Journal of Experimental Social Psychology 56 (2015) 228–234

Contents lists available at ScienceDirect

Journal of Experimental Social Psychology

journal homepage: www.elsevier.com/locate/jesp

Supine body posture decreases rationalizations: Testing the action-based model of dissonance

Eddie Harmon-Jones *, Tom F. Price, Cindy Harmon-Jones

School of Psychology, The University of New South Wales, Sydney, NSW 2052, Australia

HIGHLIGHTS

- A supine body posture has been found to reduce approach motivation.
- Cognitive dissonance reduction involves approach motivation.
- We test whether a supine posture will also decrease cognitive dissonance reduction.
- The supine posture decreased cognitive dissonance reduction.

ARTICLE INFO

Article history:
Received 24 July 2014
Revised 21 October 2014
Available online 6 November 2014

Keywords:
Cognitive dissonance
Approach motivation
Embodiment
Attitude
Decision

ABSTRACT

The action-based model of dissonance theorizes that when individuals have conflicting cognitions *with action implications*, they experience dissonance. This dissonance motivates the individual to value one action tendency over the other, thereby facilitating effective action. Thus, a decrease in the motivation to act (decreased approach motivation) should decrease this tendency to value one action tendency over the other (dissonance reduction). The present research tested this prediction by using an embodied manipulation, a supine posture, to decrease approach motivation. In Experiment 1, relative to an upright posture, a supine posture decreased dissonance reduction in an effort justification paradigm. In Experiment 2, a supine posture decreased the spreading of alternatives following a difficult decision. These results suggest that embodied manipulations that reduce approach motivation decrease dissonance reduction. The findings support the action-based model of dissonance, and suggest that embodied manipulations of reduced approach motivation reduce the rationalization of behavior.

Introduction

We humans often think of ourselves as rational animals, but it may be more accurate to characterize us as *rationalizing* animals (Aronson & Aronson, 2007). That is, rather than using our cognitive faculties to determine the most judicious course of action, we more often use those faculties to justify the course of action in which we previously chose to engage. Indeed, research on cognitive dissonance theory (Festinger, 1957) has produced over 3000 experiments, in 50 years of research, demonstrating this tendency (Harmon-Jones & Mills, 1999; Tavris & Aronson, 2007). Individuals justify their difficult decisions and effortful behavior by viewing the outcomes associated with those actions as more positive than would be expected based on rational logic. Would something as simple as lying flat on one's back, as compared to sitting upright, influence these rationalizations? A theoretical perspective that conceptualizes rationalization as an approach-related, action-oriented response would predict such a difference.

The action-based model of cognitive dissonance is a theoretical perspective that predicts that these simple body postures may influence rationalizations (Harmon-Jones, 2009; Harmon-Jones, Amodio, & Harmon-Jones, 2009). Before explaining why this model makes this prediction, we briefly describe the theory of cognitive dissonance and the action-based model. Festinger's (1957) original conception of dissonance theory predicted that when an individual has in mind two or more elements of knowledge that are relevant to each other but inconsistent with one another, he or she experiences a state of discomfort (dissonance affect) and is motivated to decrease the inconsistency between cognitions (dissonance reduction).

A paradigm for evoking cognitive dissonance, the "effort justification" paradigm, is based on this prediction. When an individual engages in an unpleasant or effortful activity, dissonance occurs because engaging in the activity is inconsistent with the knowledge that one would not want to engage in the activity (Aronson & Mills, 1959). In other words, "The information that the animal has concerning the expenditure of energy and effort is dissonant with continuing to engage in the

* Corresponding author. Fax: +61 2 9385 3641.
E-mail address: eddiehj@gmail.com (E. Harmon-Jones).

http://dx.doi.org/10.1016/j.jesp.2014.10.007
0022-1031/

action…" (Lawrence & Festinger, 1962, p. 139). In the effort justification paradigm, dissonance can be reduced by increasing the subjective desirability of the goal. Or as Lawrence and Festinger (1962, p. 139) wrote, "The greater the effort required, the greater would be the magnitude of dissonance, and, hence, the greater the development of extra attraction for something in the situation in order to reduce dissonance." Research has found that individuals have more positive attitudes toward goals after engaging in effortful activities, compared to easy activities, to obtain the goals. In one classic experiment (Gerard & Mathewson, 1966) utilizing this paradigm, participants underwent mild or severe electric shocks to gain access to a group, or they underwent mild or severe shocks and then were placed in the group (non-contingent condition). Consistent with predictions derived from dissonance theory, participants who underwent severe shocks in order to gain access to the group had the most positive attitudes toward the group. In contrast, participants who underwent severe shocks and were simply placed in the group had the least positive attitudes toward the group. This latter result suggests that the former one was not due to a simple contrast effect (i.e., negative experience of shock caused participants to view the group more positively). Furthermore, effort justification is not specific to human animals. Rats also show evidence of effort justification (Lawrence & Festinger, 1962).

According to the action-based model, many perceptions and cognitions activate action tendencies. When perceptions or cognitions with action implications are inconsistent with one another, dissonance occurs, because these conflicting action-based cognitions have the potential to interfere with effective action (Harmon-Jones et al., 2009). The dissonance then motivates the organism to subjectively value one action tendency over the other so the organism can behave effectively. This process of dissonance reduction is often an approach-motivated process aimed at successfully translating a behavioral intention or commitment into effective action.

The action-based model of dissonance views dissonance reduction as an adaptive response that is present across many animal species (Egan, Bloom, & Santos, 2010; Lawrence & Festinger, 1962). Instead of being primarily harmful, dissonance reduction is posited to often assist in goal-direction actions, as "justifying" a recent behavioral commitment may insure that the organism does not waste energy but instead successfully follows through with the commitments or decisions. Thus, dissonance processes may have evolutionary value, with survival benefits.

