EFFECTS OF TENDERNESS ON PROBLEM SOLVING

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The purpose of this study was to determine the effects of tenderness on problem solving. Thirty-four female undergraduates participated. In the experimental condition, participants received instructions to reproduce a specific respiratory-posturo-facial pattern that had induced tenderness in previous studies. Participants in the control condition performed a non-emotional exercise. After either the pattern or the control exercise, participants completed one of two jigsaw puzzles. One puzzle had only an empty room while the other had a family scene. For participants who worked on the room puzzle, the tenderness pattern led to longer completion times. In contrast, for participants who worked on the family puzzle, the tenderness pattern led to shorter completion times.
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INTRODUCTION

The objective of this project was to experimentally test the effects of specific respiratory-postural-facial patterns of problem solving. The respiratory-postural-facial patterns used constitute a method for inducing the emotions of tenderness and joy. Therefore, the basic assumption behind this project was that the effects of the patterns on problem solving would be due to the emotions those patterns induce. The first part of this introduction reviews the experimental background of the method for emotional induction. The following two sections review the possible effects that these emotional patterns could have on problem solving.

Alba Emoting™¹

In the early 1970s, Guy Santibáñez and Susana Bloch started a research program to study the physiological changes occurring during different emotions (Bloch & Santibáñez, 1973; Santibáñez & Bloch, 1986). They asked professional actors to relive different emotions. They also hypnotically induced those emotions in both normal subjects and subjects with anxiety disorders. In these experiments, Santibáñez and Bloch were interested in six emotions that they considered basic: joy, sadness, fear, anger, eroticism and tenderness. They found that several physiological changes accompanied each of these emotions. Of those changes, the most distinguishing feature among the

¹ The name “Alba Emoting” belongs to Susana Bloch.
different emotions was a specific breathing pattern—invoking parameters such as amplitude, frequency, the presence or absence of saccades\textsuperscript{2}, and expiratory pause. Thus, each emotion had its own respiratory pattern (see figure 1). Other changes that were somewhat distinguishing of particular emotions were facial expressions and body postures. All these behaviors have the special feature of being under both voluntary and automatic control (unlike other changes present during different emotions such as heart rate and blood pressure). These researchers called the specific configuration of respiratory, postural and facial behaviors specific to each emotion an “emotional effector pattern”. A disadvantage of this denomination is that these patterns only included those changes under voluntary control, whereas the term “effector” refers to any behavior that produces an effect on the environment, either internal or external. Therefore, in the present study I will refer to them as “emotional somatic patterns”, which seems more appropriate.

Bloch and Santibáñez (1973; Santibáñez & Bloch, 1986) investigated what happened if they asked a person to reproduce the patterns for each emotion. They found that this procedure could activate the rest of the emotional system, namely the subjective experience of the person and autonomic changes such as heart rate. Several studies have reported this phenomenon under different circumstances (e.g., Bloch, Orthous, & Santibáñez, 1987; Bloch, Paulet, & Lemeignan, 1994; Bloch & Santibáñez, 1973; Riskind, 1983; Santibáñez & Bloch, 1986). Based on these findings, Bloch, Orthous, and

\textsuperscript{2}“Saccade” usually refers to small, rapid, intermittent eye movements. Here, the term refers to small breathing movements superimposed on the main respiratory cycle.
Figure 1. Recordings of prototypical breathing patterns for each basic emotion.

Santibáñez (1987) developed a method for emotional induction based on the reproduction of the somatic patterns. Bloch (1993) called this method “Alba Emoting™”. Bloch and her colleagues have used it in several countries as a tool for teaching actors how to express emotions (Bloch, 1993; Bloch, Orthous, & Santibáñez, 1972, 1987).

The “Effects” of the Pattern of Tenderness

In spite of the potential usefulness of the Alba Emoting method for working with emotions in psychotherapy, until recently there was no research on this topic. For that reason, I conducted an exploratory study to investigate the effects of this method in psychotherapy (Kalawski, 1997). In one of the sessions studied, the client was talking about relational problems with her boyfriend. Her discourse was generally one of blaming him about the situation, conveying a lack of understanding of his perspective. Then the therapist (myself) suggested that the client reproduce the emotional somatic pattern of tenderness, obviously without naming the target emotion. During this exercise, I asked her to think about her boyfriend. After that, I gave the client the instructions for the step-out procedure. Then the client reported having felt tenderness. When I questioned about what happened when I asked her to think about her boyfriend, she reported feeling “empathy” toward him. She said that she was able to see the whole situation in a different way, understanding his position.

