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Effects of Self-Generated Facial Expressions on Mood

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Two experiments were conducted in which participants looked at photographs (Experiment 1, n = 129) or slides (Experiment 2, n = 90) of people engaging in positive or negative facial expressions. Participants attempted to communicate these facial expressions as accurately as they could to a video camera while viewing themselves in a mirror or without viewing themselves in a mirror. Participants in a control group maintained neutral facial expressions. Participants experienced increased positive moods when they engaged in positive facial expressions and decreased positive moods when they engaged in negative facial expressions. These effects were enhanced when participants viewed themselves in a mirror. The effects of facial expressions on positive affect were stronger for participants with high private self-consciousness. Results were integrated with research identifying individuals who are responsive to self-produced versus situational cues and with theory and research on self-awareness.

Recognition that facial expressions are intimately related to emotional experience has a long and interesting history (Adelmann & Zajonc, 1989; Izard, 1990). References to the process of intensifying one's emotions through amplification of expressions can be found in the writings of Homer and Shakespeare (Izard, 1990). Darwin (1872/1965) and William James (1890/1950) both included facial expressions as an important component in their theories of emotion. More recent theories focusing on the role of facial feedback in regulating emotions were developed by Tomkins (1962, 1963), Gellhorn (1964), Izard (1971, 1977), and Zajonc, Murphy, and Inglehart (1989).

During the past 20 years, researchers have attempted to experimentally demonstrate that facial expressions influence emotional experience. One approach has been to show that research participants' emotional experiences in various situations are decreased when they minimize their facial expressions. Another approach has been to show that research participants' emotional experiences are enhanced when they accentuate their facial expressions. Because of the necessity to maintain strict experimental controls, studies using these two approaches have had various degrees of success in capturing the spontaneity of naturally occurring emotions that were postulated in the original facial feedback theories. However, taken as a whole, these studies have supported facial feedback theories of emotion by confirming that research participants' emotional experiences are modified when their facial expressions are altered (for reviews, see Adelmann & Zajonc, 1989; Izard, 1990; Manstead, 1988).

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Our experiments were designed to contribute to research testing the facial feedback hypothesis by using a different method of manipulating facial expressions than has been used in the past. Research participants were instructed to look at photographs or slides of people engaging in various facial expressions and to communicate these expressions as accurately as possible to a video camera. This methodology differs from that of McCaul, Holmes, and Solomon (1982), who instructed participants to portray specific emotions with their faces, because it minimizes experimental demands (see Laird, 1974, p. 477). It was predicted that participants who emulated the facial expressions would experience the emotions associated with these facial expressions to a greater degree than would participants in a control group who were instructed to look at the photographs or slides while maintaining a neutral facial expression. To place the experiments reported here in perspective, it will be helpful to provide a brief review of studies in which research participants' facial expressions were experimentally manipulated.

Laird and his colleagues induced research participants to engage in positive and negative facial expressions by attaching electrodes to their faces and asking them to tense or relax particular facial muscles as part of a study of "the activity of facial muscles" (Duclos et al., 1989; Duncan & Laird, 1977; Laird, 1974; Laird & Crosby, 1974; Laird, Wagener, Halal, & Szegda, 1982). In general, research participants reacted with more positive moods when they engaged in positive facial expressions and with more negative moods when they engaged in negative facial expressions. Similar results using this methodology were reported by McArthur, Solomon, and Jaffe (1980), Rhodewalt and Comer (1979), and Rutledge and Hupka (1985).

A somewhat less intrusive method of manipulating facial expressions was designed by instructing research participants to hold a pen with their lips (smiling expression) or with their teeth (frowning expression; Martin, Harlow, & Strack, 1992; Strack, Martin, & Stepper, 1988). Research participants reacted more positively to stimulus materials when they were induced to smile than when they were induced to frown. Larsen, Kasimatis, and Frey (1992) used a similar method in which research

participants were instructed to pull together (frown) or keep apart (neutral) two golf tees that had been attached to their forehead. Participants reacted with more negative moods when they had been induced to frown.

