

BRIEF REPORT

Keep smiling: Enduring effects of facial expressions and postures on emotional experience and memory

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Self-perception theory (Bem, 1972; Laird, 1974) holds that acting ‘as if’ one feels something will result in that feeling. Whereas other studies have examined effects of emotional expression on immediate emotional experience, this study investigated the more lasting influence of *practised* expressions. Participants repeatedly produced the facial expressions and postures associated with either *Happiness*, *Sadness* or *Anger*. Subsequently, participants responsive to their bodily, personal cues felt more of the emotions they practised, even though they were no longer performing the expressive behaviour. In a separate procedure, they recalled more life events with an emotional content associated with their training. No mood changes occurred for participants responsive to situational cues.

Pretend that you are happy, and you will feel happy, pretend that you are angry, and you will feel angry. Well known to actors (e.g., Dolman, 1949), this effect has been extensively studied by psychologists following the tradition of William James (1890) and self-perception theory (Bem, 1972; Laird, 1974). According to self-perception theory, we are like external observers of ourselves, because we must infer our internal states from our actions. Our emotional and other feelings are derived from our own bodily experience of facial expressions, postures, levels of arousal, actions, etc. In that sense, feelings are the consequences of behaviour, not the causes: We feel happy because we smile, and angry because we scowl.

Many studies (see reviews by Adelman & Zajonc, 1989; Capella, 1993; Izard, 1990; Laird & Bresler, 1990) support the basic self-perception prediction that feeling states can

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be induced by changes in people's bodily activities. For example, people who are induced to adopt facial expressions or postures of various emotions feel the corresponding emotions (Duclos et al., 1989). People feel romantic attraction if they exchange mutual gazes (Kellerman, Lewis, & Laird, 1989; Williams & Kleinke, 1993). Increases in arousal lead to increases in intensity of experiences of fear, anger, and passionate love (see Laird & Bresler, 1992, for a review).

In all the research on the effects of behaviours on feelings, the behaviours have been enacted for relatively brief periods of time, ranging from 10 or 15 seconds to perhaps 5 minutes. Furthermore, with a few exceptions (e.g. Riskind & Gotay, 1982; Stepper & Strack 1993) only the immediate effects of the behaviour on mood during the time of producing the expressions have been investigated. Characteristically, the measurements of feeling are obtained during the time the expressive behaviour is being performed, or within seconds afterwards, with the participants reporting how they felt during the preceding procedure. However, we know that emotional feelings often persist beyond the time that any emotional behaviours are being performed. The purpose of this study was to explore the effects of repeated, prolonged performance of emotional behaviour on feelings assessed a few minutes afterwards.

Two effects of repeated performances seem possible. One would be something akin to habituation, in which the effects of adopting an emotional behaviour decline with repetition (Stepper & Strack, 1993). The alternative would be that people do not habituate, so that repeated behaviours would continue to have an effect.

Mood and memory

One way in which expression practice might produce longer lasting mood changes would be through memories. Generally, positive affect seems to enhance recall of positive material, and negative affect seems to enhance recall of negative material. This so-called "mood-congruency" effect has been consistently reported in the literature (see Blaney, 1986, and Ellis & Ashbrook, 1989, for reviews). Recall of mood-congruent memories might be expected to enhance and maintain the current mood.

Effects of expressive behaviour on mood and memory

The issue becomes more complicated when looking at the effects of expressive behaviour on mood, and of mood on information processing taken together. Several authors (e.g., Förster & Strack, 1996; Perrig & Perrig, 1988; Riskind & Gotay, 1982) have reported results that imply that emotionally expressive behaviour affects memory *directly* without inducing a mood state. On the other hand, a number of studies (e.g., Laird, Cuniff, Sheehan, Shulman, & Strum, 1989; Laird, Wagener, Halal, & Szegda, 1982; Teasdale & Fogarty, 1979) show that recall of emotionally congruent material depends on the prior occurrence of the feeling. One of the objectives of the current study was to investigate whether *both* mood and memory effects would be obtained after manipulating expressive behaviour over extended periods of time.