The above observation is consistent with other experiences reported by people who attend workshops to learn the Alba Emoting method. For instance, one of the persons who attended one of these workshops was divorced. According to her own report, she would not talk to her ex husband, because every time they tried to talk they
would argue. Of her own accord, and after learning the pattern of tenderness, she decided
to call him from a public phone. Before dialing the number, she did the tenderness
pattern. She said that that was the first time they had talked without arguing in years
(Bloch, 1997, personal communication).

Of course, the above observations are too informal to be evidence of the effects of
the pattern of tenderness. Thus, one of the objectives of this project is to experimentally
test the hypothesis that the somatic pattern of tenderness helps people adopt a better
strategy in conflict management. However, before attempting such a test, it is wise to
review what psychologists know about the effects of emotions (especially positive ones)
in cognitive processes and interpersonal behavior.

Positive Affect, Cognitive Processes, and Social Behavior

The present review of the literature does not directly address tenderness. In fact,
the concept of tenderness is hard to find in the psychological literature in general. Instead,
this section focuses on the interpersonal and cognitive effects of what researchers have
called positive affect or happiness. Given that tenderness also falls in the category of
“positive” emotions, one of the objectives of this project is to see whether this emotion
produces the same effects that research has shown for the construct of positive affect.3

3 The reason I am classifying tenderness as a positive emotion is that most people tend to
view it as positive, as opposed to other emotions such as fear or sadness, which are
usually seen as negative. The reason for this distinction may be that people usually seek
“positive” emotions, whereas they usually avoid “negative” ones. However, from an
evolutionary perspective, one could see any emotion as positive insofar as it is adaptive.
The influence of positive affect on social behavior. A large number of studies have shown that positive affect has beneficial effects on social interaction (for a review, see Isen, 1987). For instance, in a series of field experiments, Isen and Levin (1972) induced positive affect in several ways. In one of these experiments, the experimental condition consisted of having people find a dime in the coin return of a public phone. Then a stranger passed by and dropped some papers. People who found the dime were significantly more likely than controls to help the stranger pick up the papers. In another experiment, students who unexpectedly received cookies in a library were more likely to volunteer to help someone, and less likely to volunteer to annoy someone. Moreover, people made believe that they had succeeded on a test of perceptual-motor skills were later more generous in donating to charity than either controls or people made believe they had failed in the test. In another study, similarly-treated people were more helpful to a stranger who needed help in carrying books and papers and who dropped one of the books (Isen, 1970).

Another group of studies showed that positive affect is associated with cooperativeness. Batson, Coke, Chard, Smith, and Taliaferro (1979) reported that positive affect increases willingness to initiate conversations with others. Furthermore, Veitch and Griffitt (1976) reported that it increases expression of liking for people. In addition, people in whom experimenters have induced positive affect show less aggressiveness than others (Baron, 1984).

Researchers have proposed several explanations for the effects of positive affect on social behavior (e.g., Forgas, 1998; Hertel & Fiedler, 1994; Isen, 1987). Most of those
explanations propose that the effects of positive affect on cognitive processes mediate its effects on social interaction. Thus, the next section reviews research on those cognitive effects.

The influence of positive affect on cognition. Some of the earliest studies concerning the effects of positive affect on cognition focused on its effects on memory. For instance, Isen and her colleagues (Isen, 1975, cited in Isen, 1987; Isen, Shalker, Clark, & Karp, 1978) found that positive affect facilitated the recall of positive words such as “friendly” or “kind” that the participants had learned earlier in the experiment, as compared to neutral or negative words. These authors also showed that positive affect could influence people’s judgments: people who had received a small gift expressed more positive evaluations on a consumer opinion survey. To explain these findings, Isen et al. (1978) proposed that positive affect could serve as a retrieval cue to prime positive material.

Another branch of findings concerns what is known as “mood-congruent learning”. These studies have found that positive affect at the time of learning could enhance memory for positive items. This is to say that a match between the material and the state of the person enhances learning. For example, Nasby and Yando (1982) found that, as compared to controls, subjects in whom experimenters had induced positive affect showed a better encoding of positive trait adjectives over other words.