Three studies used even more naturalistic methods of manipulating facial expressions. Kleinke and Walton (1982) provided positive reinforcement to a group of research participants whenever they smiled during an interview. Smile-reinforced participants reacted with more positive moods than did participants who were given noncontingent reinforcement. Research participants in a study by Kraut (1982) were instructed to engage in positive or negative facial expressions while smelling odors that ranged from pleasant to unpleasant. Participants' ratings of the odors were influenced mainly by the odor but were moderated by their facial expressions. Zajonc et al. (1989) manipulated facial expressions (and resulting facial temperature) by having research participants read stories containing phonemes whose pronunciation requires the movement of different facial muscles. Participants reacted with more positive moods when the phonemes they read resulted in facial expressions that facilitated a cooling of the face.

In a critique of research manipulating facial expressions, Winton (1986) pointed out that most studies tested a *dimensional* model of the facial feedback hypothesis in which negative facial expressions resulted in generally negative moods and positive facial expressions resulted in generally positive moods. Since Winton's critique, Duclos et al. (1989) performed a *categorical* study in which specific facial expressions were shown to elicit specific emotions. Matsumoto (1987) argued that although the results of facial manipulation studies supporting the facial feedback hypothesis were statistically significant, their effect sizes were generally low. Izard (1990) reanalyzed Matsumoto's data and found the effect sizes for studies using naturalistic manipulations of facial expressions were fairly high (r = .457), whereas the effect sizes for studies using experimenter-manipulated facial expressions were on the lower side (r = .275). Izard concluded that the effects of experimenter-manipulated facial expressions on moods, although generally reliable, are weak for the following reasons: (a) The innervation of spontaneous and voluntary (manipulated) facial expressions involves different neural pathways, (b) connections between voluntary (manipulated) facial expressions and emotions are moderated by learning, (c) manipulated facial expressions may not be congruent with the situation, and (d) the experimental manipulation may be perceived by research participants as untenable and intrusive.

In addition to using a different method of modifying facial expressions than has been used in the past, our experiments were designed to make the following specific contributions to the research examining the facial feedback hypothesis:

1. Laird and his colleagues (Duclos et al., 1989; Duncan & Laird, 1977; Laird & Crosby, 1974; Laird et al., 1982) concluded that people differ in their propensity to respond to self-produced emotional cues. In Experiment 1, individual differences were assessed with the Revised Self-Consciousness Scale (Scheier & Carver, 1985). People with high private self-consciousness are very cognizant of their thoughts, feelings, and moods (Carver & Scheier, 1978; Scheier & Carver, 1977). It was therefore predicted that participants with high scores on private self-consciousness would be more influenced by their facial expressions than would participants with low scores on private self-consciousness.

2. Laird (1974) hypothesized that an important mechanism mediating the effects of facial expressions on emotions is self-perception (Bem, 1972). An attempt was made to look specifically at the effects of self-perception by including a treatment group in which participants observed themselves in a mirror. Self-perception theory would predict that facial expressions would have a greater effect on moods when the mirror was present because of participants' heightened awareness of their behaviors. Research and theory on self-focused attention (Duval & Wicklund, 1972; Wicklund, 1975) would also predict a stronger effect of facial expressions on mood when participants viewed themselves in a mirror because participants would be more aware of their moods (Carver & Scheier, 1978; Scheier & Carver, 1977).

Experiment 1

Method

Participants

Participants were 73 women and 58 men who were recruited as volunteers from various undergraduate courses. All participants were Caucasian. Participants ranged in age from 17 to 58 years (M = 27.2 years, Mdn = 25 years, SD = 9.13 years).

Experimental Design

The experiment was described as a study of how accurately people can communicate facial expressions. Participants in the two experimental groups were asked to look at a series of photographs of men and women with posed facial expressions and to communicate the emotional expression of the person in the photograph as accurately as they could with their own facial expressions. It was explained to participants that their facial expressions would be videotaped and then shown to students in a subsequent study with the purpose of finding out how accurately these students could judge which emotional expressions the present participants were communicating.

Participants in the expression–mirror group were instructed to emulate the facial expressions of the people in the photograph as accurately as possible. They were provided with a mirror so they could match their facial expressions with those of the people in the photograph. Participants in the expression group were instructed to emulate the facial expressions of the people in the photograph as accurately as possible. They did not have a mirror for observing their own facial expressions. Participants in the control group were instructed to maintain a neutral facial expression throughout the study. Their task was to make it impossible for people observing their videotaped facial expressions to guess which photographs they were observing. Half of the participants were given photographs of people engaging in positive facial expressions and half of the participants were given photographs of people engaging in negative facial expressions.