Support for the action-based model comes from research that has found that individuals who score higher in trait approach motivation show more dissonance reduction (Harmon-Jones, Schmeichel, Inzlicht, & Harmon-Jones, 2011), from research that has found that cognitive manipulations that increase approach motivation cause more dissonance reduction (Harmon-Jones & Harmon-Jones, 2002), and from research that has found that the process of dissonance reduction is associated with greater activity in the left frontal cortical region, an area involved in approach motivational processes (Harmon-Jones, Harmon-Jones, Fearn, Sigelman, & Johnson, 2008; Harmon-Jones, Harmon-Jones, Serra, & Gable, 2011). Based on this evidence, we would predict that manipulations that decrease approach motivation should decrease dissonance reduction.

It may be important, at this point, to specify what is meant by "approach motivation," because various scientists define this term in slightly different ways. We define approach motivation as "*the impulse to go toward*, without specifying the valence of stimuli toward which the impulse is directed, indeed, without the requirement of any evoking stimulus." (Harmon-Jones, Harmon-Jones, & Price, 2013, p. 291). Based on research, this definition is broader than other definitions. It does not preclude goal-directed urges, but it also does not presume that goals are necessary. Approach motivation may arise from an evoking stimulus, but may also derive from internal processes at the trait or state level. Approach urges are a fundamental capability of organisms that are capable of movement.

Embodiment, motivation, and evaluations

One manipulation that has been found to influence approach motivation is whole body posture. Relative to sitting upright and/or leaning forward, being supine has been found to reduce activity in the left frontal cortical region, which is related to approach motivation, in a resting, baseline state (Price & Harmon-Jones, 2011), in response to desirable dessert stimuli (Harmon-Jones, Gable, & Price, 2011), and in response to an anger evocation (Harmon-Jones & Peterson, 2009). Moreover, a supine posture has been found to reduce approach motivation as measured by startle eyeblink responses and event-related potentials to appetitive but not to neutral stimuli (Price, Dieckman, & Harmon-Jones, 2012).

The idea that bodily postures and movements can influence motivational and evaluative responses has received previous support (for a recent review, see Price, Peterson, & Harmon-Jones, 2012). For instance, Laird (1974) found that individuals evaluated cartoons as being more humorous when they were unobtrusively induced to smile (as compared to induced to frown). Wells and Petty (1980) found that nodding the head back and forth caused more positive attitudes toward pro- and counter-attitudinal editorials than nodding the head side to side. Cacioppo, Priester, and Berntson (1993) found that when individuals were asked to evaluate novel, neutral stimuli, they evaluated them more positively when activating arm flexion as compared to arm extension; they suggested that these results occurred because arm flexion is associated with actions such as bringing food to one's mouth. Briñol, Petty, and Wagner (2009) found that positive and negative thoughts had more of an influence on self-related attitudes when individuals adopted a body posture associated with confidence (back erect and pushing chest out) as compared to doubt (slouched forward with back curved).[1] Although these studies and others reveal that body movements and postures can influence evaluative processes, they have not examined how body movements and postures influence dissonance-related attitude change via changes in approach motivation.

The present research

Given research suggesting that dissonance reduction is associated with approach motivation and research suggesting that a supine body posture reduces approach motivated responses, we predicted that assuming a supine body posture would decrease dissonance reduction. If the results support the hypothesis, the present research would extend past research in two important ways: It would reveal that manipulated decreases in approach motivation decrease dissonance reduction, and it would reveal that embodied manipulations of approach motivation decrease dissonance reduction.

In addition, the extension of previous research on trait approach motivation with the present experimental approach motivation studies is important because trait measures of approach motivation are correlated with other trait measures, which in turn may explain the previously published trait approach and dissonance results. For example, the agency model of narcissism (Campbell & Foster, 2007; Foster & Trimm, 2008) describes approach motivation as a key feature of narcissism. And narcissists have been found to show more dissonance reduction than non-narcissists (Jordan, Spencer, Zanna, Hoshino-Browne, & Correll, 2003). Thus, the present studies are needed as a complement of the previous trait approach motivation and dissonance studies, to more convincingly demonstrate the role of approach motivation in dissonance phenomena.

[1] We believe that the supine posture used in our research is not a submissive posture, because participants are simply reclined in a chair. Submissive postures, as manipulated in past research, have had individuals slouch (Briñol et al., 2009) or have had individuals slump in closed positions (Carney, Cuddy, & Yap, 2010). These postures are very different from how individuals recline as they might do while watching television or after eating a meal.

We tested the prediction in two experiments using two different experimental paradigms that have been commonly used in dissonance research. Experiment 1 utilized the effort justification paradigm in which individuals typically evaluate a goal more positively after high as compared to low effort (Aronson & Mills, 1959). We predicted that individuals in a supine posture would show less effort justification. Experiment 2 utilized the difficult decision paradigm in which individuals typically spread the decision alternatives farther apart after a difficult as compared to an easy decision (Brehm, 1956). We predicted that individuals in a supine posture would show less spreading of alternatives after a difficult decision.

Experiment 1

Method

Participants

Forty-nine students from introductory psychology classes participated for course credit. Participants were randomly assigned to one of the orders of conditions in a fully within-subjects design. The design was a fully within-subjects 2×2 factorial combining easy vs. difficult versions of the task and supine vs. upright posture conditions. Task difficulty and posture conditions were counterbalanced to create the within subjects design (e.g., supine-easy, supine-difficult, upright-easy, upright-difficult). One participant was excluded from analyses because she failed to recline the chair fully during the experiment. In both experiments, we ran as many participants as possible during the semester and stopped collecting data at the end of the semester.