An interesting issue concerning both of the effects of affect on memory described above is the asymmetry between happiness and sadness. As Isen (1987) pointed out, if one saw positive and negative affect as two extremes of the same continuum, one would
expect their effects to be opposite but symmetrical. That is, given that positive affect seems to improve memory for positive items, one would expect negative affect to improve memory for negative items in the same proportion. However, this is not the case. Although some investigators have reported symmetrical effects for happiness and sadness (e.g., Laird, Wagener, Halal & Szegda, 1982), most research suggests that sadness does not facilitate the recall of negative material, or does so to a lesser extent than does comparable positive affect (Nasby & Yando, 1982; Riskind, 1983).

Isen (1987) suggested two possible mechanisms for understanding this asymmetry. First, there is a motivational interpretation. According to this hypothesis, people are motivated to maintain a positive emotional state whereas they are motivated to change a negative one. The idea is that people use positive affect as a cue and then enjoy the positive material that comes to mind as a result. In contrast, if negative affect cues negative materials, people will try to stop this process. Isen pointed out that this mechanism might even explain why some studies did find symmetrical effects for sadness and happiness. This is because in those studies subjects received instructions to try to maintain the emotions induced. Thus, subjects would not stop any cueing process triggered by negative affect.

A second interpretation proposed by Isen is a structural interpretation. According to this thesis, the cognitive structures or sets of materials associated with positive and negative affect may differ in extension and/or inter-relatedness. In other words, there are more ideas associated with positive affect than with negative affect, or the ideas associated with positive affect are better integrated than those associated with negative
affect. It is important to notice that these two interpretations are not mutually exclusive, and one can even think of them as complementary. For instance, the strategy of stopping the negative materials cued by negative affect may, in the end, lead to those materials staying isolated from others. On the other hand, the enjoyment of cued positive materials may lead to those materials being better integrated and more extensive.

If one follows the logic of the structural interpretation, one would expect that people in a positive mood would have more associations, regardless of the values of the materials (Isen, 1987). Isen proposed that positive affect might facilitate the recognition of more features or dimensions of objects or more aspects of ideas. This process may also have the paradoxical effect of enabling better integration. This is because the more features of a given object one sees, the more chances one has to find a feature that the object has in common with others. Several studies have addressed the issue of whether positive affect facilitates cognitive differentiation and integration. For instance, in a study by Isen, Daubman and Gorgoglione (1987), people read several words and rated the degree to which the concepts belonged to four categories. For each category (e.g., "clothing"), some items were typical exemplars of the category (e.g., shirt), whereas others were less typical (e.g., purse). Subjects in whom the experimenters had induced positive affect rated non-typical exemplars higher than control subjects did. This means that positive-affect subjects were able to see more commonalities among apparently diverse items.

This tendency to see more commonalities also applies to commonalities among people. For instance, Dovidio, Gaertner, Isen and Lowrance (1995) examined the effects
of positive affect on social categorization. They found that positive affect increased the extent to which subjects formed inclusive group representations. That is, members of two groups felt like one superordinate group. In a related study, Crisp and Hewstone (2000) found that happy participants liked targets equally well across four combinations of two in-group-out-group distinctions. Neutral participants showed the more usual pattern of preference for double in-group targets over mixed category targets, and the latter over double out-groups. It is worth noting that both of these studies used a minimal group paradigm, where the experimenters assigned participants to artificial groups. Thus, positive affect may not affect real-life categories in the same manner. Urada and Miller (2000) showed that when targets were out-groups only on an unimportant category but in-groups for an important category, participants in a positive mood rated them similar to those who were in-groups for both categories. In contrast, participants in the neutral mood condition rated the former targets worse than the latter. Thus, these studies suggest that a positive mood is associated with flexible and broader boundaries for categories.

It is possible to view this expanded categorization as an instance of the use of heuristics. However, not all findings showing an expanded cognitive organization under positive mood are consistent with this view. By definition, the use of a heuristic implies a restriction in the amount of information an individual considers. Some studies actually show the opposite effect. Conway and Hassebrauck (1997) correlated ratings of peripheral relationship-quality features with global ratings of relationship satisfaction. Interestingly, the correlations were higher for happy than for sad participants, suggesting that the former included more peripheral information in their judgments. In another study
(Wegener, Petty, & Smith, 1995), happy participants displayed higher scrutiny of a persuasive message than both neutral and sad participants did, although this effect was only evident when the content of the message was not mood threatening.

