EXAMINATION OF THE PASSIVE FACIAL FEEDBACK HYPOTHESIS USING AN IMPLICIT MEASURE: WITH A FURROWED BROW, NEUTRAL OBJECTS WITH PLEASANT PRIMES LOOK LESS APPEALING\(^1,2\)

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Summary.—98 undergraduates (54 men, 44 women) participated in an experiment to examine whether having an artificially furrowed brow would have an effect on participants’ subjective impression of perceived targets. An elastic adhesive bandage was either stretched to create furrows on the brow when it retracted, or not stretched so as to avoid creating wrinkles. While wearing the bandages, the participants rated their impressions of neutral targets preceded by agreeable, disagreeable, or neutral primes in a modified Affect Misattribution Procedure. The results showed that participants with artificially furrowed brows tended to rate the neutral targets preceded by agreeable primes less favorably than did the control participants, while both groups rated similarly the targets preceded by disagreeable primes.

The hypothesis regarding the feeling of emotions as a result of facial expression is called the “Facial Feedback Hypothesis” (McIntosh, 1996). Previous studies have examined this hypothesis by giving participants an artificial tearing-up experience (Mori & Mori, 2007) or an external cheek lift (Mori & Mori, 2009) and then asking them to rate their subjective emotions while their facial expressions were being passively modified. The results confirmed the hypothesis that a feeling of sadness was evoked when subjects experienced artificial tearing-up and that they felt happier when their cheeks were raised artificially by means of adhesive bandages. However, the rating procedure of the Mori and Mori studies might have been biased if the participants noticed the experimental purpose and responded accordingly. Therefore, it seemed desirable to re-examine the Passive Facial Feedback Hypothesis by utilizing a bias-free rating procedure. Payne, Cheng, Govorum, and Stewart (2005) invented a new procedure called the Affect Misattribution Procedure for measuring implicit social attitudes such as racial prejudice or out-group attitude. The methodology is based upon a set of primes followed by neutral targets. The task of participants is to rate the targets, but their ratings are unconsciously affected.

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by the primes preceding the targets. Thus, implicit attitudes toward the primes can be measured by this procedure. Payne, *et al.* (2005) showed that the procedure was robust against intentional bias of the participants.

Larsen, Kasimatis, and Frey (1992) demonstrated that participants with a simulated facial expression of frowning tended to experience unpleasant affect. Larsen, *et al.* had their participants put two small stickers on their foreheads and asked them to move them closer together, thereby artificially creating a sad expression. Their participants reported more sadness in response to unappealing photos while manipulating the stickers.

Strack and Neumann (2000) simply asked their participants to simulate tension in the brow by contracting the eyebrows toward the middle of the forehead. Then, they presented portraits of famous and nonfamous persons, and instructed the participants to judge the presumed fame of the persons on a 10-point scale. The results showed that those who successfully contracted their eyebrows tended to rate the target as less famous than those who did not.

The findings of Larsen, *et al.* (1992) and Strack and Neumann (2000) showed that the movement of muscles related to an unpleasant emotion, such as frowning, could cause an unpleasant emotional experience or a lessened fame rating. It was hypothesized that facial feedback from frowning might occur without the active movement of muscles but in a somewhat more passive way. The present study aimed to provide further evidence for the Passive Facial Feedback Hypothesis by means of the application of an elastic bandage on the participant’s forehead to create an artificially furrowed brow and then measuring the resulting effects with a modified Affect Misattribution Procedure. Participants with an artificially furrowed brow were expected to rate neutral stimuli less favorably than those without a furrowed brow.

**Method**

**Participants**

Undergraduate students (*N*=98; 54 men, 44 women), enrolled in a pedagogy class in a university education curriculum, participated in the experiment. The participants were naïve in terms of psychological theories of emotion. They were assigned randomly either to the Furrowed-brow condition or to the Control condition, according to their seating in the classroom: 44 participants (25 men, 19 women, 18–28 years old) were in the Furrowed-brow condition and 54 (29 men, 25 women, 18–25 years old) were in the Control condition.

**Materials**

*Primes.*—Three types of prime photos (three babies, three buildings,
and three bugs) were used. These images had been pilot tested in Mori (2008) and rated by 34 Japanese university students on a 3-point scale, with 1: Pleasant, 0: Neutral, and −1: Unpleasant. The nine pictures chosen here had mean ratings of 0.47, 0.33, and −0.50 for the three categories, respectively, and so were selected for use in the current study.

