $\chi^2 = 7.69$, $p = .006$), but no effect of type of item (beta = -0.68, $\chi^2 = 0.60$, $p = .43$), perspective (beta = -0.649, $\chi^2 = 1.45$, $p = .22$), type of item*perspective interaction (beta = 0.073, $\chi^2 = 0.005$, $p = .94$), or atypicality (beta = -0.20, $\chi^2 = 1.95$, $p = .16$). Importantly, there was a significant main effect of SHRQ (beta = 1.56, $\chi^2 = 8.42$, $p = .004$) reflecting more smiles for participants who scored higher in the humor scale.

Self-reported amusement

Model 1. The model 1 specification was as follows: Amusement ~ 1 + Type of item + Perspective + Type of item*Perspective + (1 |Participant) + (1 |Item). The fixed effects accounted for 17.4% of the total (expected) variance of amusement, and together with the random effects for 40.5% of the total (expected) variance of amusement. As anticipated, there was a significant main effect of type of item (beta = -1.85, $\chi^2 = 7.356$, $p = .007$) reflecting the fact that there were more choices of amusement in response to purity than harm scenarios. However, there was no main effect of perspective (beta = 0.318, $\chi^2 = 0.644$, $p = .42$) and no type of item*perspective interaction (beta = 1.125, $\chi^2 = 2.58$, $p = .10$).

Model 2: Malignance. The model 2 specification was as follows: Amusement ~ 1 + Type of item + Perspective + Malignance index + Type of item*Perspective + (1 |Participant) + (1 |Item). The fixed effects accounted for 32.8% of the total (expected) variance in amusement, while the fixed and random effects together for 51.4% of the total (expected) variance in amusement. There was a significant main effect of the malignance index (beta = -0.77, $\chi^2 = 32.44$, $p < .001$) reflecting the fact that there were fewer amusement choices for items scoring high in malignance. Importantly, now that the malignance index was included as a covariate, the effect of type of item became non-significant (beta = 0.602, $\chi^2 = 0.48$, $p = .46$). Once again, there was no main effect of perspective (beta = 0.614, $\chi^2 = 2.51$, $p = .11$) and no type of item*perspective interaction (beta = 0.651, $\chi^2 = 0.805$, $p = .37$).

Model 3: Malignance, atypicality. The specification of model 3 was as follows: Amusement ~ 1 + Type + Perspective + Malignance index + Atypicality + Type*Perspective + (1 |Participant) + (1 |Item). The fixed effects accounted for 34.2% of the total (expected) variance in amusement, while together with the random effects for 49.3% of the total (expected) variance in amusement. The results were similar to those of model 2. There was a significant main effect of the malignance index (beta = -0.807, $\chi^2 = 33.71$, $p < .001$), but no effect of type of item (beta = 1.061, $\chi^2 = 1.53$, $p = .21$), perspective (beta = 0.603, $\chi^2 = 2.38$, $p = .12$), or type of item*perspective interaction (beta = 0.601, $\chi^2 = 0.687$, $p = .40$). In addition, there was no main effect of atypicality (beta = 0.167, $\chi^2 = 1.907$, $p = .16$).

Model 4: Malignance, atypicality, SHRQ. The model 4 specification was: Amusement ~ 1 + Type of item + Perspective + Malignance index + Atypicality + SHRQ + Type of item*Perspective + (1 |Participant) + (1 |Item). The fixed effects accounted for 34.4% of the total (expected) variance in amusement. The fixed and random effects together accounted for 49.3% of the total (expected) variance in amusement. The results were similar to those of model 3. There was a significant main effect of the malignance index (beta = -0.803, $\chi^2 = 33.52$, $p < .001$), but no effect of type of item (beta = 1.04, $\chi^2 = 1.48$, $p = .22$), perspective (beta = 0.584, $\chi^2 = 2.23$, $p = .13$), type*perspective interaction (beta = 0.609, $\chi^2 = 0.704$, $p = .40$), or atypicality (beta = 0.167, χ^2 1.906, $p = .16$). Unlike the analysis for smiles, here there was no effect of SHRQ (beta = 0.206, $\chi^2 = 0.221$, $p = .63$).