Individual differences

Emotional expressions and behaviours, and their manipulation in experiments, do not have the same influence on everybody. Some people report feeling the impact of expressive behaviour on their emotional feelings as predicted by self-perception theory,

whereas others do not (Laird & Crosby, 1974). This difference in response to expressive behaviour is stable over time, and consistent across a wide variety of behaviours and feelings (Laird & Bresler, 1992; Schnall, Abrahamson, & Laird, 2002). The differences in impact of behaviour seem to reflect the type of cues on which individuals base their emotional experience. People who attend to their own bodily cues, their appearance, and their instrumental actions are more responsive to so-called “personal” or “self-produced” cues. In contrast, individuals who primarily focus on interpretations of the situation and infer responses from what is appropriate in their situation, are responsive to “situational” cues.

In order to identify in experiments whether somebody is more responsive to personal or situational cues, the person is exposed to conflicting information: For example, they might be induced to adopt a smile while examining an abstract painting entitled “Betrayal”. The title provides a situational cue which contrasts with the personal cue, smiling. (e.g., Duclos & Laird, 2001). Participants are then assigned to cue-response groups depending on what cue their emotional experience corresponded to more strongly and consistently (see Laird & Bresler, 1992 for a review of research using this procedure).

The current study

The main purpose of this study was to investigate the effects of repeated manipulation of emotionally expressive behaviour on mood. Participants were trained to perform facial expressions and postures for one of three specific emotions, *Sadness*, *Anger* or *Happiness*, five times (4 minutes each). The advantage of this undisguised expression manipulation procedure is that participants are free to adopt emotional behaviour that they would exhibit in a natural setting. The disadvantage of this technique is that it may make participants susceptible to experimenter demand. However, a recent study (Duclos & Laird, 2001) showed that only participants who responded to personal cues in a very well-disguised manipulation also responded to a procedure that was completely undisguised. As in that earlier study, in the experiment reported here cue response was established in a highly disguised procedure independently from the actual experimental manipulation. The disguise and the follow-up assessment of awareness made it extremely unlikely that systematic experimenter effects could occur. Consequently, if the effects of deliberate expressions fitted the individual difference predictions, they too could not be due to experimenter effects.

After each participant had practised a certain emotional expression, an emotion rating scale was given. Then autobiographic memory was tested by a task similar to those used by, among others, Kumari, Hemsley, Cotter, Checkley, and Gray (1998), Laird, Cuniff, Sheehan, Shulman, and Strum (1989), and Teasdale and Fogarty (1979). Participants were exposed to a neutral stimulus word and were asked to recall a life event associated with the cue word. Subsequently, they rated the emotional content of the life memory.

METHOD

Participants

The participants were 39 female and 13 male college student volunteers. The data of six participants were excluded from the analyses because they revealed on a post-questionnaire that they suspected that facial expressions were intended to affect feelings.

Procedure

Participants were told that the experiment concerned the effects of muscle contractions on picture recognition memory. Initially, each participant was asked to fill out a baseline Emotion Rating Scale with the items relaxed, angry, happy, sad, afraid, depressed, upset, and confused.

To test for individual differences in respect to cue-response, participants performed a disguised version of the Expression Manipulation Procedure, for which they were led to believe that its purpose was to investigate effects of muscle movements on perception. Abstract black-and-white pictures of random rectangular shapes, with titles that provided situational cues for feelings, were placed in front of the participants. Pictures entitled "Betrayal" and "Rip-off" were presented with instructions which led the participant to adopt a smile, while the titles "Dancing" and "Spring" were accompanied by a frown (see Duclos & Laird, 2001, for a more complete description of the procedure). Thus, the picture titles implied an emotional state quite different from the expressions. After viewing the picture for 10 s, the participants filled out an emotion rating scale describing their feelings while looking at the picture.

