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Research Article

I'll Know What You're Like When I See How You Feel

How and When Affective Displays Influence Behavior-Based Impressions

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ABSTRACT—*Accumulating evidence suggests that targets' displays of emotion shape perceivers' impression of those targets. Prior research has highlighted* generalization *effects, such as an angry display prompting an impression of hostility. In two studies, we went beyond generalization to examine the interaction of displays and behaviors, finding new evidence of* augmenting *effects (behavior-correspondent inferences are stronger when behavior is accompanied by positive affect) and* discounting *effects (such inferences are weaker when behavior is accompanied by negative affect). Thus, the same display can have different effects on impressions depending on the behavior it accompanies. We found evidence that these effects are mediated by ascribed intentions and that they have a boundary: When behaviors and affective displays are repeated, the augmenting and discounting power of displays appears to wane.*

How do an individual's affective displays affect an onlooker's impressions of him or her? Past research has demonstrated that perceivers often show *generalization* effects, intuiting enduring dispositions from momentary displays. For instance, individuals with happy expressions tend to be seen as high in affiliation, whereas individuals with angry expressions are seen as low in affiliation (e.g., Harker & Keltner, 2001; Knutson, 1996; Montepare & Dobish, 2003). Although there are some limits to generalization (e.g., see Trope, Cohen, & Maoz, 1988), perceivers often seem ready to leap from a single affective display to inferences about broader dispositions. But is this the only way in which affective displays shape impressions? Drawing on work in multiple traditions, we present an account of, and evidence for, a new set of effects.

We believe that affective displays not only produce generalization effects, but often have moderating effects, sometimes magnifying and other times mitigating the inferences that are drawn from behavior, especially from prosocial and antisocial acts (cf. Jones & Davis, 1965). These moderating effects occur because perceivers assume that targets' affective displays are typically *about* something and factor this link into the intentions and motives they ascribe to a target (Higgins, 1998). Some clues about how this happens come from research on pride, which has shown that an actor's displays of positive affect suggest that he or she claims "causal ownership" or responsibility for a behavior or outcome (e.g., Tracy & Robins, 2007; Weiner, 1985). Likewise, recent research suggests that an actor's degree of willingness to help affects how his or her helping behavior is interpreted (Krull, Seger, & Silvera, 2008). Other clues come from work on remorse and apology, which has shown that negative displays suggest a repudiation of an act—essentially saying, "That's not me" (cf. Goffman, 1959; Gold & Weiner, 2000; Heider, 1958). In addition, work in developmental and cognitive science suggests that perceivers—even very young ones—posit a range of associated beliefs, desires, and intentions on the basis of targets' emotional displays (e.g., Wellman, Phillips, & Rodriguez, 2000).

These effects fit with appraisal theories of emotion (e.g., Ellsworth & Smith, 1988; Roseman, Antoniou, & Jose, 1996), which hold that positive emotions signal satisfaction with motive-consistent outcomes, whereas negative emotions are elicited by motive-inconsistent outcomes. Perceivers act as folk psychologists who, in effect, run appraisal theories of emotion in reverse when targets engage in prosocial and antisocial acts. Perceivers intuit whether a target's behavior or outcomes are consistent with his or her intentions by using the target's

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accompanying positive or negative emotional display. From these ascribed intentions, perceivers may draw more general conclusions about the target's dispositions.

This line of reasoning led us to make three predictions about how affective displays affect impressions. First, a target will be seen more positively (e.g., as more helpful) when his or her prosocial act is accompanied by a positive emotional display (e.g., happiness, contentment) than when that act is accompanied by a negative emotional display (e.g., sadness, frustration). Second, a target will be seen more negatively (e.g., as more selfish) when his or her harmful act is accompanied by a positive emotional display than when that act is accompanied by a negative emotional display. In other words, positive emotional displays augment behavior-correspondent trait inferences, whereas negative displays discount such inferences. Third, we posited a mechanism consistent with folk-psychological models of perceived intent (e.g., Malle, 2004; Read, Jones, & Miller, 1990; Reeder, Kumar, Hesson-McInnis, & Trafimow, 2002), predicting that the link between an emotional display (e.g., "she's pleased") and trait inferences (e.g., "she's selfish") will be mediated by the inference of underlying intentions (e.g., "she doesn't care about hurting her friend").