In addition to being randomly assigned to one of three experimental groups and one of two types of facial expression, participants were divided into groups of high versus low private self-consciousness. This resulted in a 2 (participant sex) × 3 (treatment group) × 2 (positive vs. negative facial expression) × 2 (high vs. low private self-consciousness) factorial design.

Instruments

MAACL-R. The Multiple Affect Adjective Check List Revised (MAACL-R; Zuckerman & Lubin, 1985) was used to assess participants' affective states. Participants were instructed to complete the MAACL-R according to "how you are feeling at this moment." The two MAACL-R scales chosen for analysis in this study were Positive Affect and Dysphoria. Participants completed the MAACL-R at the beginning and at the conclusion of the experiment.

Brief Symptom Inventory. The Brief Symptom Inventory (BSI) is a brief form of the SCL-90-R (Derogatis, 1975, 1977), measuring nine symptom dimensions and providing three global indexes of distress. The General Severity Index was used in our study because it is the most sensitive of the global indexes (Derogatis & Spencer, 1982). Participants completed the BSI at the conclusion of the experiment. The BSI was included as a measure in Experiment 1 because research studies have found that people's moods have an effect on their self-reported health and well-being (Croyle & Uretsky, 1987; Salovey & Birnbaum, 1989). It was of interest to determine whether changes in participants' moods resulting from their facial expressions would influence their reports of psychological distress.

Self-Consciousness Scale. The Revised Self-Consciousness Scale (Scheier & Carver, 1985) was used to measure participants' private self-consciousness. On the basis of the nine items measuring private self-consciousness (e.g., "I'm always trying to figure myself out"; I think about myself a lot"; "I'm constantly thinking about my reasons for doing things), participants were divided at the median ($Mdn = 15$) into two groups: those high and those low in private self-consciousness.

Photographs of Positive and Negative Facial Expressions

The photographs were 3 × 5 in. color prints showing shoulder-to-head views of men and women with intentionally posed facial expressions reflecting either positive (12 photographs) or negative (12 photographs) emotions. The positive facial expressions were characterized by smiling and an attempt to look pleased or happy. The negative facial expressions were characterized by frowning and an attempt to look angry, displeased, or disgusted. The positive versus negative emotions expressed in the photographs were unambiguous. Twenty judges sorted the photographs into groups reflecting positive, neutral, or negative emotions. All judges placed the 12 positive photographs in the positive group and the 12 negative photographs in the negative group. No photographs were placed in the neutral group.

Procedure

Participants were seated in a comfortably decorated 10 × 10 ft room at a small table holding experimental materials and a cassette audiotape player. A video camera on a tripod in full view was oriented to record participants' facial expressions. The experimenter observed participants on a video monitor in an adjacent room to ensure that they followed experimental instructions. In the expression–mirror condition, a 9 × 12 in. mirror was set up on the table so participants could look directly at themselves.

Participants read and signed an informed consent and completed the MAACL-R (pretest) and the Revised Self-Consciousness Scale. After this, they listened to tape-recorded instructions describing the experiment and instructing them about what they were expected to do. The experimenter then answered questions and left the participants alone in the room until the experiment was completed. At this time, participants turned on the tape recorder, which instructed them to pick up the first photograph and to match their facial expression to the expression of the person in the photograph for 15 s (expression group), to match their expression for 15 s with the aid of the mirror (expression–mirror group), or to maintain a neutral facial expression for 15 s (control group). After 15 s, participants were instructed to put Photograph 1 down and to pick up Photograph 2, and so on. There was a 5-s period between each photograph. The tape-recorded instructions guided participants through all 12 photographs and then told participants to complete the remaining paperwork, which consisted of the MAACL-R (posttest) and the BSI.

When participants had completed the experiment, the experimenter returned, answered questions, and conducted a brief interview to determine whether participants might have been influenced by experimental demands (Orne, 1962). Participants were first asked to describe their experiences during the study. They were then questioned about whether they noticed a connection between their facial expressions and their feelings. Finally, participants were prompted to report whether they were aware that the study was intended to influence their moods. After the poststudy interview, participants were debriefed and told how they could obtain results of the study.