Then, participants were randomly assigned to one of three expression training conditions. Participants in the *Happiness* condition received the following written instruction: "Pretend that you are very happy right now. Produce the facial expression that you would have when you were extremely happy. It might help you to close your eyes while you are making the happy facial expression. Also, please adjust your body to the posture you would be in if you were very happy. It is important that you *don't think* of something that makes you happy, so just 'act' happiness with your face and your body. Imagine, for example, you want somebody else to think you are happy, whatever you are feeling."

Participants in the *Anger* and in the *Sadness* condition received the identical instruction for expressing an angry, and, respectively, a sad mood.

The participant held the position for 4 min, relaxed all their muscles for approximately 2 min, and the procedure was repeated. In order to make the cover story more plausible, after the second and fourth trials, the experimenter performed a recognition memory test of four abstract pictures. After one last training in facial expression and posture, the same emotional rating scale as for the baseline mood measurement was given. Ratings of all mood adjectives were scored by measuring in half cm from the *didn't feel at all* end, yielding raw scores which could range from 0 to 17. Because only the ratings for happy, angry and sad were central to the research questions, only those will be considered further.

Subsequently, the autobiographical memory task was administered. A card with one of several relatively neutral cue words ("Tree", "House", "Car") printed on it was exposed to the participant. In a previous study (Laird et al., 1989), these words had been found to have no emotional connotations of their own. The participant was asked to think of a life experience associated with that word. After the participant had thought of such an experience, he/she filled out a rating scale concerning the emotional content of the life event.

Finally, a post-experimental questionnaire was administered asking the participant to specify any potential purposes of the study besides the explanations given.

Participant classification

To determine the extent to which a participant was responsive to expressive, personal cues, expression manipulation scores were computed. For each pair of the frown and the smile trial, participants' angry scores while smiling were subtracted from their angry scores while frowning, and their happy scores while frowning were subtracted from their happy scores while smiling. Positive expression manipulation scores occurred when the participant's feelings were consistent with his/her expressions. Because consistency of response was more important than its magnitude, only participants who had positive scores on both trials were categorised as being responsive to personal cues. Participants with negative scores on either trial were classified as responsive to situational cues. (See Duclos & Laird, 2001 for more details on scoring.) Using this method, 22 participants were categorised as personal cue responders, and 24 were categorised as situational cue responders.

RESULTS

Effects of expression practice conditions on emotion ratings

Each emotion score from the baseline rating scale (pre-test) was compared to the corresponding emotion score obtained after the expression training trials (post-test) in a repeated-measures ANOVA, in which expression condition (*Happiness*, *Anger*, *Sadness*) was a between-subjects variable and pre-test–post-test change was a within-subjects variable. These analyses were carried out separately for the personal and situational cue groups.

In the personal group, the results were precisely as expected. Participants in the *Sadness* condition reported significantly greater scores for sadness on the post-test, relative to the *Anger* and *Happiness* Conditions, overall $F(2, 19) = 10.51, p = .001$. (See Table 1 for mean emotion ratings and F and p values for individual comparisons.)

In the *Anger* condition, people responsive to personal cues reported being more angry, $F(2, 19) = 4.77, p = .021$ after the intervention, while this was not the case for the other two conditions. Analyses of the happiness ratings showed a similar two-way interaction, although happiness increased only slightly in the *Happiness* expression condition, but decreased significantly for participants in the *Sadness* and *Anger* condition, overall $F(2, 19) = 12.16, p = .000$.

Among the situational cue group, only one of these effects was significant, with most F s for the target interaction smaller than 1.0. There was a significant overall decline for happiness among the situational cue responders, with larger declines in the *Anger* and *Sadness* expression conditions, $F(2, 21) = 3.45, p = .05$. In contrast to the personal cue responders, the means for happiness on the post-test were *lower* in the *Happiness* expression condition, indicating that the effects represented a general decline in happiness, irrespective of condition.