Along with these augmenting, discounting, and mediation effects, we predicted a boundary condition. We believe that when a behavior-display pairing is encountered repeatedly (e.g., repeated acts of harm accompanied by displays of remorse), the augmenting and discounting effects of the affective displays will wane, and perceivers will come to regard the repeated behavior as especially diagnostic (cf. Heider, 1958, pp. 51–52; McArthur, 1972; Trope, 1986). For instance, after a single act of harm, a remorseful display might mitigate the ascription of harmful intent (i.e., the behavior seems "uncharacteristic"), but after repeated instances of harmful behavior, displays of remorse come to matter less than the track record of damage. Individual behaviors may be ambiguous cues whose signal value can be boosted or dampened by accompanying affect, but repeated behaviors, affect notwithstanding, may be taken as reliable predictors of future conduct. We call this effect *convergence*, arguing that when behaviors are repeated, impressions converge on behavior-correspondent inferences regardless of affective displays.

We tested our predictions in two studies. Study 1 explored augmenting and discounting effects, pairing behaviors with different affective displays. Study 2 examined convergence effects, focusing on repeated behaviors and displays. The results hold implications for social, developmental, and cognitive research on face and emotion perception and social judgment. We conclude this article by discussing these implications.

STUDY 1

In Study 1, participants viewed scenes featuring prosocial and harmful behaviors, with targets showing varying affective displays. Participants' ratings of the targets' emotions, intentions, and traits allowed us to test for augmenting and discounting effects.

Method

Ninety-one members of a paid university research pool participated. The average age of the participants was 22.5 years (SD = 6.2 years); 57 participants (62.6%) were female, and 34 (37.4%) were male. Forty-seven participants (51.6%) identified themselves as Asian or Asian American, 32 (35.2%) identified themselves as Caucasian, and 4 (4.4%) identified themselves as Hispanic or Latino.

Our stimuli featured actors performing prosocial or harmful behaviors while displaying positive, neutral, or negative affect. To ensure that discounting and augmenting effects did not stem from specific actors or specific behaviors, we employed a range of targets (including males and females), as well as a range of behaviors (prosocial behaviors included helping a colleague, donating to a charity, and conceding in a negotiation; harmful behaviors included spilling coffee on someone, failing to do a promised errand, and disparaging a roommate's boyfriend in her presence). (Table S1 in the supporting information available online provides the text of the scenarios; see p. 593.) Participants were randomly assigned to see one of three sets of materials in a computer-based survey. Each set featured one vignette showing prosocial behavior and one vignette showing harmful behavior; the order of the vignettes was counterbalanced across participants (see Fig. 1). In addition, each vignette had three possible endings, conveyed in both text and photographs; whether the ending indicated positive, negative, or neutral affect was manipulated across participants. Thus, the experiment had a 3 (scenario set: 1, 2, or 3) × 2 (scenario: prosocial or harmful behavior) × 2 (scenario order: prosocial or harmful behavior first) × 3 (affective display: positive, neutral, or negative affect for each scenario) design, with scenario set, scenario order, and affective display manipulated between participants. The affective-display conditions were yoked between the scenarios such that each participant saw two different kinds of affective displays (negative affect for Scenario 1 and neutral affect for Scenario 2, positive affect for Scenario 1 and negative affect for Scenario 2, or neutral affect for Scenario 1 and positive affect for Scenario 2).

For each scenario, text and a pair of photos portraying the target were presented on a computer monitor. The poses were selected from photographs of models (graduate students ages 25–35 years; four female and two male) asked to display various emotions, such as anger and frustration or joy and happiness. For each condition, we selected two photos that captured different aspects of the relevant emotion (e.g., looking down, cringing). The photos and text descriptions for the affective displays were identical for the prosocial and harmful behaviors.