Besides the ability to cluster different things together, positive affect also facilitates greater differentiation when that is what the task demands. In a study by Isen and Daubman (as cited in Isen, 1987), participants had to sort stimuli as many times as necessary to include all the ways in which they could group the items. People in the positive affect condition produced more different groupings than did people in the control condition.

In a study by Isen et al. (1987), participants in either positive-affect or control conditions received a list of words to memorize. Spaced throughout the list there were some words relating to the American Revolution. Results indicated that persons in whom experimenters had induced happiness had better recall of the American Revolution words than did control group members. This suggests that people who felt happy were more able to see the underlying theme of those words.

Other studies have explored the impact of positive affect on creativity. Isen, Daubman and Nowicki (1987) presented subjects with the “candle problem”. That is, subjects received a candle, a box of tacks, and a box of matches. The experimenter asked the participants to attach the candle to the wall so that it would burn without dripping wax on the floor. The correct solution involves emptying the box of tacks, tacking the box to the wall, and placing the candle in the box. Thus, to solve this problem, the person needs
to use the box in an unaccustomed way. People in the positive-affect condition were more likely to solve the problem than did people in the control or negative-affect conditions.

Knowing whether the facilitating effects of positive affect can improve performance on decision-making would have implications for real-life situations. One of the most ecologically valid studies regarding this question had physicians as participants. Physicians received a protocol of a simulated patient with liver disease. The experimenters asked them to think aloud while reviewing the protocol and trying to reach a diagnosis. Physicians in the positive-affect group considered the hypothesis of liver disease earlier than did physicians in the control group (Estrada, Isen & Young, 1997).

Statement of the Problem

Given the evidence of beneficial effects of positive emotions on different cognitive tasks, the purpose of this study is to determine the effects of two distinct positive emotions: joy and tenderness. The task chosen was the resolution of a jigsaw puzzle, and the dependent measure was the time participants took to complete it. I hypothesized that both joy and tenderness would facilitate problem solving, as compared to a non-emotional condition. Thus, my hypotheses were that both emotional conditions would lead to lower puzzle completion times, as compared to the control condition. I also planned to explore any differences between the joy and the tenderness conditions.

Since this was the first study on the effects of positive emotions that used jigsaw puzzles, I decided to employ two different puzzles. One of them only had inanimate objects, while the other one had an interpersonal scene. Having these two kinds of puzzle to compare could give information regarding differential effects of the patterns on
personal versus impersonal cognitive tasks. If these differential effects were present, they would produce a pattern x puzzle interaction.
METHOD

Participants

The participants were 59 undergraduate students (41 female) from the University of North Texas. Their mean age was 21.66 years old ($SD = 3.51$). They received extra class credit for their participation. I explained to prospective participants that the experiment was about the effects of physical exercises on problem solving. I excluded prospective participants with a history of asthma or other respiratory or heart disorders because of a small risk of an adverse reaction to the respiratory patterns, especially that of joy. However, the main reason for this exclusion was that respiratory problems could interfere with the correct reproduction of the patterns.

Design and Procedure

The experimental design involved two between-subjects factors: emotional somatic pattern and puzzle. The three conditions of the first factor were joy, tenderness, and a non-emotional exercise (a control condition for the emotional somatic patterns). The second factor was which puzzle the participants solved. One puzzle was a picture of a room, with only inanimate objects. The other puzzle was a picture of a family scene. I randomly assigned 12 participants to each cell. Appendix B is the script used in the experiment.

I coached the participants to perform the emotional somatic pattern or the non-emotional exercise. The standard instructions for the pattern of joy are: "… inhale sharply through the nose and exhale the air through the mouth in rapid saccades; at the same time
stretch your lips horizontally drawing the corners up and back, keep your eyes semi-
closed, the body very relaxed, the head loosely hanging backwards…” (Lemeignan,
Aguilera-Torres, & Bloch, 1992, p. 188). The instructions for the pattern of tenderness
are: “… breathe very evenly through the nose; put up a little smile; keep your eyes open
with relaxed lids. Slightly tilt your head sideways. Keep your body very
relaxed…” (Lemeignan et al., 1992, p. 188). Because the instructions are very complex, I
did not give them verbatim. Rather, I coached the participants until the reproduction of
the pattern appeared satisfactory.