Demand Characteristics and Participant Compliance

Although some participants expressed awareness of a connection between their facial expressions and feelings, no participant reported knowledge of the purpose of the study. Two participants (one man and one woman) apparently found humor in some of the negative facial expressions in the photographs and they smiled. Data from these participants were deleted, resulting in data from 72 women and 57 men.

Results

Positive Affect

An analysis of variance (ANOVA) on residual change scores for MAACL-R Positive Affect identified a significant Treatment Group × Facial Expression interaction, $F(2, 105) = 6.24$, $p < .003$, $r = .24$, and a significant interaction for Treatment Group × Facial Expression × Private Self-Consciousness, $F(2, 105) = 3.94$, $p < .023$, $r = .19$.

Data in Figure 1 indicate that participants reported increased positive affect when they engaged in positive facial expressions and decreased positive affect when they engaged in negative facial expressions. This effect was particularly strong when participants viewed themselves in the mirror. Contrasts between residual change scores of participants who communicated positive versus negative facial expressions were as follows: $F(1, 105) = 4.01$, $p < .05$, $r = .19$, for the expression condition, and $F(1, 105) = 22.7$, $p < .001$, $r = .41$, for the expression–mirror condition.

The Treatment Group × Facial Expression × Private Self-Consciousness interaction is outlined in Table 1. Note that the influence of posed facial expressions (particularly negative expressions) on positive affect was more pronounced for participants with high private self-consciousness than it was for participants with low private self-consciousness.

Dysphoria

An ANOVA on residual change scores for MAACL-R Dysphoria did not find any significant main effects or interactions.

Brief Symptom Inventory

An ANOVA on the General Severity Index of the BSI identified only a significant main effect for private self-consciousness,

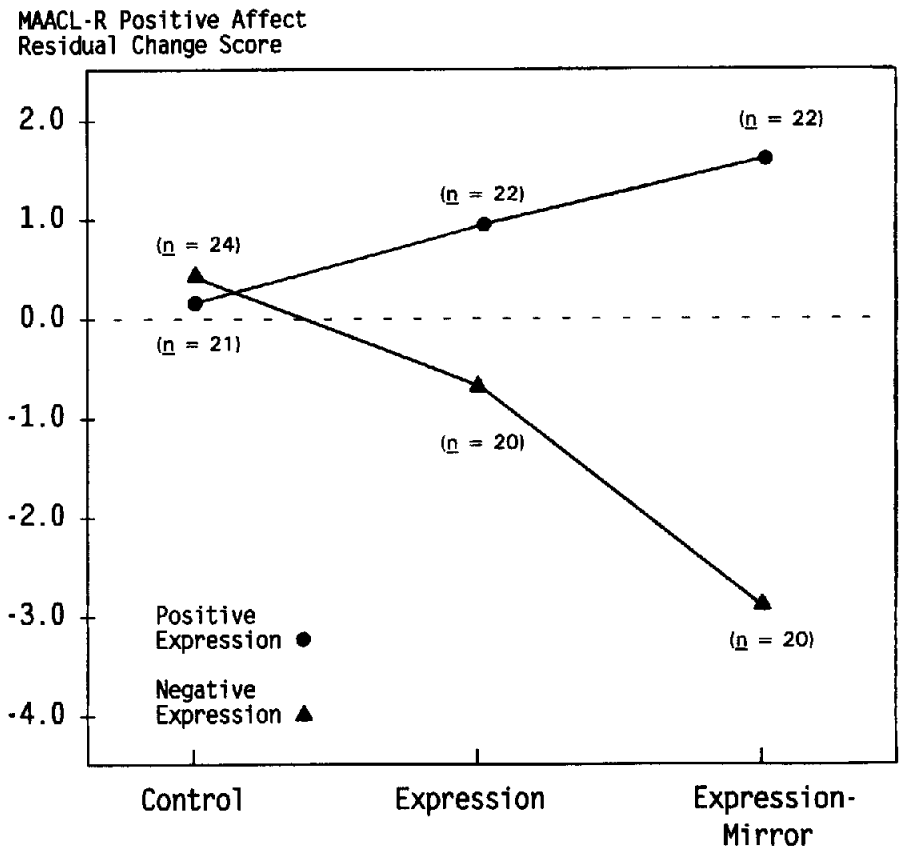

Figure 1. Experiment 1: Mean residual change scores on Multiple Affect Adjective Check List Revised (MAACL-R) Positive Affect.