Materials and procedure

Participants were tested individually. Participants sat in a comfortable chair that could recline to a horizontal position (Gregory Commercial Furniture's axess recliner; www.gcfau.com.au). Participants were fitted with computer goggles. These goggles insured that instructions, regardless of body position, were presented equidistant from the participant's eyes. Participants were also fitted with a headset and attached microphone that allowed the experimenter to hear and record the participant's verbal responses from an adjacent control room. After everything was in place, the experimenter had participants recline the chair to a full horizontal position and then return the chair to the upright position. This insured that participants knew how to recline the chair during the experiment.

The experimenter then explained that the experiment would examine liking for pictures; photographic materials were being developed for use in future studies and each participant would be asked to view and rate these photographs. Participants were told that they would complete a cognitive task and the number of pictures they would rate would depend on their performance; they would rate more photographs if they performed well at the task, and fewer pictures if they did not do well (in fact, all participants rated the same number of pictures after each of the Stroop tasks in this experiment).

Afterwards, the experimenter turned off the lights in the room – insuring that text instructions were clearly visible on the goggles – before exiting the room and closing the door. At this point, the researcher assigned participants to a presentation order of conditions based on a randomization sheet. Thus, researchers were unaware of the within-subjects order participants would receive while interacting with the participant.

Task difficulty was manipulated with different versions of a color-naming Stroop task. In the difficult conditions, participants saw the words "blue," "green," "red," and "yellow" displayed in blue, green, red or yellow font. In this difficult task, 75% of the items were incongruent (e.g., the word "blue" was displayed in green font) and 25% of the items were congruent (e.g., the word "blue" was displayed in blue font). In the easy conditions, participants saw the words "green" and "red" displayed in congruent green or red font.

The difficult version of the Stroop task should evoke dissonance because the "information that the [human] animal has concerning the expenditure of energy and effort is dissonant with continuing to engage in the action [of working on the Stroop task]" (Lawrence & Festinger, 1962, p. 139; bracketed portions were added). The computerized Stroop task was used to manipulate effort because it was methodologically easy to implement, kept the experimenter blind to condition, could be performed by participants in the supine as well as upright body posture, and was amenable to a within-subjects design.

In both conditions, each word was presented for a maximum of 1000 ms, with a total of 3000 ms allowed for each response (pressing one of two buttons to indicate font color; red and blue were associated with one button and yellow and green were associated with the other button). After the participant responded, there was a 120 ms delay before the next word was presented. Items were presented in a random order in both task conditions. Participants viewed instructions that their performance would be compared to other participants to determine how many pictures they would rate at the end of each color-naming task.

Participants completed 192 easy and 192 difficult trials in each posture. After completing each one of these Stroop tasks, participants received eight neutral photographs of rocks presented individually. There were four sets of eight neutral rock pictures, and one set was presented after each of the four Stroop tasks (the set of rock pictures was counterbalanced across participants). As these photographs were intended to serve as "rewards" for task performance, participants were only asked to make a simple rating after viewing each set of eight rock pictures on a liking scale ranging from 1 (not at all) to 5 (extremely). Participants were also asked how difficult and how much effort they exerted on the task using a similar scale. After completing all four Stroop tasks, participants were debriefed.

Regarding data analyses, in addition to reporting t, F, and p values, effect sizes are reported. In particular, Cohen's d is reported and it is based on the average standard deviation from the two means. Because the design is within-subjects, dependence between means is addressed using Morris and DeShon's (2002) equation. Confidence intervals for primary differences between means are also reported. Finally, 95% confidence intervals for the means are displayed in the figures, and they are calculated using the method recommended by Cousineau (2005).

Results

The typical effort justification effect occurred when participants were sitting upright. That is, participants evaluated the goal more positively after the difficult ($M = 3.083$, $SD = 0.846$) as compared to the easy task ($M = 2.792$, $SD = 0.922$), $t(47) = 2.04$, $p = .047$, d $= 0.30$, 95% CI [0.005, 0.579]. In contrast, effort justification did not occur when participants were supine. In fact, participants tended to evaluate the goal more positively after the easy ($M = 3.063$, $SD = 0.755$) as compared to the difficult task ($M = 2.833$, $SD = 0.859$), though this reversed effect was not significant by conventional standards, $t(47) = 1.56$, $p = .12$. Consistent with the prediction that the supine posture would reduce effort justification compared to the upright posture, the positive difference in evaluations between difficult and easy tasks – the effort justification effect – was greater in the upright than in the supine posture, $t(47) = 2.77$, $p = .008$, d $= 0.40$, 95% CI [0.142, 0.900]. These results were also revealed in a significant 2 (upright vs. reclining) $\times$ 2 (easy vs. difficult task) within-subjects ANOVA, $F(1, 47) = 7.65$, $p = .008$, partial $\eta^2 = .14$. See Fig. 1.