To compare directly the impact of expression conditions on the two cue response groups, we compared personal and situational cue groups on the change from pre- to post-emotion rating on the target emotion, using planned comparisons. Compared to the situational cue group, the personal cue group showed increased sadness in the *Sadness*

TABLE 1
Mean emotion ratings for baseline (pre-test) and after expression training (post-test)

Rating	Condition	<i>Personal cue responders</i>		<i>F</i>	<i>p</i>	<i>Situational cue responders</i>		<i>F</i>	<i>p</i>
		<i>M (SD)</i>				<i>M (SD)</i>			
		<i>Pre-test</i>	<i>Post-test</i>			<i>Pre-test</i>	<i>Post-test</i>		
Happy	Happiness	10.5 (3.5)	11.1 (3.2)	0.37	.559	11.0 (4.8)	9.1 (4.7)	4.28	.084
	Sadness	11.1 (2.7)	4.8 (3.3)	27.06	.001	10.1 (2.8)	4.5 (3.7)	19.42	.005
	Anger	11.3 (2.2)	5.4 (2.8)	15.40	.017	10.8 (2.7)	5.8 (3.7)	29.03	.000
Sad	Happiness	3.1 (2.7)	2.1 (2.8)	1.97	.198	1.0 (1.4)	1.1 (1.5)	0.09	.772
	Sadness	4.4 (3.8)	10.2 (3.0)	18.89	.003	2.6 (2.0)	2.9 (5.2)	0.03	.877
	Anger	5.2 (3.2)	4.8 (5.1)	0.05	.883	1.6 (1.5)	3.6 (3.8)	1.72	.222
Angry	Happiness	3.3 (4.3)	3.4 (4.5)	0.01	.910	1.1 (1.0)	0.4 (0.5)	2.21	.188
	Sadness	2.5 (3.1)	3.8 (4.1)	4.60	.069	1.0 (1.0)	2.6 (4.4)	1.46	.273
	Anger	3.4 (3.8)	8.2 (3.7)	8.04	.047	2.1 (2.6)	5.3 (4.0)	6.51	.031

Note. Individual comparisons were one-way repeated-measures ANOVAs, performed for each of the expression conditions separately.

condition, $F(1, 12) = 7.06$, $p < .05$, and increased happiness in the *Happiness* condition, $F(1, 13) = 3.83$, $p < .06$. The two groups did not differ in the amount of change in the *Anger* condition, $F(1, 13) = 0.14$, n.s.

Emotion ratings for life events

Each emotion rating of the life event task was analysed in a one-way ANOVA, comparing the expression conditions separately for the two types of cue responders. The analysis of the first cue word ("Tree") confirmed our hypothesis. Personal cue responders in the *Anger* condition recalled more life events with content rated as angry, compared to participants in the *Happiness* condition. (See Table 2 for means, F ratios, and p values.) People in the *Happiness* condition recalled more happy information than people in the *Anger* condition. Unexpectedly, in addition to angry content, participants in the *Anger* condition also reported higher sad content than participants in the *Happiness* condition. In all of these analyses, the means of participants in the *Sadness* condition fell between the *Anger* and *Happiness* groups. No differences in the emotional tone of memories were found for the situational cue responders.

To specifically test the differential impact of the expression conditions on the memories of personal and situational cue groups, a series of planned comparisons like those described above were run. In the *Sadness* condition, the personal and situational cue groups did not differ significantly regarding the sadness of their memories, but did differ significantly in the degree of anger, $F(1, 13) = 9.62$, $p < .05$. In the *Anger* condition, the memories of personal cue participants were significantly more angry than in the situational cue group, $F(1, 13) = 5.36$, $p < .05$. In the *Happiness* condition, the two groups did not differ in their reported happiness, apparently because of a ceiling effect and a