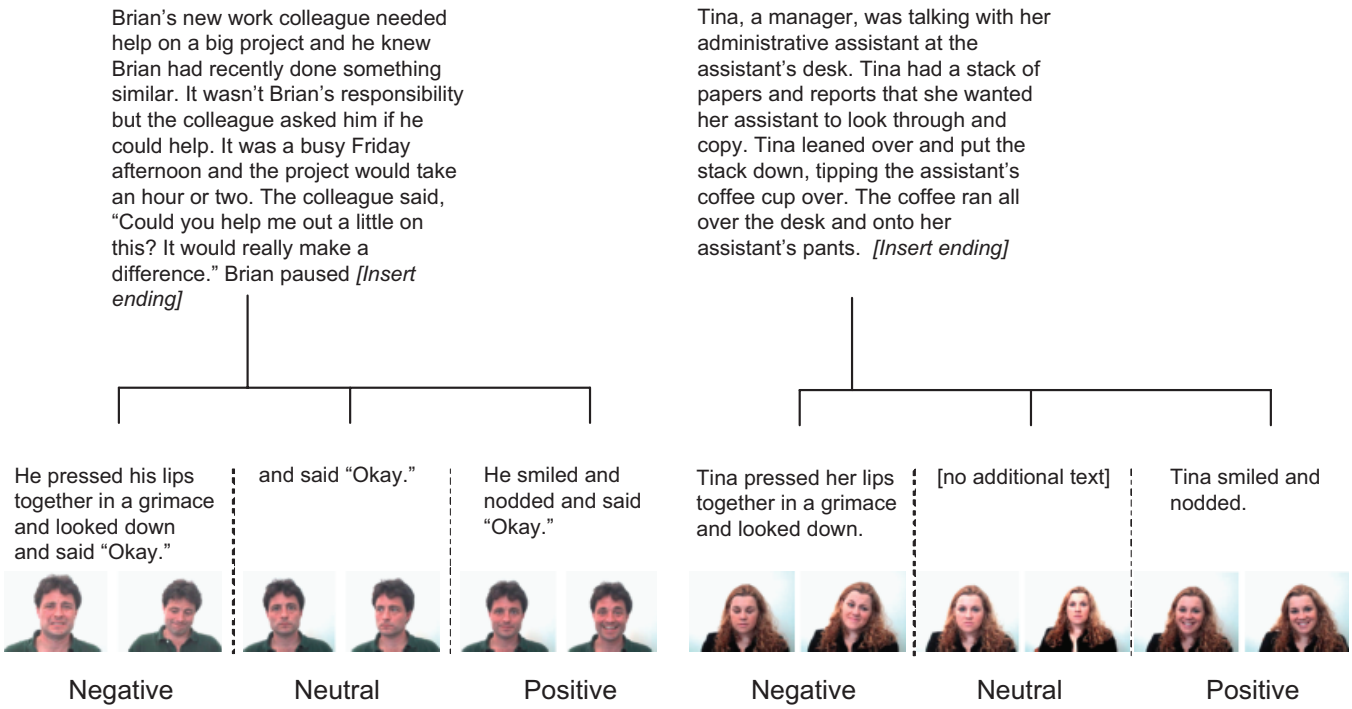

Fig. 1. Illustration of one scenario set in Study 1. Table S1 in the supporting information available on-line (see p. 593) presents all three scenario sets used in this study.

Each scenario was presented three times, and participants completed a different set of dependent measures after each presentation. The three sets of questions asked about the target's emotions, intentions, and traits, respectively. The emotion items were "S/he felt happy, pleased," "S/he felt sad, bad," "S/he felt embarrassed, guilty," and "S/he felt angry, frustrated." The intention items were "S/he wanted to be nice to others" and "S/he didn't really care about other people." The trait items consisted of "S/he is trustworthy, reliable," "S/he is helpful, kind," "S/he is selfish, uncaring," and "S/he is a jerk, mean." The questions within each set were randomly ordered, and participants had unlimited time to answer them. All items were rated on scales from 1 (*strongly disagree*) to 7 (*strongly agree*).

Results

We calculated a composite measure of perceived positive affect by averaging ratings for "happy," "sad," "embarrassed," and "angry" (the latter three were reverse-scored). Our composite measure of positive intentions was the average rating for the "wanted to be nice" and "didn't really care" (reverse-scored) items, and our composite measure of positive impressions was the average rating for "trustworthy," "helpful," "selfish," and "jerk" (the latter two were reverse-scored). Across multiple analyses, we did not find reliable effects suggesting that the impact of affective displays was bounded or moderated by scenario set, scenario order, or the target's sex. Therefore, we collapsed across these dimensions in the analyses reported here.