$F(1, 107) = 6.08$, $p < .02$, $r = .24$. Participants with high private self-consciousness claimed to experience more symptoms of distress than did participants with low private self-consciousness (Ms = 0.82 and 0.55, respectively).

Table 1
Experiment 1: Mean Residual Change Scores for MAACL-R Positive Affect

Measure	Control	Expression	Expression–mirror
Low private self-consciousness			
Positive expressions	$.30_a$	$.80_a$	$.99_a$
	(14)	(12)	(12)
Negative expressions	$.33_a$	$-.37_a$	$-.77_a$
	(10)	(10)	(11)
High private self-consciousness			
Positive expressions	$.04_a$	$.96_{a,b}$	2.67_b
	(10)	(10)	(10)
Negative expressions	$.20_a$	-1.23_a	-5.20_c
	(11)	(10)	(9)

Note. Within each private self-consciousness group, means not sharing a common subscript differ at $p < .05$. Cell sample sizes are in parentheses. MAACL-R = Multiple Affect Adjective Check List Revised.

Discussion

Experiment 1 supported the theory that facial expressions can influence emotions by showing that participants experienced increased positive moods when they engaged in positive facial expressions and decreased positive moods when they engaged in negative facial expressions. The effect of facial expressions on mood was even stronger when participants observed themselves in a mirror. This finding is in line with predictions from self-perception theory (Laird, 1974, 1984) and from research and theory on self-awareness (Carver & Scheier, 1978; Scheier & Carver, 1977).

Participants with high scores on private self-consciousness were more influenced by their facial expressions than were participants with low scores on private self-consciousness. This finding is consistent with research identifying individual differences in people's propensity to use self-produced versus situational cues for inferring their attitudes and emotions (Duncan & Laird, 1977; Laird & Crosby, 1974; Laird et al., 1982). It also supports studies showing that people with high private self-consciousness are more responsive to mood-inducing experiences than are people with low private self-consciousness (Carver & Scheier, 1978; Scheier, 1976; Scheier & Carver, 1977).

There were no main effects or interactions involving participant sex, indicating that men and women responded similarly

to the facial expression manipulations. Although self-generated facial expressions influenced participants' positive moods, they did not affect participants' negative moods and participants' reports of psychological distress on the BSI. One problem with the MAACL-R Dysphoria scale was that its range was very limited. The modal score was zero and few participants had prescores or postscores greater than three. The range of scores on the General Severity Index of the BSI was also limited. The modal score was .07 and 90% of the participants had scores less than one.

Experiment 2

Experiment 2 was designed to replicate Experiment 1 with the following modifications. First, the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) was substituted for the MAACL-R for measuring self-reported mood. The main reason for using the PANAS scale was to replicate Experiment 1 with a different mood measure. The PANAS scale is briefer and more focused on positive versus negative affectivity than the MAACL-R. A second modification was the use of slides of people making facial expressions that had been standardized by experts in the field (Ekman & Friesen, 1976). Participants in the positive expression condition looked at slides of people expressing happiness. Participants in the negative expression condition looked at slides of people expressing sadness, fear, and anger. Because of its limited range of scores with our participants, the BSI was not used in Experiment 2.

Method

Participants

Participants were 50 women and 40 men who were recruited as volunteers from various undergraduate courses. All participants were Caucasian. Participants ranged in age from 18 to 65 years (M = 29.5 years, Mdn = 25.0 years, SD = 10.9 years).

Experimental Design

The same instructions and experimental groups were used as in Experiment 1, with the exception that participants did not complete the Revised Self-Consciousness Scale. This resulted in a 2 (participant sex) × 3 (treatment group) × 2 (positive vs. negative facial expression) factorial design.

Instruments

Participants completed the PANAS scale (Watson et al., 1988) before and after the experiment. The PANAS scale includes 10 positive and 10 negative moods, which are rated by respondents according to how they feel *at this moment* on a 5-point scale from 1 (*very slightly or not at all*) to 5 (*extremely*). Scores for positive affect and negative affect are computed by averaging the respective ratings for positive and negative moods.