TABLE 2
Mean emotion ratings for recalled life event (cue word "tree")

Rating	Condition	Personal cue responders			Situational cue responders		
		M	F	p	M	F	p
Happy	Happiness	12.6 _a	4.57	.024	12.1	0.09	.916
	Sadness	8.4 _{ab}			11.4		
	Anger	3.4 _b			11.2		
Sad	Happiness	1.7 _a	5.04	.018	1.4	0.77	.474
	Sadness	5.1 _{ab}			1.1		
	Anger	9.9 _b			2.9		
Angry	Happiness	1.6 _a	3.39	.055	1.1	0.17	.841
	Sadness	4.4 _{ab}			2.0		
	Anger	7.3 _b			2.3		

Note: Means with different subscripts differ significantly at $p < .05$, using Tukey's *post hoc* comparison. *F* and *p* indicate condition.

generally positive mood of all participants at the beginning of the experiment. However, while there was a significant decline in happiness for the personal cue participants in the *Anger* and *Sadness* conditions, there was no such decline in the situational cue group. Rather, the personal cue group rated the recalled life event as much less happy in the *Anger* condition than the situational cue group, $F(1, 12) = 8.91, p < .05$.

Surprisingly, the analysis of the memories generated in response to the second and third cue words ("House", "Car") yielded almost exclusively nonsignificant differences across the three conditions, for both types of cue responders.

DISCUSSION

The results indicate that there was a delayed, "mood" effect of the training that lasted at least for some minutes after the participants had stopped practising the expressions, and which affected feelings as well as episodic memory. Furthermore, these effects were quite specific, in both the feelings created, and in which participants showed these effects. People who were responsive to personal cues and who practised sad expressive behaviour reported feeling significantly more sadness, and significantly less happiness, but notably, not more anger. People who practised angry expressive behaviour reported significant increases in anger, and decreased happiness. No habituation to expressive behaviour occurred. Note that only participants responsive to personal cues were expected to show the effects, as they did.

In sum, the practised emotional expressions did produce the expected effects, even when the expressions had been repeated, with breaks, for half an hour, and the feelings being reported continued to exist after the expressive behaviour had ceased. There was no evidence of habituation or loss of effectiveness, and instead, the feelings lasted for at least the five minutes or so that passed between the last practice session and the last emotional rating scale.

Emotion ratings for life events. The analysis of the first cue word ("Tree") largely confirmed our hypothesis regarding memory effects of expressive behaviour. People more responsive to personal cues who had practised *Anger* behaviours remembered life events that they rated as more angry, and less happy. People who had practised *Happiness* behaviours reported happier memories, as well as memories that were less angry and sad. In general, the memories of the people who practised *Sadness* behaviours fell between these two, with moderate levels of anger, happiness, and even sadness itself.

The effects of the *Sadness* expression manipulation are more complicated than expected. The *Sadness* manipulation produced robust changes in emotional feelings of sadness, but seemed to have had no effect on the kinds of memories that were elicited. Indeed, the *Anger* expression condition produced memories that were significantly more sad, as well as angry, than the memories produced by the *Happiness* expression condition. This pattern suggests that the impact of sad moods on memories might be different from the impact of other mood states. The same kind of conclusion has been reached by some other authors (e.g., Isen, 1984). For example, Nasby and Yando (1982) and Laird et al. (1989) found that both happiness and anger facilitated memories of life experiences with the corresponding emotional content, but sadness did not. However, a number of other studies (e.g., Teasdale & Fogarty, 1979) have found effects of sad moods on memories. Given the very consistent effects of other emotional states on memories, the effects of sadness do appear to stand out because of their unreliability, although the reason is not at all clear.

Another finding that deserves special attention is the fact that the second and third cue words ("House", "Car") did not show the expected effects on autobiographical memory. In an earlier study (Laird et al., 1989) we found no differences between the three words in their lack of intrinsic emotional meaning, so the difference probably did not lie in the words, but in the passage of time. Thus, we might conclude that the effects of the half hour's practice of emotional expressions lasted less than approximately ten minutes, the time needed to complete the post-questionnaire on emotional feelings, and the first memory task and emotional ratings.