The affective-display conditions led to the expected differences in ascribed affect. For both prosocial and harmful behaviors, displays of positive affect (compared with displays of negative affect) led to higher ratings for "happy" and lower ratings for "sad," "embarrassed," and "angry" (see Table S2 in the supporting information available on-line).

As expected, compared with negative affective displays, positive displays appeared to augment behavior-correspondent judgments, making them more positive for prosocial behaviors and more negative for harmful behaviors (Fig. 2). Specific contrasts confirmed our predictions: For prosocial behaviors, positive affect led to significantly more positive intention ratings, $t(57) = 3.15$, $p_{rep} = .98$, $d = 0.83$, and impression ratings, $t(57) = 3.37$, $p_{rep} = .99$, $d = 0.89$, than did negative affect. For harmful behaviors, positive affect led to significantly less positive intention ratings, $t(60) = 1.77$, $p_{rep} = .89$, $d = 0.46$, and impression ratings, $t(60) = 1.97$, $p_{rep} = .92$, $d = 0.51$, than did negative affect. This pattern of significance extended across nearly every one of the individual intention and impression items (see Table S2 in the supporting information available on-line). Our inclusion of a control condition helps to clarify the effects. Compared with neutral displays, positive displays augmented impressions based on prosocial behavior, $t(60) = 3.26$, $p_{rep} = .99$, $d = 0.84$, whereas negative displays discounted impressions based on harmful behavior, $t(56) = 2.26$, $p_{rep} = .94$, $d = 0.60$.

We also examined another contrast: Were harm-doers who appeared to be remorseful and frustrated seen more negatively

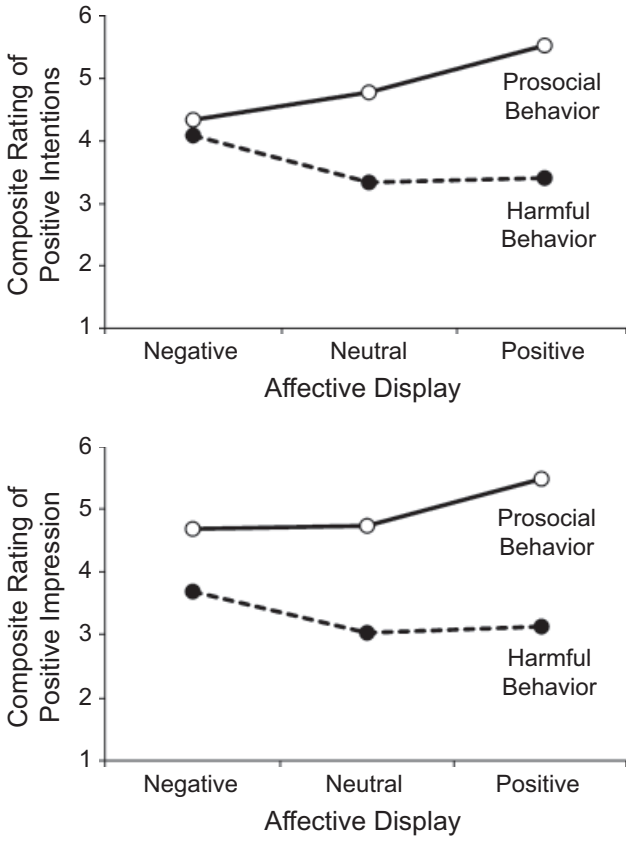

Fig. 2. Results from Study 1: participants' judgments of targets' intentions (top panel) and impressions of targets (bottom panel) as a function of targets' behavior (prosocial or harmful) and affective display (negative, neutral, or positive).

than helpers who appeared to be remorseful and frustrated? Indeed, impressions were significantly more negative for harm-doers displaying negative affect (3.69) than for helpers displaying negative affect (4.69), $t(56) = -3.60$, $p_{rep} = .99$, $d = 0.96$. However, harm-doers showing negative affect were not seen as harboring worse intentions than helpers showing negative affect (4.34 for helpers, 4.09 for harm-doers), $t(56) = -0.63$, $p_{rep} = .67$, $d = 0.17$.