The manipulation check on perceived task difficulty revealed that participants rated the mostly incongruent Stroop task as more difficult ($M = 3.64$, $SD = 0.120$) than the completely congruent Stroop task ($M = 2.69$, $SD = 0.118$), $F(1, 44) = 55.78$, $p < .001$, partial $\eta^2 = 0.559$. This mean difference of 0.95 has a 95% CI of 0.69 to 1.21. No other effects were significant (i.e., the main effect of body posture or the two-way interaction). Perceived effort mirrored the above effects. That is, participants indicated that they exerted more effort on the

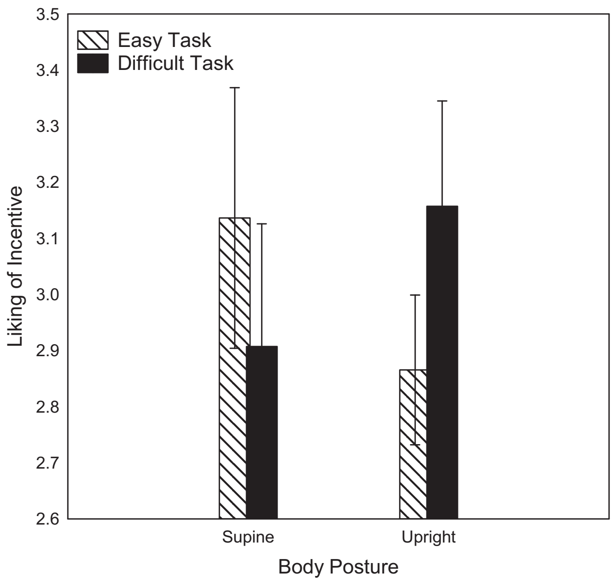

Fig. 1. Effort justification toward easy and difficult tasks, as a function of posture condition.

difficult ($M = 3.54$, $SD = 0.114$) compared to the easy task ($M = 2.90$, $SD = 0.099$), $F(1, 44) = 26.263$, $p = .00001$, partial $\eta^2 = 0.374$. This mean difference of 0.64 has a 95% CI of 0.388 to 0.892. No other effects were significant.

Discussion

The results from Experiment 1 supported the hypothesis that a supine posture would reduce the effort justification effect. When individuals were in an upright body posture, they rated the reward associated with a difficult task as more positive than the same reward when it was associated with an easy task. In contrast, when individuals were in a supine body posture, they did not rate the rewards associated with the difficult and easy tasks differently. These results are consistent with the prediction derived from the action-based model of dissonance that decreases in approach motivation embodied in a supine body posture decrease the motivation to reduce dissonance. As such, this is the first demonstration that an embodied reduction in approach motivation influences dissonance reduction, a response that has fascinated the field for over 57 years (e.g., Proulx, Inzlicht, & Harmon-Jones, 2012).

One question we have been asked after presenting these effort justification results is whether they are due to a contrast effect. According to this contrast effect explanation, individuals evaluate the goal more positively after more effortful activities because the unpleasant effort stands in contrast to the valence of the goal and makes it appear more positive. Although this contrast explanation may explain some effects, it does not seem to be able to explain the current effects, particularly why the supine posture reduced effort justification. In other words, for a contrast effect to explain the supine posture reducing effort justification, the supine posture would need to reduce the perception of effort. In fact, no evidence supports this interpretation, as the results indicated that the supine posture did not differ from the upright posture in how effortful they perceived the difficult task to be ($t = 1.23$, $p = .23$; supine $M = 3.67$; upright $M = 3.42$; in fact, these means are opposite in direction to the expected direction from a contrast effect explanation).

Experiment 2

The impact of Experiment 1 would be more substantial if the results were conceptually replicated in another experimental paradigm. In Experiment 2, participants underwent the free choice or difficult decision paradigm originally used by Brehm (1956). In this paradigm, participants first rate several decision alternatives, then make an easy or difficult decision, and finally re-rate the decision alternatives. After an easy decision, ratings of the alternatives rarely change. However, after a difficult decision, ratings of the alternatives change: They spread apart such that prior to the decision, the to-be-chosen and to-be-rejected alternatives are rated similarly, but after the decision, the chosen alternative is rated more positively than the rejected alternative. If, as we expect, the supine body posture decreases approach motivation, and if dissonance reduction is associated with approach motivation, then the supine body posture should decrease this spreading of alternatives in the difficult decision condition.

Method

Participants

Seventy-nine students from introductory psychology classes participated for course credit. Participants were randomly assigned to condition in this between-subjects design with approximately 20 participants per condition. One participant was excluded from analyses because he indicated that all of the task descriptions described the same experimental (Stroop) task.

Materials and procedures

The same chair, goggles, headset, etc. used in Experiment 1 were used. The experimenter explained that the experiment involved motivational and cognitive processes, and that the participant would rate different descriptions of cognitive tasks. Participants were also given a computer mouse, which allowed them to complete the Stroop task via mouse button presses. Once in the adjacent control room, the experimenter randomly assigned participants to condition with a randomization sheet. Thus, the experimenter was blind to condition while interacting with the participant.

The experiment began with instructions to read seven descriptions of cognitive tasks carefully. Participants read the seven descriptions individually in order to become familiar with them. Each of these seven blurbs described a Stroop task in different ways (e.g., task measuring color perception; a task measuring ability to deal with conflicting information). After participants had read all seven descriptions, they were instructed to rate how desirable they found each description on a 1 (not desirable) to 9 (very desirable) scale (Harmon-Jones et al., 2008).

Next, depending on condition, they reclined the chair or kept it in the upright position. There was a 2-min break at this point in the experiment, to insure participants were acclimated to their assigned body position. Thus, participants saw all seven descriptions and initially rated them while sitting upright, but then either reclined or remained sitting upright (posture was a between-subjects manipulation) throughout the remainder of the experiment.

Next, participants were informed that some of the tasks they had rated were being used in the lab. They were told that they would be given a choice between two of the tasks they had seen. In the difficult choice condition, participants were given a decision between two alternatives that they have rated similarly and were rated as close as possible to the mid-point to moderately high in desirability (e.g., rating of 5 or 6; Brehm, 1956). In the easy choice condition, participants were given a decision between one alternative they had rated near the mid-point and another alternative rated at least two points beneath the mid-point (e.g., 2 or 3). Thus, participants in the difficult decision condition chose between two tasks rated almost equally in attractiveness, whereas participants in the easy decision condition chose between two tasks rated differently in attractiveness (choice was a between-subjects manipulation). Participants announced their decision to the experimenter.