Were the effects of expressions on memory mediated by mood? The emotional expressions influenced both emotional feelings and memory. The question is whether there could be memory (or other cognitive) effects without changes in feelings. The pattern of individual differences in our results suggests the answer is "No", that feelings are necessary. The reason is that the effects of expressive behaviour on memory only occurred among participants who also showed significant changes in their feelings. These changes were seen in the highly disguised expression manipulation at the beginning of the study, and in the effects of the practice sessions on feelings. Participants in the situational cue group were asked to perform identical expressive behaviours, but showed no mood-congruency effects on memory.

An apparent alternative explanation of these consistencies is that participants in the personal cue group were those for whom the disguised manipulations of the first expression task were best fitted to their own natural expressions. In that case, all three effects of expressions would be independent but related because of the degree to which the manipulations matched the participants' natural expressions. However, the second, less disguised expression procedure had the particular advantage that each participant chose to enact the behaviours in whatever way was most natural for them. And it was

these later, natural enactments that affected the memories of the personal cue group, but not the situational cue group. Thus, both groups acted naturally, in the same way, but only those whose highly disguised expressive behaviour also affected their feelings also showed selective effects of the expressions on their memories. Furthermore, in some of the studies where mood was not seen to be necessary for effects on memory, the measures of mood were very general (e.g., ‘Rate your mood from ‘very bad’ to ‘very good’ ’, as in Förster & Strack, 1996) or even missing entirely (Perrig & Perrig, 1988, study 2), so they may have missed detecting feelings changes.

Although there may not be enough evidence at this point to resolve the issue conclusively, the more plausible conclusion seems to be that behavioural manipulations affect cognitive processes through the mediating function of the feelings they produce.

Experimenter demand. One frequent criticism (e.g., Buck, 1980; Fridlund, 1994) of experimental manipulations of expressive behaviour is that the results might be due to experimenter demand. In the dozens of studies showing similar self-perception effects, a variety of solutions have been suggested to deal with the problem of experimenter demand (for an extended discussion, see Duclos & Laird, 2001), and it seems improbable that demand could account for the various effects. In this study, particularly in the less disguised training period, the participants might have inferred that they were ‘supposed’ to feel the corresponding emotion, or alternatively, might have been unable to avoid having emotional thoughts in company with their expressive behaviours. Neither of these possibilities can be conclusively ruled out, but they seem unlikely. The reason is that both expectations and the potential for emotional thoughts would have been identical for all participants, whereas only those who were responsive to personal cues showed the effects of the undisguised tasks on both feelings and memory. Because the experimenter was blind to the participants’ performance on all of these tasks, neither she nor the participants could have known whether they should have responded. Furthermore, a number of previous studies have shown that people who are responsive to personal cues are *less* likely to respond to social expectations than are people responsive to situational cues (Duclos & Laird, 2001; Laird & Bresler, 1992).

The pattern of results in the memory task is also inconsistent with a demand explanation. The participants only obtained the information critical to a response to demand on the second memory trial. Prior to the end of Trial 1, they had no idea the emotional character of their memories would be relevant. However, the theoretically predicted effects only occurred when the participants lacked this information, and failed to appear when they knew it. Had the participants been reporting what they believed we wanted to hear, the memory effects would have appeared on the last two, not the first, memory trial.

In sum, practising emotional expressive behaviour for about half an hour did have effects on emotional feelings, and on access to emotional memories that endured briefly beyond the practice period. The fact that these effects appear to have faded in ten minutes or so suggests that the practical significance of this particular technique for manipulating emotional feelings is limited. Perhaps more prolonged practice would begin to exert the kinds of mood changes that would be useful for us all in our daily lives.

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