We also conducted correlational tests of our predictions. As expected, for prosocial behaviors, ascription of positive emotions to the target was positively correlated with attribution of positive intentions, $r(91) = .25$, $p_{rep} = .95$, and positive impressions, $r(91) = .26$, $p_{rep} = .96$. Also as expected, these correlations were reversed for harmful behaviors: In this case, positive emotions were negatively correlated with the attribution of positive intentions, $r(91) = -.41$, $p_{rep} = .99$, and positive impressions, $r(91) = -.39$, $p_{rep} = .99$.

We tested for mediation with separate regressions for prosocial and harmful behaviors (for further details, see Alternative Mediation Models in Study 1 in the supporting information available on-line). For prosocial behaviors, we predicted positive impressions with rated positive emotions, $\beta = .26$, $t(89) = 2.58$, $p_{rep} = .95$, and then with rated positive intentions, $\beta = .64$, $t(89) = 7.78$, $p_{rep} = .99$. Separately, emotion ratings predicted intention ratings, $\beta = .25$, $t(89) = 2.47$, $p_{rep} = .95$. In a combined model predicting impressions, rated intentions were substantially predictive, $\beta = .61$, $t(88) = 7.22$, $p_{rep} = .99$, but rated emotions were less so, $\beta = .11$, $t(88) = 1.30$, $p_{rep} = .82$; this result is consistent with mediation, Sobel $z = 2.33$, $p_{rep} = .95$. The results were similar for harmful behaviors. Rated positive emotions predicted positive impressions, $\beta = -.39$, $t(89) = -4.05$, $p_{rep} = .99$, as did rated positive intentions, $\beta = .69$, $t(89) = 8.99$, $p_{rep} = .99$. Separately, emotion ratings predicted intention ratings, $\beta = -.41$, $t(89) = -4.24$, $p_{rep} = .99$. In a combined model predicting impressions, rated intentions were substantially predictive, $\beta = .64$, $t(88) = 7.62$, $p_{rep} = .99$, but rated emotions were less so, $\beta = -.13$, $t(88) = -1.61$, $p_{rep} = .87$; again, this result is consistent with mediation, Sobel $z = 3.71$, $p_{rep} = .99$.

STUDY 2

Having established augmenting and discounting effects in Study 1, we next focused on a potential boundary condition: *convergence*. In Study 2, participants reviewed a sequence of scenes involving a target's acts of harm or help. Different participants saw different affective displays accompanying the scenes. Participants recorded their judgments of the target after each scene. We expected to replicate the augmenting and discounting effects after the initial scene; however, we expected the effect of affective display to wane as participants viewed more scenes.

Method

One hundred forty-five paid participants completed Study 2. Eighty-six of the participants (59.3%) were female, and 59 (40.7%) were male; the average age was 21.7 years. Fifty-six of the participants (38.6%) identified themselves as Asian or Asian American, 43 (29.7%) identified themselves as Caucasian, 19 (13.1%) identified themselves as African or African American, and 15 (10.3%) identified themselves as Latino or Hispanic.

Photographs from two models in Study 1 were used. Photos from a male model accompanied positive behaviors. On the basis of pilot testing, we selected five photographs in which this model displayed positive affect (happiness or pleasure), and five photographs in which he displayed neutral affect (no obvious affect). Photos from a female model accompanied negative behaviors. In this case, we selected five photographs in which the model displayed negative affect (embarrassment, sadness, or distress), and five photographs in which she showed neutral affect.

In a computer-based survey, these photographs were paired with prosocial or harmful behaviors, presented as a cumulative sequence of work episodes. For the harmful behaviors (female target), the introduction read:

> Imagine that you are working in a professional office job and Janet is a colleague of yours. You have been assigned to work on a project with Janet, who typically works in a different building. . . . Over the

> next few screens, you'll see scenes about your ongoing meetings with Janet. Review each scene and record your impressions of Janet as they evolve. The picture above each scenario portrays Janet during the events described.