Next, a 3-min delay occurred, as is typical in dissonance research. Then, participants read the following instructions, “Before you begin the task you chose, please take one more look at all of the tasks. Past research has found that people's evaluations of tasks sometimes change from one moment to the next whereas at other times, their evaluations do not. Therefore, it's important to assess evaluations multiple times. Please report your current preferences, that is, how you feel about the tasks right now, without regard for your earlier evaluations." After reading these instructions, participants re-rated each of the tasks. All participants then completed the Stroop task. Afterwards, participants were debriefed.

Results

Difficult decision

Within the difficult decision condition, the typical spreading of alternatives effect occurred when participants were sitting upright, as suggested by a significant 2 (pre- vs. postdecision) × 2 (chosen vs. rejected) within-subjects ANOVA, $F(1, 21) = 15.02$, $p < .01$, $\eta^2 = .41$. Follow-up analyses revealed that the chosen alternative was evaluated more positively ($p < .01$) and the rejected alternative was evaluated more negatively following the decision ($p = .03$). In contrast, when participants were in a supine posture, a significant amount of spreading of alternatives did not occur, as suggested by a non-significant 2 × 2 ANOVA, $F(1, 21) = 1.20$, $p = .28$. These results were also supported by a significant three-way (posture condition × pre- vs. postdecision × chosen vs. rejected) interaction, $F(1, 42) = 8.60$, $p < .01$, partial $\eta^2 = .17$. See Fig. 2.

Another way to test the prediction is to calculate a commonly used index of spreading of alternatives, which is the difference in evaluations of the chosen and rejected alternatives after the decision minus the difference in evaluations of the chosen and rejected alternatives prior to the decision. Using this spreading index, we tested the planned comparison that spreading of alternatives would be greater in the upright than in the supine posture. Results supported the prediction that the upright condition would spread the alternatives more ($M = 1.545$, $SD = 1.870$) than the supine condition ($M = 0.227$, $SD = 0.973$), $t(42) = 2.93$, $p = .005$, d = 0.905. This mean difference of 1.318 has a 95% CI of 0.402 to 2.234. See Fig. 3.

Thus, these results support the prediction derived from the action-based model of dissonance. To further test the prediction that the effects should only emerge in the dissonance-arousing conditions, the next set of tests focused on the easy decision conditions.

Easy decision

Within the easy decision condition, neither the upright nor the supine condition produced a significant spreading of alternatives effect in the pattern observed above. That is, within the upright condition, a non-significant 2 (pre- vs. post decision) × 2 (chosen vs. rejected) within-subjects ANOVA occurred, $F(1, 14) = 2.55$, $p = .13$. However, within the supine condition, a significant interaction emerged, $F(1, 18) = 5.20$, $p = .03$, but it appeared opposite to the typical spreading effect that occurs after difficult decisions. That is, attitudes toward the rejected alternative became marginally more positive following the decision ($p = .053$), whereas the chosen alternative did not change ($p = .26$). The three-way (posture condition × pre- vs. postdecision × chosen vs. rejected) interaction was also not significant, $F(1, 32) = .07$, $p = .78$.

Planned comparison on spreading of alternatives

In this last set of analyses, the spreading of alternatives index was used in a planned comparison that tested the prediction that spreading of alternatives would be greater in the upright/difficult-decision condition (+3) than in any other condition (each of the other three conditions was weighted −1). Results supported this prediction: The upright/difficult-decision condition spread the alternatives more ($M = 1.545$, $SD = 1.870$) than the supine/difficult-decision condition ($M = 0.227$, $SD = 0.973$), the upright/easy-decision condition ($M = -0.600$, $SD = 1.454$), and the supine/easy-decision condition ($M = -0.737$, $SD = 1.408$), $t(74) = 5.18$, $p < .001$, d = 1.265. The difference between the mean of the upright/difficult-decision condition and the mean of the other three conditions was 1.866, and it has a 95% CI of 0.975 to 2.758.

Discussion

The results for Experiment 2 conceptually replicate the results for Experiment 1, suggesting that a supine body posture decreases dissonance reduction. In Experiment 2, dissonance reduction was measured using the difficult decision paradigm. As in past research, after individuals made a difficult decision, they evaluated the chosen alternative more positively and the rejected alternative more negatively than they evaluated these alternatives prior to the decision. In other words,

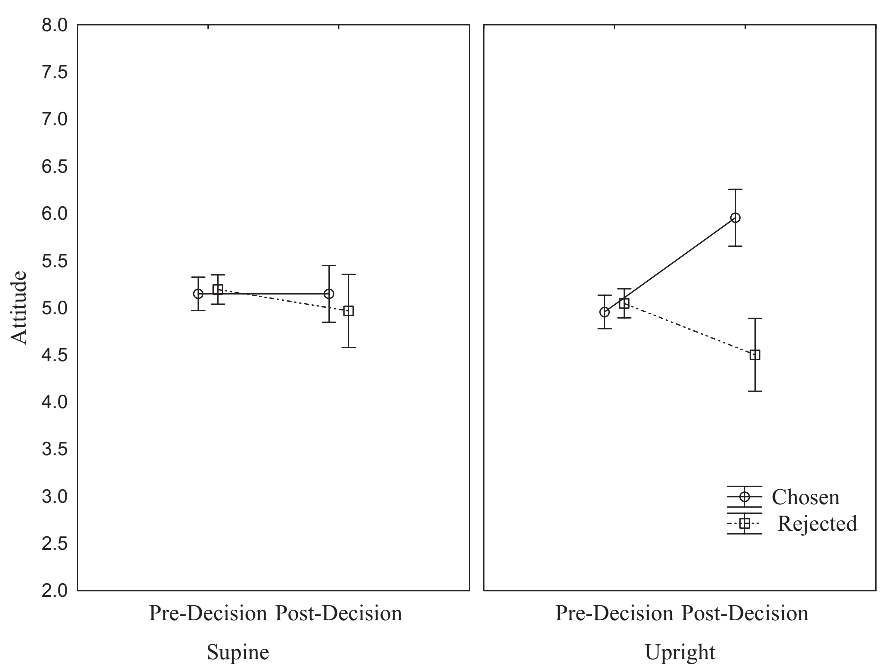

Fig. 2. Attitudes toward chosen and rejected decision alternatives pre- and post-decision, as a function of posture condition in the difficult decision condition.