Discussion

The present study investigated emotional reactions in response to five classic purity scenarios and five classic harm scenarios that are frequently used in the moral psychology literature (e.g., Gray et al., 2014; Haidt et al., 1993; Rozin et al., 1999). Violations were framed either from a psychologically close, second person perspective, or a more psychologically distant, third person perspective. Based on the benign-violation theory of humor, we predicted more frequent facial expressions of amusement (smiles), and selections of "amusement" as the first-felt emotion, in response to purity than harm violations. This was based on the assumption that the classic purity violations we studied are more benign (less malignant) than the classic harm violations, at least in a non-traditional society as it was the case for our participants, an assumption that was borne out in our manipulation check. The results from both measures of amusement were in line with our prediction. Purity violations elicited more amusement than harm

violations. Importantly, when we added the malignance index as a covariate to the model, it was a significant predictor of amusement and, once included, the effect of type of scenario became non-significant (models 2–4). This is consistent with our hypothesis that the effect of type of scenario is associated with the differential benignness (malignance) of the purity and harm scenarios.

Furthermore, we predicted that by increasing psychological distance, amusement in response to purity violations would increase, whereas amusement in response to harm violations would remain unaffected. This is because the relatively more benign (less malignant) purity violations should be perceived as even less threatening from a distance. However, this prediction was not borne out in our analyses.

Individual differences in humorousness as captured by the Situational Humor Response Questionnaire (Martin & Lefcourt, 1984) were predictive of facial expressions of smiles, but not predictive of selections of amusement as the first-felt emotion. This is an interesting finding that merits further research. It could be suggested that this result is obtained because smiles are spontaneous expressions of amusement whereas self-reported amusement is influenced by social norms and social desirability. Thus, people scoring high in the SHRQ might spontaneously smile in response to a moral violation – although it is socially inappropriate to do so – but be unwilling to tick the box "amusement" as the first–felt emotion. However, there are two issues with this argument. First, this argument predicts more facial expressions of amusement than self-reports of amusement, which was not the case. Amusement expressions accounted for 14.9% of all emotional facial expressions, while self-reported amusement accounted for 12.3% of all self-reported emotions. Second, the SHRQ is a self-report scale and includes items where it would be socially inappropriate to smile such as smiling in front of your classmates when receiving one of the best grades in the class, or laughing when a waiter accidentally spills soup to your friend.

The present findings are broadly consistent with the results of McGraw and Warren (2010) and crucially provide novel support for their theory from spontaneous facial expressions elicited while listening to moral violations. As predicted by the theory, amusement was almost exclusive to the more benign purity violations, largely absent from the more malignant harm violations, and it was positively associated with the extent to which a violation was evaluated as malignant (the malignance index). However, in contrast to our second prediction, we found no evidence that purity violations elicit more amusement from a distance than up close. The absence of an effect could be statistical (insufficient power as perspective varied between-subjects), but could also be related to the hypothetical nature of the scenarios used.

The hypothetical nature of scenarios in most moral research has been raised as an issue against its ecological validity. For example, Bauman et al. (2014) claim that people are frequently amused by certain moral violations, such as pushing a man off a footbridge and into the path of a train to save more lives, but it is unlikely that in real life such situations would elicit amusement. Although the present findings do not allow an evaluation of this hypothesis, anecdotal evidence suggests that in real life certain negative outcomes, such as slipping on ice, do elicit amusement Returning to our study, the hypotheticality of the scenarios cannot fully explain the results. For example, it cannot explain why amusement is more strongly associated with purity than harm violations given that all scenarios were hypothetical. However, hypothetically could have contributed to the null effect of psychological distance (second-*versus* third-person perspective). Hypotheticality is a type of psychological distance, and therefore it could have made it harder to detect the effect of our additional psychological distance manipulation. Maglio et al. (2013) found that any type of psychological distance (such as distance from reality prompted by the hypotheticality of the scenarios) can reduce sensitivity to any further type of psychological distance (such as distance from the self prompted by the third- *versus* second-perspective manipulation). Otherwise stated, the effects of psychological distance manipulations are additive and so the hypotheticality of our scenarios could have diluted the effect of our psychological distance manipulation.

It is worthwhile to point out the link between the present research and research on *schadenfreude*, which stands for the feeling of pleasure at the misfortune of another. For example, schadenfreude is relevant in how people respond to third-party violations. Research suggests that three conditions typically give rise to schadenfreude: (1) the observer gains from the misfortune; (2) the misfortune is perceived as deserved; or (3) the misfortune befalls an envied person (e.g., Smith et al., 2009). None of these conditions were met in our items. For example, smiling while listening about a kid you know nothing about had its palm pinned is not a typical case of schadenfreude, but perhaps evidence for a darker type of schadenfreude prompted by sadistic tendencies or lack of empathic concern. Interestingly, research has shown that individuals high in sadism experience greater schadenfreude for severe than minor misfortunes, while individuals lower in sadism experience greater schadenfreude for minor than severe misfortunes (Schumpe & Lafrenière, 2016). Therefore, individuals high in sadistic traits may provide an exception to the benign-violation theory of humor. Future research could measure individual differences in sadism and

empathy and examine how these are associated with facial expressions and self-reports of amusement in response to moral violations.