For the prosocial behaviors (male target), the introduction read:

> Imagine that you are working in a professional office job and Alex is a colleague of yours. You and Alex have been assigned to work together on a project. These scenes you'll see take place over five days as the project goes on. Read each scene through carefully and answer the questions that follow. The picture above each scenario portrays Alex during the events described.

Each participant viewed five episodes, each matched with a photograph of the same valence (see Table S3 in the supporting information available on-line). Harmful behaviors included Janet coming to meetings late and unprepared. Prosocial behaviors included Alex helping to fix a computer problem and staying late to help. As in Study 1, the text descriptions also featured language corresponding to the affective displays. For each set of behaviors, some participants viewed the scenes in one order, and others saw the scenes in the reverse order; this counterbalancing helped to rule out the possibility that any apparent convergence was a function of the strength of the behaviors (e.g., later harmful behaviors might have been worse than the initial ones).

After each of the five scenes, the text and photograph remained on the screen until participants responded to our dependent measures (i.e., response time was not limited). Participants indicated their answers on a 7-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Items for the harmful-behavior condition were "She is selfish, uncaring," "She is a good colleague," "She respects and cares about you," "She is helpful, kind," and "She is a sad, downbeat person." For the prosocial-behavior condition, the same items were used, except that "She" was changed to "He," and the last item read, "He is a happy, upbeat person." The order of these items was randomized for each scene.

Thus, the experiment had a 2 (behavior valence: prosocial vs. harmful) × 2 (affective display: neutral vs. positive for prosocial behaviors, neutral vs. negative for harmful behaviors) × 2 (scene order: original sequence vs. reversed) between-participants design. Our selection of the affects to be contrasted (positive vs. neutral for the prosocial behaviors, negative vs. neutral for the harmful behaviors) was based on pilot research indicating that participants found the other behavior-affect combinations (e.g., repeated harmful behaviors accompanied by positive affect) peculiar or pathological.

Results

To test for convergence, we compared average ratings between the two affective-display conditions within each behavior (prosocial vs. harmful) condition and each episode (1–5; see Table S4 in the supporting information available on-line for detailed results of the comparisons). For each participant, we calculated a composite measure of positive impressions of the target by averaging ratings for "good colleague," "helpful," "respects you," and "selfish" (reverse-scored).

In the prosocial-behavior conditions, the measure of positive impressions was significantly higher after the first episode for targets who showed positive affect (5.37) than for targets who showed neutral affect (4.73), $t(75) = 2.60$, $p_{rep} = .97$, $d = 0.60$. However, the difference between the affective-display conditions was not significant after the fifth episode (6.06 for positive affect vs. 6.12 for neutral affect), $t(75) = 0.29$, $p_{rep} = .58$, $d = 0.07$ (see Fig. 3). A repeated measures analysis of variance revealed a significant interaction between episode (first vs. fifth) and affective display (positive vs. neutral), $F(1, 75) = 7.91$, $p_{rep} = .97$, $\eta^2 = .10$, as well as a main effect of episode, $F(1, 75) = 68.94$, $p_{rep} = .99$, $\eta^2 = .48$.

In the harmful-behavior conditions, the measure of positive impressions was significantly higher after the first episode for targets who showed negative affect (3.62) than for targets who showed neutral affect (3.24), $t(66) = 2.39$, $p_{rep} = .95$, $d = 0.59$. However, the difference between the affective-display conditions was not significant after the fifth episode (2.08 for negative affect vs. 2.05 for neutral affect, $t(75) = 0.14$, $p_{rep} = .54$, $d = 0.03$ (see Fig. 3). A repeated measures analysis of variance revealed a marginally significant interaction between episode (first vs. fifth) and affective display (negative vs. neutral), $F(1, 66) = 2.95$, $p_{rep} = .88$, $\eta^2 = .04$, as well as a main effect of episode, $F(1, 66) = 63.60$, $p_{rep} = .99$, $\eta^2 = .73$.

Discussion

Our results were consistent with our prediction about convergence. Although positive (compared with neutral) affect initially augmented impressions based on a single episode of prosocial behavior, the effect dissipated as participants viewed additional helpful behavior. Likewise, although negative (compared with neutral) affect initially discounted impressions based on a single episode of harmful behavior, the effect dissipated as participants viewed additional harmful behavior.