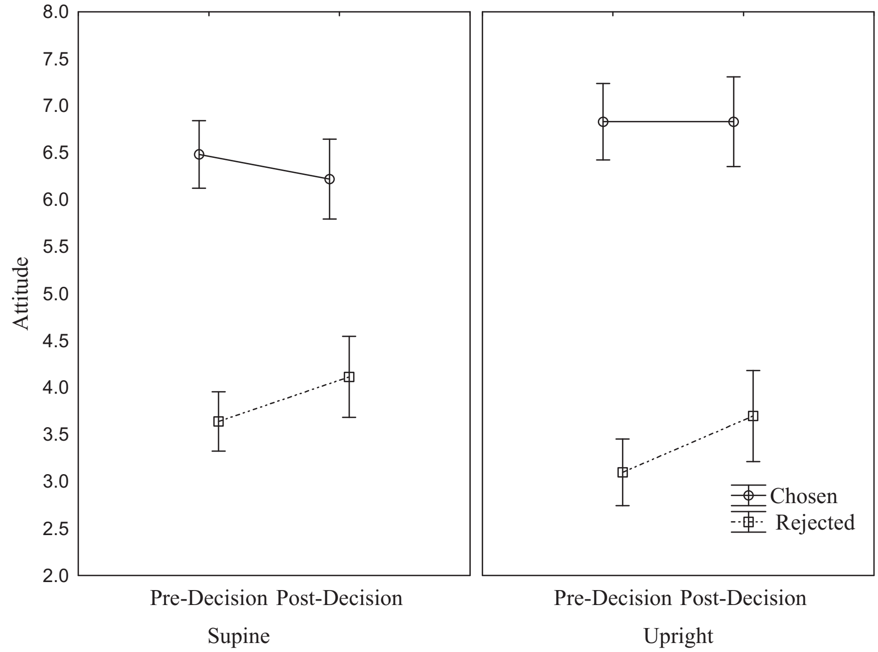

Fig. 3. Attitudes toward chosen and rejected decision alternatives pre- and post-decision, as a function of posture condition in the easy decision condition.

after the difficult decision, individuals' attitudes toward the alternatives spread apart. More importantly, this spreading of alternatives was moderated by body posture, such that it was greater when individuals were sitting upright than when they were in a supine body posture.

General discussion

The present experiments tested the hypothesis derived from the action-based model of cognitive dissonance that a manipulated decrease in approach motivation embodied via a supine body posture would decrease dissonance reduction. This hypothesis was predicated on the idea that dissonance reduction is associated with approach motivation. And this idea has been supported in past research that has found that individuals who score higher in trait approach motivation show increased dissonance reduction (Harmon-Jones, Schmeichel, Inzlicht, & Harmon-Jones, 2011). It has also been supported in research that found that cognitive manipulations that increase approach motivation increase dissonance reduction (Harmon-Jones & Harmon-Jones, 2002; Harmon-Jones et al., 2008). The present research extends this past research in two important ways: It revealed that manipulated decreases in approach motivation decrease dissonance reduction, and it revealed that embodied manipulations of approach motivation decrease dissonance reduction.

Considering alternative explanations

A different explanation of the current results is that arousal was reduced by the supine body posture and this decreased arousal rather than decreased approach motivation caused the decrease in dissonance reduction. However, based on other results using this supine body posture, we believe that approach motivation rather than arousal is the better explanation of the current results. First, the construct of "arousal" is not terribly useful because aroused states differ dramatically both in subjective experience and associated behaviors. All high-motivation states could be conceived as "aroused" states, if arousal is defined as a bodily preparation to act. However, approach motivation and withdrawal motivation impel opposite behaviors, even though both can be considered high-arousal states. For example, extreme sexual excitement and extreme terror may be similar in "arousal," but few would argue that these states have equivalent behavioral urges. Indeed, past research found that trait approach motivation relates to more dissonance reduction, whereas trait withdrawal motivation does not relate to or relates to less dissonance reduction (Harmon-Jones, Schmeichel, Inzlicht, & Harmon-Jones, 2011).

Second, several experiments have found that the supine body posture reduces appetitive responses but does not influence other types of "aroused" responses (Price, Dieckman, & Harmon-Jones, 2012; Price, Peterson, & Harmon-Jones, 2012). For example, the supine body posture does not influence startle eyeblink responses while individuals are viewing neutral stimuli (Price, Dieckman, & Harmon-Jones, 2012; Price, Peterson, & Harmon-Jones, 2012). If the supine posture simply reduced all kinds of arousal, then it should reduce the startle response which is a defensive response associated with aversive arousal. Third, in other research, the supine body posture did not differ from a sitting upright posture in terms of its effects on salivary cortisol and heart rate, although standing caused greater cortisol and heart rate (Hennig et al., 2000). The same research found that "posture did not affect well being dramatically" (p. 77). In fact, of the 13 emotional states measured, only self-reported activity and anxiety differed between posture conditions, and both differences indicated that the standing upright condition reduced activity and anxiety relative to sitting upright and being supine (see Hucklebridge, Mellins, Evans, & Clow, 2002, for replication).