Although the main objective of the present work was to examine predictions derived from the benign-violation theory of humor using moral violations, the present results also inform theories of moral judgment. According to a well-known account of moral judgment, the Moral Foundations Theory (e.g., Graham et al., 2013), there exist a number of distinct moral foundations and each one is associated with a different emotional reaction. In regards to the moral violations we studied, purity violations are theorized to predominantly elicit disgust whereas harm violations to elicit anger. When we consider the full range of emotions we examined (see Supplementary Materials), we found that indeed harm violations predominantly elicit anger. However, dovetailing with previous research (Franchin et al., 2019), purity violations predominantly elicited facial expressions of anger and, to a lesser extent, amusement.

Based on the current findings, one could suggest that smiles are differentially associated with purity and harm violations. Furthermore, there have been several studies on the link between disgusting actions, which are connected to some purity violations, and humor elicitation (Deckman & Skolnick, 2021; Strohminger, 2013, 2014). Therefore, the findings could be said to support a weaker version of the Moral Foundations Theory according to which violations of different moral foundations are differentially associated with specific emotions. However, we warn against such an interpretation of our findings. The classic purity and harm scenarios we used differed systematically in several respects such as moral wrongness, severity, harmfulness, and atypicality. Therefore, the differential association between smiles and purity violations might be due to these confounding variables. Indeed, in the present study we found evidence that the effect of violation type was driven by differences in moral wrongness, severity, and harmfulness (the malignance index). To examine whether purity and harm violations are differentially associated with amusement one should use scenarios that are matched on these aspects (see Gray & Keeney 2015). This could provide a fruitful avenue for future research.

Future research could also examine whether the present gap in smiles between classic purity and classic harm violations depends on factors such as culture and socioeconomic status (SES). Studies suggest that some cultures moralize certain purity violations whereas other cultures adopt a more permissive stance, and that, within a culture, high SES is associated with a more permissive stance towards such violations (e.g., Haidt et al., 1993). For example, Haidt et al. (1993) found that cutting a flag and using the pieces as cleaning rags was judged as more morally wrong (the actor should be stopped or punished) by Brazilian than US participants, and judged wrongness was higher among low SES participants. The benign-violation theory of humor predicts that smiling expressions are related to the perceived benignness of a moral violation, rather than its type. Therefore, the gap in smiling expressions between harm and purity violations should diminish for individuals that, due to culture, education, or ideology, perceive the purity violations as non-benign. Furthermore, the Haidt et al.'s study suggests that benignness might not only depend on harm, but also on the offensiveness of an action.

There are several works on the social functions of humor, smiles and laughter (e.g., Martin et al., 2017; Wood & Niedenthal, 2018). A main theme in these works is that such expressions serve as a social signal of harmless intentions; they signal that a situation is not threatening. For example, laughter can serve as a reward for others' behavior, to reinforce ongoing interaction, to ease social tension or to signal affiliation. Furthermore, laughter could also be used to enforce norms, show negotiation status, and correct undesirable behavior by signaling superiority. In our study, participants largely worked in private. As there was no immediate audience, it is unlikely that smiles and self-reports of amusement served a particular social function. However, future research could systematically manipulate whether participants have to respond in the presence of an audience or in private, and how this influences facial expressions and self-reports of amusement.

Even though the second- *versus* third-person perspective manipulation did not have a significant influence on smiles or self-reports of amusement, it influenced other emotional reactions. For example, the selection of the options "shame" and "disgust" were much more frequent in response to the second- than third-person harm violations (see Fig. 3). Indeed, shame is considered to be a self-relevant emotion. People feel mostly ashamed of themselves and their actions rather than about the actions of others. The only case we can think concerning feeling shame about others' actions is when these others are perceived to be close to us, such as family or in-group members, presumably because we feel that they represent us. Future research could systematically investigate how second- *versus* third-person perspective moral violations affect emotional reactions beyond amusement.

In conclusion, this study presents novel supporting evidence for the benign-violation theory of humor in the form of spontaneous facial expressions which are less susceptible to social pressures. We found that the relatively more benign purity violations elicited more smiles than the relatively more malignant harm violations. Critically, looking beyond scenario type, we found that the benignness of a violation (the extent to which it scored low on the malignance index)

was a strong positive predictor of amusement elicitation. However, we found no evidence that psychological distance influences amusement elicitation.

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Data Availability The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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