GENERAL DISCUSSION

Results from these two studies were generally consistent with our expectations. Perceivers appeared to use targets' affective displays to clarify the targets' underlying motives and character: Positive displays augmented behavior-correspondent inferences, whereas negative displays discounted behavior-correspondent inferences. Indeed, in Study 1, disgruntled helpers were ascribed intentions that were no more positive or prosocial than those of remorseful harm-doers. In other words, affective displays seemingly nullified the impact of behavior on perceived

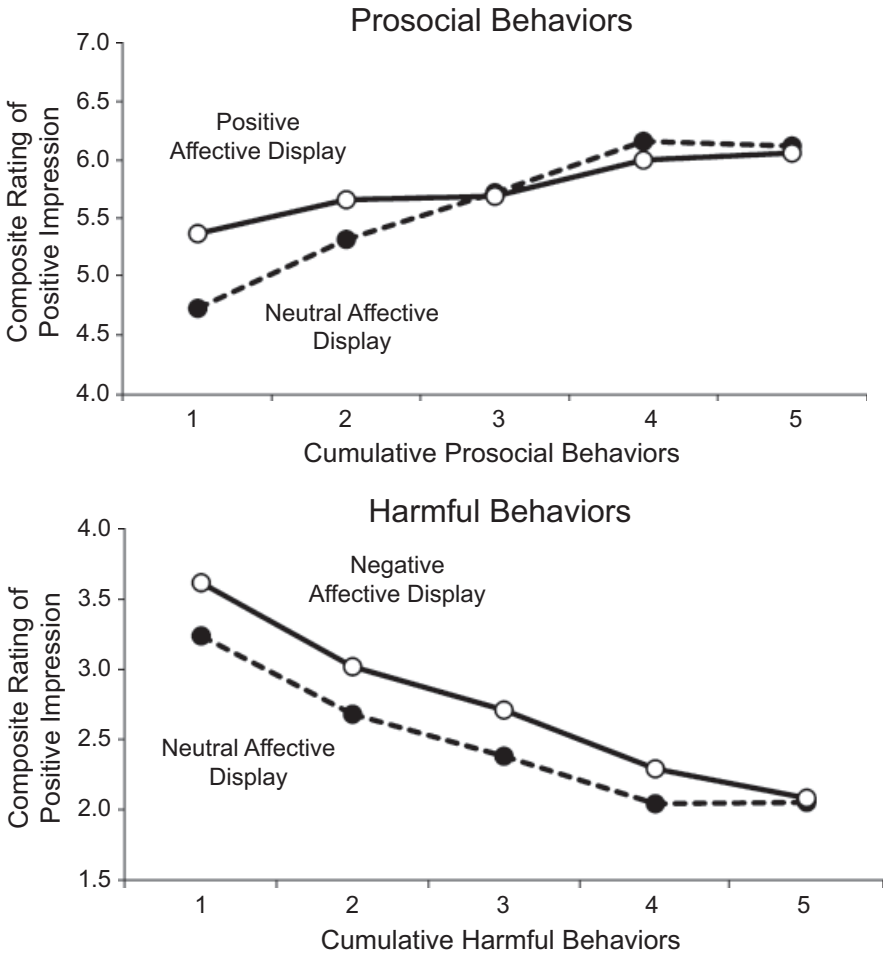

Fig. 3. Results from Study 2: participants' impressions of targets displaying positive or negative affect as a function of the number of episodes viewed. Results are shown separately for targets engaged in prosocial behaviors (top panel) and targets engaged in harmful behaviors (bottom panel). Results for targets displaying neutral affect are included in each graph for purposes of comparison.

intent. We also found the expected pattern of mediation: The link between affective displays and impressions seemed to be accounted for by perceived intentions. Study 2 showed evidence of convergence as a boundary to these effects: The ability of affective displays to discount or augment behavior-correspondent inferences appeared to wane over repeated episodes. In the short run, a target's affective displays may be able to trump his or her behavior in the eyes of a perceiver, but in the long run, impressions converge with repeated behavior. Over time, actions speak louder than affect.

