

Research Article

The warmth of our regrets: Managing regret through physiological regulation and consumption ☆☆☆

Jeff D. Rotman ^{a,*}, Seung Hwan (Mark) Lee ^b, Andrew W. Perkins ^c

^a *Ivey Business School, Western University, Canada*

^b *Ted Rogers School of Retail Management, Ryerson University, Canada*

^c *Carson College of Business, Washington State University, USA*

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Abstract

This research suggests that experiencing action regret induces a change in psychological and physical warmth, motivating individuals to ameliorate that change via interaction with objects that are perceived to be physically or psychologically opposite in temperature. Experiment 1 revealed individuals experiencing action regret felt more self-conscious emotions, and subsequently preferred cold (versus hot) drinks. Experiment 2 replicated this effect and ruled out arousal as a possible alternative explanation. Experiment 3 furthered this link by demonstrating that those feeling more self-conscious emotions felt warmer and subsequently preferred cold (versus hot) drinks. Finally, experiment 4 found that advertisements manipulated for temperature (e.g., cold climate) mitigated the psychological effects of action regret. We interpret the results of these four studies within the emerging field of embodied cognition, which argues that our understanding of emotional concepts is grounded in, and can be influenced by, physical experiences.

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Regret is an aversive cognitive emotion that people are motivated to avoid, suppress, deny, and regulate should they experience it (Zeelenberg & Pieters, 2007). It is a negative, cognitively-based emotional response experienced when realizing or imagining that our present situation would have been better had we acted differently (Zeelenberg, 1999). For consumers, regret induces a painful sensation that arises as a result of comparing

‘what is’ with ‘what might have been’ (Sugden, 1985). In other words, regret transpires when an obtained outcome compares unfavorably with an outcome that could have been better had the individual chosen differently. Within a marketing context, consumers are constantly making choices that might lead to feelings of regret; understanding the processes that lead to ameliorating this experience is important for maintaining the well-being of consumers. As such, one key area of interest for marketers is to understand how the cognitive experience of regret might affect consumption behavior.

Recent theories (Damasio & Carvalho, 2013) of emotion processing assert that our subjective mental experiences of emotion are a function of our bodily states. In line with an embodied perspective, emotions are thought to be generated by the individual’s perception of related physiological responses. Indeed, empirical evidence suggests bodily expressions and responses are closely tied to the processing and interpretation of emotional

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* Corresponding author.

E-mail address: jrotman.phd@ivey.ca (J.D. Rotman).

experiences (Damasio, 2000; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005; Niedenthal, Mondillon, Winkielman, & Vermeulen, 2009). For instance, fear is associated with certain bodily responses such as raised heart rate and goose bumps (Oosterwijk, Topper, Rotteveel, & Fischer, 2010). Stepper and Strack (1993) suggest that specific bodily postures (e.g., upright posture) are associated with specific emotional response (e.g. pride). Even merely thinking about emotional content elicits certain facial expressions (Winkielman & Cacioppo, 2001). Physiological research demonstrates that emotional responses may result in certain forms of bodily stimulation, such as electrodermal activity (Glenberg, Webster, Mouilso, Havas, & Lindeman, 2009). Hence, emotion processes are inherently linked with physiological responses, and contain psychobiological properties such as motor expression, action tendency, subjective experience, and emotion regulation (Fontaine, Scherer, Roesch, & Ellsworth, 2007).

Here, we argue the effects of experiencing regret on consumer behavior from an embodied cognitive perspective. Importantly, we move beyond merely documenting the physiological–psychological link between regret and consumption by uncovering the process mechanism that explains this relationship. Specifically, we show that experiencing a certain form of regret (i.e., action regret) results in increased perceptions of warmth via the experience of self-conscious emotions and creates a subsequent desire for cold (versus hot) products. Taken together, these findings help to define the psychological underpinnings of experienced regret within the context of embodied cognition theory and extend it into meaningful applications in marketing and consumer behavior from both a theoretical and managerial perspective.