Another potential alternative explanation of the current results is that the supine posture did not decrease dissonance reduction but instead caused individuals to reduce dissonance in a different, unmeasured way. This alternative explanation is based on the idea that the supine posture increased cognitive elaboration and this elaboration caused individuals to reduce dissonance via self-distraction or trivialization of the cognitions involved in the dissonant relationship. The idea that a supine posture could increase cognitive elaboration has received some support from previous research (Petty, Wells, Heesacker, Brock, & Cacioppo, 1983). In this experiment, individuals stood or reclined while listening to a persuasive message that contained weak or strong arguments. Whereas individuals lying on their backs were more influenced by messages with strong than weak arguments, individuals who were standing up were not. The authors interpreted these results by positing "that a reclining posture facilitates message-relevant thinking over a standing posture and thereby enhances the importance of message content in producing persuasion" (p. 219). However, because the experiment lacked a standard condition of sitting upright and because sitting individuals were likely to have been more influenced by messages with strong than weak arguments, it is not clear from the results of this experiment whether the supine posture exerted any effects that were different than the typical effect that would occur with sitting. In other words, it is not clear from these results whether a supine posture actually increases cognitive elaboration. However, it remains possible that the supine posture caused individuals to reduce dissonance in an alternative manner, and future research should investigate this possibility.

Concluding thoughts

Cognitive dissonance reduction has often been conceptualized as a maladaptive defensive response in which the individual alters his or her cognitions to justify or rationalize his or her actions (see Tavris & Aronson, 2007). This self-justification process is viewed as one that we humans would be better off without. The action-based model of dissonance, instead, conceptualizes dissonance reduction as an adaptive response that is present in many animal species (Egan et al., 2010; Lawrence & Festinger, 1962). Instead of being primarily harmful, dissonance reduction is posited to assist in goal-direction actions, as "justifying" a recent behavioral commitment may insure that the organism does not waste energy but successfully follows through with commitments. Of course, following through with commitments may occasionally cause harm to the individual, but the action-based model posits that these harms are likely fewer than the benefits obtained. The point of the present research is not to test these competing views. In fact, it may be impossible to empirically demonstrate that dissonance reduction is primarily maladaptive or adaptive. But like all good theories, both perspectives have generated research. And consideration of the "maladaptive" view in conjunction with the present research suggests that being in a supine body posture may decrease defensive processes such as rationalization. And all of this makes us wonder if this was why Freud (subconsciously) had his clients lying flat on their backs when they "freely" shared their thoughts.[2]

References

Aronson, E., & Aronson, J. (2007). *The social animal* (10th edition). New York, NY: Worth Publishers.

Aronson, E., & Mills, J. (1959). The effect of severity of initiation on liking for a group. *Journal of Abnormal and Social Psychology*, *59*, 177–181. http://dx.doi.org/10.1037/h0047195.

Brehm, J.W. (1956). Postdecision changes in the desirability of alternatives. *Journal of Abnormal and Social Psychology*, *52*, 384–389.

Briñol, P., Petty, R.E., & Wagner, B. (2009). Body posture effects on self-evaluation: A self-validation approach. *European Journal of Social Psychology*, *39*, 1053–1064.

Cacioppo, J.T., Priester, J.R., & Berntson, G.G. (1993). Rudimentary determinants of attitudes: II. Arm flexion and extension have differential effects on attitudes. *Journal of Personality and Social Psychology*, *65*, 5–17.

Campbell, W.K., & Foster, J.D. (2007). The narcissistic self: Background, an extended agency model, and ongoing controversies. In C. Sedikides, & S. Spencer (Eds.), *Frontiers in social psychology: The self* (pp. 115–138). Philadelphia: Psychology Press.

Carney, D.R., Cuddy, A.J., & Yap, A.J. (2010). Power posing brief nonverbal displays affect neuroendocrine levels and risk tolerance. *Psychological Science*, *21*, 1363–1368.

Cousineau, D. (2005). Confidence intervals in within-subject designs: A simpler solution to Loftus and Masson's method. *Tutorials in Quantitative Methods for Psychology*, *1*, 42-45–42-45.

Egan, L.C., Bloom, P., & Santos, L.R. (2010). Choice-induced preferences in the absence of choice: Evidence from a blind two choice paradigm with young children and capuchin monkeys. *Journal of Experimental Social Psychology*, *46*, 204–207.

Festinger, L. (1957). *A theory of cognitive dissonance.* Stanford, CA: Stanford University Press.

Foster, J. D., & Trimm, R. F. I. V. (2008). On being eager and uninhibited: Narcissism and approach–avoidance motivation. *Personality and Social Psychology Bulletin*, *34*, 1004–1017. http://dx.doi.org/10.1177/0146167208316688.

Freud, S. (1913). On beginning the treatment (further recommendations on the technique of psycho-analysis I). *Standard Edition*, *12*, 121–144.

Gerard, H. B., & Mathewson, G. C. (1966). The effects of severity of initiation on liking for a group: A replication. *Journal of Experimental Social Psychology*, *2*, 278–287.

Harmon-Jones, E. (1999). Toward an understanding of the motivation underlying dissonance processes: Is feeling personally responsible for the production of aversive consequences necessary to cause dissonance effects? In E. Harmon-Jones, & J. Mills (Eds.), *Cognitive Dissonance: Perspectives on a pivotal theory in social psychology* (pp. 71–99). Washington, DC: American Psychological Association.