**Stimulus pairs.**—Three types of prime photos were paired with targets (three Tibetan characters, assumed to be neutral) to create 27 possible prime-target combinations: $3 \times 3 \times 3 = 27$ pairs. The primes and the targets were presented on the screen using a PowerPoint slideshow. The presentation time for both primes and targets was one second each, followed by the rating phase lasting for 3 sec. The participants rated the favorableness of the targets by marking a circle denoting “good,” a triangle (“neutral”), or an X (“bad”), respectively, on the answer sheet.

**Procedure**

The original Affect Misattribution Procedure was modified so that it could be administered to all participants simultaneously in a large lecture room with a projector screen.

The experimenter gave each participant a standard-size elastic adhesive bandage (19 mm × 72 mm) and indicated that it should be applied to the brow. The participants in the Furrowed-brow condition were instructed to stretch the bandage wide when they applied it horizontally so that it would make furrows when it shrank back to the original size (see Fig. 1). In contrast, those in the Control condition were instructed not to stretch the bandage when applying it to the brow.

![Adhesive bandage applied with stretching to make a furrowed brow](image1)

![Adhesive bandage applied without stretching (Control)](image2)

**Fig. 1.** Application of elastic adhesive bandages: with stretching to make a furrowed brow (top, experimental group) and without stretching (bottom, control group).
TABLE 1

Mean Ratings of Targets Classified by Experimental Condition and Prime

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>Prime</th>
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Babies</td>
<td>Buildings</td>
<td>Bugs</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Pleasant)</td>
<td>(Neutral)</td>
<td>(Unpleasant)</td>
<td></td>
</tr>
<tr>
<td>Furrowed brow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>25</td>
<td>.11</td>
<td>.18</td>
<td>-.25</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>19</td>
<td>-.05, .27</td>
<td>-.00, .36</td>
<td>-.42, -.08</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>29</td>
<td>.37</td>
<td>.24</td>
<td>-.24</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>25</td>
<td>.21, .53</td>
<td>.10, .38</td>
<td>-.40, -.08</td>
<td></td>
</tr>
</tbody>
</table>

It is worth noting that the modified Affect Misattribution Procedure was used even though the goal was not to measure priming effects. Rather, the priming paradigm was used to conceal the real aim of the experiment. The PowerPoint presentation would not be suitable for genuine priming studies, but interestingly enough, basically the same results were obtained using this group administration procedure (Mori, 2008).

**Analysis**

The participants’ ratings of targets were converted into scores, with 1: Good, 0: Neutral, and −1: Bad. Then mean average scores were calculated for each of the experimental conditions (see Table 1), and analyzed by three-way analysis of variance (ANOVA): 3 (type of prime) × 3 (target rating) × 2 (face manipulation).

**Results and Discussion**

The main effect of the facial expression manipulation was significant ($F_{1,94} = 5.83, p < .05$; Cohen’s $f = .25$). The main effect of sex was not statistically significant ($F_{1,94} = 0.01$, ns). The main effect of the preceding primes was significant ($F_{2,188} = 63.82, p < .01$; Cohen’s $f = .82$).

The interaction of the facial expression and the primes was not significant ($F_{2,188} = 2.48, .05 < p < .10$; Cohen’s $f = .16$) but had a small effect size. Therefore, the effect of the facial expression was analyzed for each prime condition. This additional analysis revealed that those in the Furrowed-brow condition rated the targets with baby and building primes significantly lower than did those in the Control condition ($F_{1,94} = 8.41, p < .01$; Cohen’s $f = .30$ for the baby primes, and $F_{1,94} = 5.69, p < .05$; Cohen’s $f = .25$ for buildings), whereas participants in both conditions rated the targets with bug primes in a similar way ($F_{1,94} = 0.12$, ns). This implies that an artificially furrowed brow caused the experimental group to view agreeable things less favorably while it did not have an effect on their perceptions of disagreeable things.
These results confirmed the hypothesis that participants may perceive agreeable things less favorably when they are viewed with a furrowed brow, even one created artificially. The Passive Facial Feedback Hypothesis was reconfirmed with implicit as well as explicit measures in previous studies (Mori & Mori, 2007, 2009). Niedenthal (2007) reviewed recent studies of embodied cognition and stated that “perceiving and thinking about emotion involves perceptual, somatovisceral, and motoric re-experiencing of the relevant emotion in one’s self” (p. 1002). The present findings provide additional support for this embodied cognition theory.

REFERENCES


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