Conceptual background

Individuals can regret their actions (errors of commission), as well as their inactions (errors of omission; Gilovich & Medvec, 1995). For example, an individual can regret an active decision gone wrong (e.g., purchasing a stock that subsequently plunges in value), or regret failing to act (e.g., not purchasing a stock that subsequently rises in value). We use the terms *action regret* and *inaction regret* to denote whether the regret stems from an event in which one took action or failed to act. Prior research examining regret has shown that there are fundamental differences between regretful situations that result from action and regretful situations that result from inaction in terms of the distinct emotional patterns that are elicited (Kahneman & Tversky, 1982). For instance, action regret (e.g. regretful situations that are caused by one's actions) induces not only the emotion of regret but also self-conscious emotional experiences such as shame and guilt, whereas inaction regret (e.g. regretful situations that are caused by one's inaction) similarly induces the emotion of regret but also wistful emotions such as longing and contemplation (Kedia & Hilton, 2011). Action regret typically results in increased internal attributions and self-focused counterfactual thinking (Byrne & McEleney, 1997; Kahneman & Miller, 1986; Zeelenberg, van der Pligt, & Manstead, 1998; Zeelenberg, van Dijk, & Manstead, 1998). Subsequently, emotions such as shame, guilt, embarrassment and remorse (generally considered to be among the consequences of evaluating

oneself negatively) should be higher when experiencing situations of action regret. On the other hand, emotions such as anger and frustration are a function of external attributions, and should occur in similar propensity for action and inaction regret. Finally, the feeling of regret reflects a temporal pattern in which situations of action regret tend to elicit greater regret in the short-term but not in the long-term. For example, while buying a stock that subsequently plummets tends to elicit greater immediate regret than holding onto that stock (Kahneman & Tversky, 1982), other research that examines recalling regret later has found either no differences or even the opposite effect (Gilovich & Medvec, 1995; Kedia & Hilton, 2011; Zeelenberg, van den Bos, van Dijk, & Pieters, 2002).

Notably, it is important to acknowledge that the emotional profiles (e.g., shame vs. wistfulness) resulting from the varying situations that elicit action vs. inaction regret are seen as separate from the regret emotion itself. Similarly, while regret may be seen as a type of self-conscious emotion, it is theoretically distinct from other self-conscious emotions such as shame, embarrassment, or disappointment. As Zeelenberg and Pieters (2007) note “regret is distinct from related other specific emotions such as anger, disappointment, envy, guilt, sadness and shame, and from general negative affect on the basis of its appraisals, experiential content and behavioral consequences.” (p.7). Individuals can feel regret without feeling shame or embarrassment, and they can experience shame and embarrassment without regret. Research examining both regret and shame find only modest correlations between the two (Zeelenberg & Pieters, 2007). Further, Zeelenberg, van Dijk, Manstead and van der Pligt (1998) extended Roseman, Wiest, and Swartz's (1994) ideas to compare the phenomenological differences between regret and disappointment. They found that regret was associated with items such as “[you] feel that you should have known better” or “[you] want to undo the event”, while disappointment was associated with “[you are] feeling powerless” or “[you] want to do nothing” (see Zeelenberg, van Dijk, Manstead and van der Pligt, 1998 for more differences). Overall, those who experienced regret tended to rethink about past events, while those who experienced other negative self-conscious emotions tended to dismiss their negative experience. This explains why regret has been found to promote goal persistence, while disappointment has been found to promote goal abandonment (Zeelenberg, van Dijk, Manstead, & van der Pligt, 2000). Individuals who regret are likely to set goals that are directed at improving one's self, similarly to how a person becomes self-focused and seek replenishment when experiencing emptiness (Levontin, Ein-Gar, & Lee, 2015).

Taken together, we offer series of predictions based on individuals' desire to regulate their level of regret. We propose that consumers seek to ameliorate their experienced regret through consumptive acts. Moreover, we focus primarily on the situation type (e.g., action regret) as it involves the activation of self-conscious emotions.