After beginning the data-collection process, it became apparent that it was very
hard for participants to reproduce the joy pattern. In fact, three prospective participants
were not able to do it at all, and I thus gave them their extra credit without continuing
with the experiment. Even those participants that were able to reproduce the joy pattern
(and thus completed the experiment) did so very poorly. Given this situation, after having
collected data from 11 participants in the joy condition, I decided to eliminate that
condition from the experiment and exclude that data from all analyses.

In the control condition, I asked participants to extend their arms in front of them,
and open and close their hands ten times. After the reproduction of the pattern was
satisfactory, or the participant had completed the non-emotional exercise, I put the pieces
of the puzzle in front of the participant, told him or her to start, and recorded the time the
participant took to put all the pieces together.

After each participant finished the puzzle, he or she completed a demographics
questionnaire (see next section) and the bipolar form of the Profile of Mood States
(POMS-BI; Lorr & McNair, 1988). After giving participants their extra credit, I debriefed them.

**Instruments**

*Puzzles.* Both puzzles were color pictures and were 24.4 x 19.5 cm. The *family puzzle* was a picture of my 5-year-old niece and my grandmother smiling in front of a Christmas tree. In the *room puzzle*, there was a desk with a computer, books, a stereo and other items, in a room no people. For each piece from one puzzle, there was a corresponding piece with identical size and shape in the other puzzle. Each puzzle had 32 pieces.

*Demographics questionnaire.* (See Appendix B.) This questionnaire asked for demographic information.

*POMS-BI.* The bipolar form of the Profile of Mood States (Lorr & McNair, 1988) consists of 72 items, grouped into six bipolar scales designed to measure subjective mood states. The scales are: Composed-Anxious, Agreeable-Hostile, Elated-Depressed, Confident-Unsure, Energetic-Tired, and Clearheaded-Confused. Each scale consists of 12 adjectives or phrases. Six of these adjectives or phrases tap the positive pole of each scale (Composed, Agreeable, Elated, Confident, Energetic or Clearheaded) and the other six represent the negative pole (Anxious, Hostile, Depressed, Unsure, Tired or Confused). In other words, each scale has a positive and a negative half-scale. There are two forms of the POMS-BI. One asks the subject to rate feelings “right now”, the other, to rate feelings “during the past week, including today”. The choices are: much like this, slightly like
this, slightly unlike this, and much unlike this. In this experiment, I used the “right now” form.

The test-retest reliability \( (r) \) of the POMS-BI scales is: Composed-Anxious, .55; Agreeable-Hostile, .33; Elated-Depressed, .59; Confident-Unsafe, .57; Energetic-Tired, .60; Clearheaded-Confused, .72 (Lorr & McNair, 1988). These low-to-moderate correlations are reasonable considering that the purpose of the POMS-BI is to measure transient mood states. The POMS-BI manual (Lorr & McNair, 1988) does not report internal consistency coefficients. However, it reviews several factor analytic studies showing evidence for the existence of the six bipolar factors, plus two higher-order factors, namely positive and negative affect. The Positive Affect factor comprises the six positive half-scales, while the Negative Affect factor comprises the six negative half-scales.

Most relevant for the present study were two half scales: Elated and Agreeable. In the present study, those half scales had \( \alpha \) coefficients of .79 and .82 respectively. There was a moderate-to-high positive correlation between the two half scales \( (r = .76, p < .01) \).

Concerning the POMS-BI validity, Lorr and McNair (1988) reported that psychiatric outpatients obtained more negative scores in all the POMS-BI scales, as compared to non-patients. The differential validity of the different scales is somewhat addressed by the factor analytic studies referred to above.
RESULTS

Preliminary Analyses

Before running any analyses, I removed the data from two participants who took more than 960 sec to complete the puzzle. Without those outliers, the overall mean and standard deviation for completion time in seconds were 320.11 and 95.76, respectively. In addition, after collecting the data, I decided to include gender as one of the factors to analyze. Table 1 displays the sample sizes broken up by puzzle type, pattern condition, and gender. As one can see, the small number of males precludes drawing valid conclusions about them. Considering that males and females may respond differently to the pattern of tenderness (Bloch et al., 1994), I decided to exclude males from all analyses. Thus, the final total number of cases analyzed is only 34. However, I will still present the descriptive statistics for males.