Slides of Positive and Negative Facial Expressions

The slides used were the Pictures of Facial Affect developed by Ekman and Friesen (1976). These slides represent men and women posing specific emotions with their facial expressions. Twelve slides were selected for positive emotions and twelve slides were selected for negative emotions. The slides for positive facial expressions were standardized by Ekman and Friesen as communicating happiness. The slides for negative facial expressions were standardized by Ekman and Friesen as communicating sadness, fear, or anger.

Procedure

The procedure was modeled after the procedure used in Experiment 1. The only differences were as follows: (a) Participants pressed the button on a slide projector to view the pictures of people making positive versus negative facial expressions and (b) participants in the expression–mirror and expression groups were instructed to emulate the facial expression of the person in the slide for 10 s. There was a 10-s pause between slides. One other difference from Experiment 1 was that instead of having a video camera set up on a tripod to record participants' facial expressions, participants were told that there was a video camera photographing them from behind a one-way mirror. Participants could not see themselves in the reflection of the one-way mirror. The experimenter sat behind the one-way mirror to ensure that participants followed instructions.

Demand Characteristics and Participant Compliance

Although some participants expressed awareness of a connection between their facial expressions and feelings, no participant reported knowledge of the purpose of the study. All participants followed instructions and engaged in the appropriate facial expressions.

Results

Positive Affect

An ANOVA on residual change scores for PANAS Positive Affect identified a significant Treatment Group × Facial Expression interaction, $F(2, 78) = 3.12$, $p < .05$, $r = .20$. Data in Figure 2 indicate that participants reported increased positive affect when they engaged in positive facial expressions and decreased positive affect when they engaged in negative facial expressions. This effect was particularly strong when participants viewed themselves in the mirror. Contrasts between residual change scores of participants who communicated positive versus negative facial expressions were as follows: $F(1, 78) = 3.11$, $p < .10$, $r = .20$, for the expression condition and $F(1, 78) = 5.65$, $p < .05$, $r = .26$, for the expression–mirror condition.

Negative Affect

An ANOVA on residual change scores for PANAS Negative Affect did not find any significant main effects or interactions. The range of scores on PANAS Negative Affect was very limited. The modal score was one, and over 90% of the participants had scores less than two.

General Discussion

Experiments 1 and 2 both supported the theory that facial expressions can influence emotions by showing that participants experienced increased positive moods when they engaged in positive facial expressions and decreased positive moods when they engaged in negative facial expressions. No effects were found for facial expressions on negative moods, largely because the range of scores on negative moods was very limited.