Hypothesis development

Niedenthal (2008) suggests emotions are understood through an embodied framework where individual's physical, cognitive, and other emotional properties are mapped together

in the neural system. For instance, when experiencing nervousness, the concept of “nervous” in memory may be linked with rapid heart rate/dry mouth (physical), anticipation (cognitive), and fear/anxiety (other emotions), which together culminate the emotional experience. As such, modality-specific models of emotions assert that specific networks of experiences are stored and associated with a particular emotional response, allowing for easier interpretation and processing of emotional information (Niedenthal et al., 2009).

Recent research (Nummenmaa, Glerean, Hari, & Hietanen, 2013) demonstrates that certain emotions correspond with different physiological states. In their research, Nummenmaa and colleagues show that consciously felt emotions were associated with distinct perceptions of body temperature. More germane to this article, their findings imply that people feel warm when they feel shame or remorse. Further, there are additional reasons that experiencing these emotions should result in embodied warmth. For example, experiencing shame and remorse can cause blushing, a physiological response associated with vasoconstriction and warming (Shearn, Bergman, Hill, Abel, & Hinds, 1990). We argue that because situations that lead to action regret activate these same self-conscious emotional states that have been linked to warmth, experiencing action regret should lead to increased perception of warmth. A pre-test confirmed that the recalling an experience of action regret differentially affects participant's perception of ambient environmental temperature; participants instructed to remember an instance of action regret perceived the room to be warmer than those in the inaction regret condition. Specifically, 57 undergraduate students (58% females) were randomly assigned to one of two conditions: participants in the first condition were instructed to recall a situation where they experienced action regret deeply (e.g., regret something they have done), while participants in the second condition were instructed to recall a situation where they experienced inaction regret deeply (e.g., regretting something they failed to do). Following the completion of this task, participants were told that the building maintenance staff had requested that they estimate the current room temperature. The actual room temperature was not given to the participants but it ranged from 20 to 20.5 °C (68–69 °F) during the experiment sessions. The mean outside temperature during the experiment over two days was 16.5 °C (62 °F), with an average temperature of 17 °C (63 °F) on the first day and 16 °C (61 °F) on the second day. Following the estimation of the room temperature, participants were debriefed and released. Overall, participants estimated ambient room temperature within a range from 55 to 75 degrees Fahrenheit. A one-way ANOVA revealed that the participants who recalled an action regret experience reported higher ambient room temperature than those in the inaction condition ($M_{\text{action}} = 69.89$ °F vs. $M_{\text{inaction}} = 67.76$ °F; $t(55) = 2.12, p < .05, \eta^2_p = .08$).

The link between consumption and regulating regret

Extant consumer behavior research suggests that individuals use consumption to regulate both actual and symbolic discrepancies (Hirschman & Holbrook, 1982). That is, people have an innate tendency to maintain balance, and embodied

processes allow for self-regulation to occur in a consumption context (Lee, Rotman, & Perkins, 2014). As discrepancy increases, so does the desire for a consumptive object related ameliorating that discrepancy. For example, individuals who have their morality threatened show a greater desire for cleaning products (Zhong & Liljenquist, 2006), while social ostracism has been shown to lead to a greater desire for warm food and drink (Zhong & Leonardelli, 2008). Further, Bilz (2012) reveals that law students who use “dirty evidence” were more likely to choose a bottle of hand-sanitizer over a pen as a free gift. People who lied over voice mail desired mouthwash to purify the specific body part that involved the moral transgression (Lee & Schwarz, 2010). Relating to emotions, people who feel embarrassed exhibited coping strategies to hide or restore their face using consumptive objects (i.e., sunglasses/cosmetics) as a way to mitigate their negative emotion (Dong, Huang, & Wyer, 2013). Overall, these results suggest that consumptive objects or experiences can be used as regulatory mechanism to achieve a physiological balance. Thus, we extend this logic to suggest people will seek to regulate their experienced regret through consumptive objects and consequently develop stronger preferences for products, thus ameliorating their feelings of regret. Here, we propose that individuals should be motivated to ameliorate this emotional warmth of regret using variety of temperature-related environmental objects (e.g., beverage products).