I conducted a series of analyses to assess the equivalence of the experimental groups. These analyses, as well as all other analyses reported, had an alpha level of .05 and were two-tailed. Overall, 19 participants had a psychology major. The proportion of participants with a psychology major was similar across both puzzle types, $\chi^2(1) = 1.27, p = .26$, and pattern conditions, $\chi^2(1) = 0.42, p = .52$. There were 23 Non-Hispanic, White US nationals, similarly distributed across puzzle types, $\chi^2(1) = 1.52, p = .22$, and pattern conditions, $\chi^2(1) = 2.55, p = .11$. An ANOVA revealed that conditions did not differ with respect to grade level (see Table 2). Another ANOVA (see Table 3) revealed that participants who solved the room puzzle were older ($M = 21.93, SD = 2.49$) than those
who solved the family puzzle ($M = 20.11$, $SD = 1.66$). However, there was no correlation between age and puzzle completion time ($r = 0.16$, $p = .35$), Elated score ($r = -.11$, $p = .54$), or Agreeable score ($r = -.06$, $p = .74$).

Table 1

Sample Sizes by Condition

<table>
<thead>
<tr>
<th>Gender</th>
<th>Puzzle</th>
<th>Control</th>
<th>Tenderness</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room</td>
<td>10</td>
<td>5</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>8</td>
<td>11</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>16</td>
<td>34</td>
<td></td>
</tr>
</tbody>
</table>

| Room | 2 | 6 | 8 |
| Family | 3 | 1 | 4 |
| Total | 5 | 7 | 12 |
| Room | 12 | 11 | 23 |
| Total | 23 | 23 | 46 |
Table 2

**Analysis of Variance for Grade Level**

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern</td>
<td>1</td>
<td>0.01</td>
<td>.92</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>Puzzle</td>
<td>1</td>
<td>1.60</td>
<td>.22</td>
<td>.05</td>
</tr>
<tr>
<td>Pattern * Puzzle</td>
<td>1</td>
<td>1.18</td>
<td>.29</td>
<td>.04</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3

**Analysis of Variance for Age**

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern</td>
<td>1</td>
<td>0.86</td>
<td>.36</td>
<td>.03</td>
</tr>
<tr>
<td>Puzzle</td>
<td>1</td>
<td>7.20</td>
<td>.01</td>
<td>.19</td>
</tr>
<tr>
<td>Pattern * Puzzle</td>
<td>1</td>
<td>0.16</td>
<td>.69</td>
<td>.01</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Manipulation Checks**

The two measures assessing the emotional induction were the Agreeable and the Elated half-scales. Tables 4 through 7 present the results for those variables. The only factor that affected either the Elated or the Agreeable score was the type of puzzle. Participants who worked on the family puzzle were both more elated and more agreeable than were those who worked on the room puzzle. These effects had a considerable size.
### Table 4

*Elated Scores by Condition*

<table>
<thead>
<tr>
<th>Gender</th>
<th>Puzzle</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>Control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Room</td>
<td>7.10</td>
</tr>
<tr>
<td>Female</td>
<td>Family</td>
<td>10.35</td>
<td>11.82</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>8.54</td>
<td>10.94</td>
</tr>
<tr>
<td></td>
<td>Room</td>
<td>9.00</td>
<td>8.17</td>
</tr>
<tr>
<td>Male</td>
<td>Family</td>
<td>9.00</td>
<td>9.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>9.00</td>
<td>8.29</td>
</tr>
<tr>
<td></td>
<td>Room</td>
<td>7.42</td>
<td>8.55</td>
</tr>
<tr>
<td>Total</td>
<td>Family</td>
<td>9.98</td>
<td>11.58</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>8.64</td>
<td>10.13</td>
</tr>
</tbody>
</table>

### Table 5

*Analysis of Variance for the Elated Half-Scale*

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern</td>
<td>1</td>
<td>1.75</td>
<td>.20</td>
<td>.06</td>
</tr>
<tr>
<td>Puzzle</td>
<td>1</td>
<td>5.69</td>
<td>.02</td>
<td>.16</td>
</tr>
<tr>
<td>Pattern * Puzzle</td>
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Table 6

*Agreeable Scores by Condition*

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<td>11.91</td>
<td>11.70</td>
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</table>