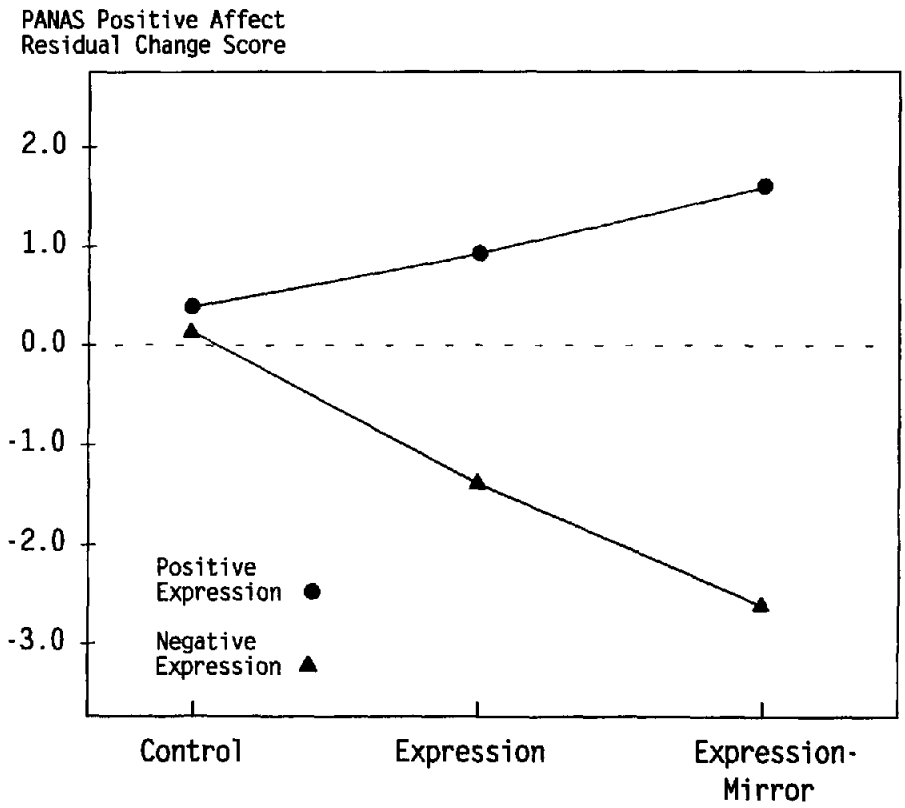

Figure 2. Experiment 2: Mean residual change scores on Positive and Negative Affect Schedule (PANAS) Positive Affect. There were 15 participants in each group.

In both experiments, participants in the control group were not influenced by the facial expressions of people in the photographs and slides. It appears that mimicry of the facial expressions was inhibited by the instructions given to control participants to maintain neutral facial expressions throughout the experiment (Hatfield, Cacioppo, & Rapson, 1992, 1993).

Our experiments were not intended to test the specific mechanisms underlying the facial feedback hypothesis (Adelmann & Zajonc, 1989; Izard, 1990; Zajonc et al., 1989). They do demonstrate, however, that the effects of facial expressions on self-reported mood are enhanced when people observe themselves making these expressions in a mirror. The finding that facial expressions had stronger effects on self-reported mood in the mirror condition is compatible with theories of self-perception (Bem, 1972; Laird, 1974, 1984) and self-awareness (Duval & Wicklund, 1972; Wicklund, 1975). Application of self-awareness theory to Experiments 1 and 2 is cross-validated by the fact that the effects of facial expressions on mood were greater for participants with high private self-consciousness as well as for participants whose self-consciousness was experimentally enhanced with a mirror (Carver & Scheier, 1978, p. 326; Scheier & Carver, 1980, p. 398).

The finding that participants in the expression–mirror group were most influenced by their facial expressions could be due to the fact that the mirror enabled participants to emulate the facial expressions more successfully. We rated participants' facial expressions (0 = *neutral*, 1 = *close to stimulus*, 2 = *very close to stimulus*) and found no difference between participants in the expression and expression–mirror groups (scores for participants in the control group were all zero). However, because of the cursory nature of our ratings, it remains for future research to determine if a mirror enhances the ability to emulate facial expressions.

Izard (1990) explained that the facial feedback hypothesis has been investigated by two types of studies: those that use experimenter-manipulated expressions and those that use spontaneous, self-initiated expressions. The manipulation of participants' facial expressions in our experiments was not as artificial as those used in many studies, but it was also not fully spontaneous. Our experiments were limited in demonstrating a dimensional form of the facial feedback hypothesis (Winton, 1986), and the effect sizes were modest (Matsumoto, 1987). The experiments contribute to the literature on facial expressions and emotions by demonstrating a different method for showing that facial expressions can influence moods and by demonstrating that the influence of facial expressions on moods is stronger for people with high (measured or manipulated) self-awareness.

In future research, it will be useful to learn more about individual differences in people's propensities to be affected by their facial expressions. Laird and his colleagues were able to distinguish between people who are responsive to self-produced versus situational cues on the basis of their responses to experimenter-posed facial expressions (Duclos et al., 1989; Duncan & Laird, 1977; Laird & Crosby, 1974; Laird et al., 1982). Experi-

ment 1 indicated that participants with high scores on private self-consciousness were more influenced by their facial expressions than were participants with low scores on private self-consciousness. Rutledge and Hupka (1985) found no relation between participants' responses to their facial expressions and their scores on scales measuring affective communication, self-monitoring, mental imagery, and self- versus situational orientation. It is likely that private self-consciousness is a better predictor of sensitivity to one's facial expressions than the measures used by Rutledge and Hupka because private self-consciousness focuses specifically on awareness of personal thoughts and feelings. It will be of interest to include measures and manipulations of self-awareness in future facial feedback research.

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