Harmon-Jones, E., Amodio, D.M., & Harmon-Jones, C. (2009). Action-based model of dissonance: A review, integration, and expansion of conceptions of cognitive conflict. *Advances in Experimental Social Psychology*, *41*, 119–166.

Harmon-Jones, E., Gable, P.A., & Price, T.F. (2011). Leaning embodies desire: Evidence that leaning forward increases relative left frontal cortical activation to appetitive stimuli. *Biological Psychology*, *87*, 311–313.

Harmon-Jones, E., & Harmon-Jones, C. (2002). Testing the action-based model of cognitive dissonance: The effect of action-orientation on post-decisional attitudes. *Personality and Social Psychology Bulletin*, *28*, 711–723.

Harmon-Jones, E., Harmon-Jones, C., Fearn, M., Sigelman, J.D., & Johnson, P. (2008). Action orientation, relative left frontal cortical activation, and spreading of alternatives: A test of the action-based model of dissonance. *Journal of Personality and Social Psychology*, *94*, 1–15.

Harmon-Jones, E., Harmon-Jones, C., & Price, T.F. (2013). What is approach motivation? *Emotion Review*, *5*, 291–295. http://dx.doi.org/10.1177/1754073913477509.

Harmon-Jones, E., Harmon-Jones, C., Serra, R., & Gable, P.A. (2011). The effect of commitment on relative left frontal cortical activity: Tests of the action-based model of dissonance. *Personality and Social Psychology Bulletin*, *37*, 395–408.

Harmon-Jones, E., & Mills, J. (1999). *Cognitive dissonance: Progress on a pivotal theory in social psychology.* Washington, DC: American Psychological Association.

Harmon-Jones, E., & Peterson, C.K. (2009). Supine body position reduces neural response to anger evocation. *Psychological Science*, *20*, 1209–1210.

Harmon-Jones, C., Schmeichel, B.J., Inzlicht, M., & Harmon-Jones, E. (2011). Trait approach motivation relates to dissonance reduction. *Social Psychological and Personality Science*, *2*, 21–28.

Hennig, J., Friebe, J., Ryl, I., Krämer, B., Böttcher, J., & Netter, P. (2000). Upright posture influences salivary cortisol. *Psychoneuroendocrinology*, *25*, 69–83.

Hucklebridge, F., Mellins, J., Evans, P., & Clow, A. (2002). The awakening cortisol response: No evidence for an influence of body posture. *Life Sciences*, *71*, 639–646.

Jordan, C.H., Spencer, S.J., Zanna, M.P., Hoshino-Browne, E., & Correll, J. (2003). Secure and defensive high self-esteem. *Journal of Personality and Social Psychology*, *85*, 969–978. http://dx.doi.org/10.1037/0022-3514.85.5.969.

Laird, J.D. (1974). Self-attribution of emotion: The effects of expressive behavior on the quality of emotional experience. *Journal of Personality and Social Psychology*, *29*, 475–486.

Lawrence, D.H., & Festinger, L. (1962). *Deterrents and reinforcement: The psychology of insufficient reward.* Palo Alto, CA: Stanford University Press.

Morris, S.B., & DeShon, R.P. (2002). Combining effect size estimates in meta-analysis with repeated measures and independent-groups designs. *Psychological Methods*, *7*, 105–125. http://dx.doi.org/10.1037//1082-989X.7.1.105.

Petty, R.E., Wells, G.L., Heesacker, M., Brock, T.C., & Cacioppo, J.T. (1983). The effects of recipient posture on persuasion: A cognitive response analysis. *Personality and Social Psychology Bulletin*, *9*, 209–222.

Price, T.F., Dieckman, L., & Harmon-Jones, E. (2012). Embodying approach motivation: Body posture influences startle eyeblink and event-related potential responses to appetitive stimuli. *Biological Psychology*, *90*, 211–217. http://dx.doi.org/10.1016/j.biopsycho.2012.04.001.

Price, T.F., & Harmon-Jones, E. (2010). The effect of embodied emotive states on cognitive categorization. *Emotion*, *10*, 934–938.

Price, T.F., & Harmon-Jones, E. (2011). Approach motivational body postures lean toward left frontal brain activity. *Psychophysiology*, *48*, 718–722.

Price, T.F., Peterson, C.K., & Harmon-Jones, E. (2012). The emotive neuroscience of embodiment. *Motivation and Emotion*, *36*, 27–37. http://dx.doi.org/10.1007/s11031-011-9258-1.

Proulx, T., Inzlicht, M., & Harmon-Jones, E. (2012). Understanding all inconsistency compensation as a palliative response to violated expectations. *Trends in Cognitive Sciences*, *16*, 285–291. http://dx.doi.org/10.1016/j.tics.2012.04.002.

Tavris, C., & Aronson, E. (2007). *Mistakes were made (but not by me): Why we justify foolish beliefs, bad decisions, and hurtful acts.* Orlando, FL: Harcourt, Inc.

Wells, G.L., & Petty, R.E. (1980). The effects of overt head movements on persuasion: Compatibility and incompatibility of responses. *Basic and Applied Social Psychology*, *1*, 219–230.

[2] Freud (1913, p. 133–134) held "to the plan of getting the patient to lie on a sofa while [he] sat behind him out of sight" because it was "the remnant of the hypnotic method out of which psycho-analysis was evolved." He further stated, "I cannot put up with being stared at by other people for eight hours a day (or more)." And elaborated by stating, "I insist on this procedure, however, for its purpose and result are to prevent the transference from mingling with the patient's associations imperceptibly…" Thus, Freud seemed to consciously focus on being out of sight from the patient rather than on the body position of the patient. The present research suggests that the body position itself may reduce defensiveness and promote an opening up on the part of the patient (Price & Harmon-Jones, 2010).