Table 7

*Analysis of Variance for Agreeable Half-Scale*

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<th>F</th>
<th>p</th>
<th>η²</th>
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<td>.02</td>
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</table>
Puzzle Completion Time

Tables 8 and 9 display the results for puzzle completion time. Participants completed the family puzzle faster than the room puzzle. In addition, there was a pattern x puzzle interaction. Analyses of simple effects showed that, for participants who worked on the room puzzle, the tenderness pattern led to longer completion times, $F(1, 13) = 6.40, p = .02, \eta^2 = .33$. In contrast, for participants who worked on the family puzzle, the tenderness pattern led to shorter completion times, $F(1, 17) = 4.98, p = .04, \eta^2 = .23$.

Finally, there was no correlation between puzzle completion time and either the Agreeable score ($r < .01, p = .98$) or the Elated score ($r = -.02, p = .91$).

Table 8

<table>
<thead>
<tr>
<th>Source</th>
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<td>.01</td>
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<td>&lt; .01</td>
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<tr>
<td>Error</td>
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</tr>
</tbody>
</table>

Table 9
### Puzzle Completion times by Condition

<table>
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<th>Gender</th>
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<th>Mean</th>
<th>Standard Deviation</th>
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<tr>
<td></td>
<td></td>
<td>Control</td>
<td>Tender</td>
</tr>
<tr>
<td>Room</td>
<td>Female</td>
<td>308.40</td>
<td>417.60</td>
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<td>Room</td>
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<td>Room</td>
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<td>305.67</td>
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<td>Room</td>
<td>Total</td>
<td>313.36</td>
<td>281.42</td>
</tr>
<tr>
<td>Room</td>
<td>Total</td>
<td>309.35</td>
<td>330.87</td>
</tr>
<tr>
<td>Room</td>
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<td>313.36</td>
<td>281.42</td>
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</tbody>
</table>
DISCUSSION

One purpose of the present study was to compare the effects of tenderness and joy. Unfortunately, the difficulty of the joy pattern made this comparison impossible. In addition, the present findings apply only to women. Future research could investigate whether the present pattern of results varies for joy or men.

The main hypothesis was that tenderness would lead to shorter completion times than the control exercise. This in fact occurred among participants who worked on the family puzzle. Among those who worked on the room puzzle, to the contrary, tenderness led to longer completion times. The presence of this interaction highlights the usefulness of having used two different puzzles.

One possible explanation for the interaction observed is that tenderness facilitates cognitive processes specific to social situations, while being incompatible with tasks that are more impersonal. This notion would be consistent with the idea that different emotions evolved as states that facilitate different domains of action. That tenderness facilitates interpersonal problem solving is consistent with the previous informal observation of its impact in psychotherapy. If this finding holds, the induction of tenderness might become very useful not only in psychotherapy, but also in other domains of interpersonal interaction, like organizational problem resolution and/or decision making, education, physical health care, or even politics, to name a few. However, if the finding that tenderness hinders impersonal problem solving also holds, it might also be useful to avoid tenderness for some purposes, maybe through the induction
of alternative emotions. This is one more reason to attempt to compare tenderness and joy in future studies.

An alternative but compatible explanation of the interaction found is that, through a long history of classical conditioning, the feeling of tenderness became associated with the perception of human figures. If that were the case, it would be easier to perceive those figures among the scattered puzzle pieces when one is in a state of tenderness. In the case of participants working on the room puzzle, they would expect to see people and, not finding them, might need a longer time to cognitively adjust to the change.

One must be cautious about over-interpreting the findings of the present study, however, because it had some important shortcomings. First, as described in the introduction, past research shows that positive affect has favorable effects on both interpersonal and impersonal tasks. To clearly assess whether this is different in the case of tenderness, one would require a comparison with joy. Second, although I made an effort to make the puzzles equal on other characteristics such as size and number of pieces, there are still many differences between them, beyond the personal-impersonal dimension. One other important difference between the two puzzles was emotional valence. In fact, the family puzzle increased both the Elated and the Agreeable scores. It is possible, then, that the interaction observed was the product of a match between the valence of the emotional pattern and the valence of the stimuli. To rule out this possibility, it might be necessary to use an equally positive impersonal puzzle.