Overall, our results portray perceivers as folk psychologists who, in effect, run appraisal theories of emotion backward in interpreting prosocial and antisocial behaviors, starting with a target's affective displays and using them to determine whether the target's behavior and outcomes are consistent with his or her motives (e.g., Ellsworth & Smith, 1988; Roseman et al., 1996). Appraisal theories also make more fine-grained distinctions within the categories of positive and negative emotions. Likewise, research on emotion perception has shown that perceivers distinguish between different kinds of positive emotions (e.g., happiness and pride; Tracy & Robins, 2007) and negative emotions (e.g., fear and anger; Marsh, Ambady, & Kleck, 2005). Our results open the door to additional work examining how specific emotional displays interact with behaviors to influence social judgment.

Our account resonates with work suggesting that impression formation is often a matter of "mind reading" (e.g., Ames, Flynn, & Weber, 2004; Malle, 2004; Read et al., 1990; Reeder et al., 2002) and highlights the role that "emotion reading" plays in these inferences. The building blocks for using faces to read minds show themselves early in human development. Infants and newborns attend to and distinguish among other individuals' affective displays; 1-year-olds can use an actor's positive-emotion displays to predict which object the actor will approach (e.g., Phillips, Wellman, & Spelke, 2002). By 2 to 3 years of age, children understand that people are happy if they get what they want, but may become sad or angry if they do not (Wellman et al., 2000; Wellman & Woolley, 1990). Children a few years older show a nuanced ability to read facial expressions—such as wariness and astonishment—and posit underlying mental states

(Baron-Cohen et al., 1996). In combination with these developmental findings, our results prompt questions about the emergence of augmenting and discounting based on affective displays. Do young children discount behavior-correspondent inferences for acts accompanied by negative affective displays? Do individuals with autism spectrum disorders show discounting or augmentation effects (cf. Frith, 2003)?

Our results also raise questions about cognitive effort and automaticity. Evidence suggests that behavioral information about a target spontaneously gives rise to trait inferences (e.g., Carlston & Skowronski, 1994; Uleman, Newman, & Moskowitz, 1996). Other research indicates that emotion recognition is automatic (Tracy & Robins, 2008). Are the augmenting and discounting effects we have demonstrated laborious corrections or spontaneous adjustments? Resolving the matter empirically would yield a more complete account of trait inference and emotion perception. At the very least, our findings suggest that perceivers consider affective displays relevant and use them when inferring dispositions from behavior.

Research on observers' emulation of targets' emotions may be relevant to our results. Recent work suggests a role for mirror neurons in social judgment (e.g., Gallese, Keysers, & Rizzolatti, 2004), such that perceivers may recapitulate other individuals' emotional displays as a way of understanding their mental states. Other work highlights various forms of mimicry and contagion that result in some version of targets' emotions being played out within perceivers (e.g., Neumann & Strack, 2000). It could be that some form of internalization is a necessary step for the augmenting and discounting effects we have shown. For instance, one may need to "feel" a harm-doer's remorse in some fashion in order to discount his or her malevolent intentions. Without this internalization, perceivers may not recognize a target's emotion, and augmentation or discounting based on that emotion may not occur (cf. Adolphs, Tranel, & Buchanan, 2005; Decety & Jackson, 2006).

There has been a recent blossoming of work on how the perception of faces, including static facial features, figures into impression formation (e.g., Gorn, Jiang, & Johar, 2008; Macrae, Quinn, Mason, & Quadflieg, 2005; Penton-Voak, Pound, Little, & Perrett, 2006; Willis & Todorov, 2006; Zebrowitz, 2006). Our results suggest that an individual with a permanent facial configuration that resembles positive or negative affective displays may be subjected to some chronic level of discounting or augmenting by onlookers. A sorrowful brow shape could lead one to receive marginally less credit for helping; an upturned mouth might cause one to be seen as slightly glib or remorseless in the face of harm.

Virtually all people offer a constantly shifting facial display that can communicate how they feel about what they have done and what is happening around them. Perceivers surely take advantage of this. From faces, they infer affect, from affect they infer intentions, and from intentions they infer character. Models of social judgment should reflect this fundamental process, as well as its boundaries.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the on-line version of this article:

Alternative Mediation Models in Study 1
Table S1
Table S2
Table S3
Table S4

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