Even though the pattern of tenderness affected puzzle completion time, it did not affect the manipulation checks. In contrast to this finding is the fact that some
participants spontaneously reported that the exercise (the tenderness pattern) made them feel “calm”. They said this during debriefing, before I told them that the purpose of the exercise was to affect their moods. One participant even expressed that, after doing the tenderness pattern, she expected that the puzzle would be of “kittens”. It is thus possible that the pattern did induce tenderness, but the effect had disappeared by the time participants completed the POMS-BI. In previous studies using the emotional somatic patterns (Bloch et al., 1987; 1994; Bloch & Santibáñez, 1973; Santibáñez & Bloch, 1986), participants reported their subjective states immediately after reproducing the patterns. In the present study, however, not only was there a task between the pattern and the POMS-BI, but also the POMS-BI required participants to report their mood “right now”, not during the exercise.

In contrast to the lack of an effect of the tenderness pattern on the manipulation checks is the effect of the family puzzle. Again, this makes sense considering that participants completed the POMS-BI immediately after the puzzle. Although I never assumed that the puzzles would be emotionally neutral, the strong effect the family puzzle had on both half-scales is interesting. As discussed above, the emotional valence of the puzzles could well explain the pattern x puzzle interaction observed on completion time.

It is vital to consider one important limitation to the present study: I was the experimenter. There are several ways this could have affected the results. For instance, I could have been slower or faster to stop or start timing the puzzle task, or I could have given nonverbal encouragement to some participants. Although I am not aware of having
done any of that, unconscious bias is still a possibility. I was aware of this difficulty from the beginning. However, the effector pattern of tenderness is the only way shown in the literature to reliably induce that emotion, and very few people have the training necessary to teach that pattern. In a future study, it would be important to have an experimenter blind to the hypotheses.

As discussed above, to draw clearer conclusions about the effects of tenderness on problem solving, it is necessary to include the emotion of joy as a comparison. There are two possible ways to overcome the problem of the participants’ difficulty with the joy pattern. One is to spend some sessions to train participants in the pattern before running the test. Another way to include joy would be to find another, non-physical way to induce this emotion. However, in that case, it would be necessary to induce tenderness in a similar way, so that effects are attributable to the emotions induced rather than the method of induction. As stated earlier, to date, there is no method to reliably induce tenderness, other than Alba Emoting. Thus, research could focus on developing such a method.

Another major limitation of the present study is that the findings are limited to females. In this case, the solution for future research is simple: have more males. It would be interesting to see whether the pattern of results obtained in the present experiment holds for males.

As far as I am aware, the present study is the first to experimentally evaluate the effects of tenderness as an emotion, not just on problem solving, but also on any variable.
Although the current study has many limitations, the findings are promising and highlight the need to continue studying tenderness.
APPENDIX A

EXPERIMENTAL SCRIPT
Experimental Script

- Take participant to room.
- Record date.
- Go over procedure:
  - This is an experiment about the effects of certain physical movements on problem solving.
  - First, you will answer a very brief anonymous questionnaire.
  - Next, I will coach you to do some specific movements.
  - Then, I’ll give you a jigsaw puzzle for you to solve. Your task is to solve it as fast as possible.
  - Then I will ask you to answer another anonymous questionnaire.
- Give consent form and read it aloud.
- Questions?
- Ask participant to sign.
- Co-Sign.
- Retain one copy and give one copy to participant.
- Hand demographic questionnaires and remind them not to write their names.
- Collect questionnaires.
- Exercise.
- Give participant the puzzle.
• Time task.
• Hand POMS-BI and remind them not to write their names.
• Collect POMS-BI.
• Give card.
• Questions?
  • Say, “Now that you are done with this experiment, I would like to tell you that I thought that some of the exercises people do in this study may affect people’s mood. I thought that the change in mood might have an impact on the way you solve the puzzle. I need to see what are people’s natural reactions, so please do not tell other students about the exercise you did. Also, please don’t tell others that the exercises may affect their mood.”
• General comments
Subject number:

DO NOT write your name on this sheet

Please answer the following questions.

What is your sex?
A Male
B Female

What is your age? _______________________

What is your major? _______________________________________

Choose the option that best describes you:
A Freshman
B Sophomore
C Junior
D Senior

What is your nationality (e.g., USA, Japanese, Canadian, etc.)?

__________________________
If you are from the USA, what is your racial or ethnic background (e.g., African-American, Hispanic, etc.)?
REFERENCES