In a review of the emotion–behavior link, Baumeister, Heatherton, & Tice (1993) argue that rather than viewing the emotion–behavior link as emotion causing behavior, it should instead be viewed as behavior pursuing emotion. Specifically, Baumeister and colleagues argue that when individuals are in an aversive state (fearful, shameful, etc.), they will engage in behaviors in an attempt to regulate and thus achieve a positive emotional state. For example, it has long been established that sadness can cause helping behavior (Cialdini, Darby, & Vincent, 1973; Cunningham, Steinberg, & Grev, 1980). However, when individuals are given a placebo and told that it would make emotional mood states immune to change, this resulted in less helping behavior (Manucia, Baumann, & Cialdini, 1984). Other results have replicated this finding in different domains, showing that a ‘mood-freezing pill’ results in lower regulating behavior of eating and sadness or procrastination and anxiety (Tice, Bratslavsky, & Baumeister, 2001).

Thus, we argue that the preference for cold for those experiencing situations of action regret should be the result of one's experience of self-conscious emotions. Individuals who are feeling greater remorse, shame, or embarrassment should attempt to regulate this negative state. Further, because these states are tied to warmth (cf. Nummenmaa et al., 2013), these individuals should be motivated to consume cold beverages as a regulatory mechanism. Conversely, other emotional states, such as anger, irritation, and arousal, which don't systematically differ between the two forms of regret, should not be a predictive factor.

H1a. Individuals recalling a situation of action regret will prefer cold items to hot items.

H1b. The relationship between recalling a situation of action regret and a preference for cold (versus hot) items is mediated by the feelings of self-conscious emotions.

Finally, an important function of the human mind is the ability to imagine external realities (Gilbert & Wilson, 2009). Past research has shown that imagining an experience can have similar effects as actual experiences (Dahl, Manchanda, & Argo, 2001). Individuals can experience various types of affective responses as a result of imagining others or imagining a situation (Dahl et al., 2001; Taylor & Schneider, 1989). In the embodiment context, Niedenthal et al. (2005) states “just thinking about an object produces embodied states as if the object were actually there” (p. 187). Gangi, Sherman, and White (2011) show that participants that watched a video while imagining themselves flossing showed better flossing skills one week later. Related to temperature, imagined warmth or coldness (i.e., thinking about holding a cup of hot/iced coffee) showed similar embodied effects as previous studies, but only if the event was imagined from an egocentric (first-person) perspective (Macrae, Raj, Best, Christian, & Miles, 2013). These results are supported by Lorey et al. (2009), who found via neuroimaging that greater activity occurred in the sensorimotor regions of the brain when people imagined events and actions from a first-person, rather than third-person, perspective.

In line with this extant research, we suggest that eliminating the effects of experienced regret may not be limited to situations where a physical product is available; merely imagining a consumption experience may mitigate the effects of experienced regret. Specifically, we investigate whether marketing promotions (advertisements) that feature attributes related to temperature can be a source for mitigating regret stemming from action. This notion builds on the emerging fields of sensory marketing (Elder & Krishna, 2012; Krishna, 2012) and embodied cognition (Barsalou, 1999; Wilson-Mendenhall, Barrett, Simmons, & Barsalou, 2011), which suggests that consumption-based objects or materials can be an effective regulator of consumption-related emotions (i.e., regret). Thus, we propose:

H2. After experiencing action regret, individuals who view an advertisement for a cold-climate vacation will experience less regret than those who view an advertisement for a warm-climate vacation.

Overview of studies

Here, we report four experiments that investigate the link among regret, temperature, self-conscious emotions, and subsequent consumer behavior. In experiments 1–3 (H1a and H1b), we investigate whether individuals seek to self-regulate their experienced action regret via consumptive objects (i.e., hot or cold drink) and whether this effect is mediated by self-conscious emotions. Finally, in experiment 4 (H2), we use consumption-based materials (advertisements that are manipulated for temperature) to investigate whether imagined embodied states can ameliorate experienced regret.

Experiment 1

In experiment 1, we investigate whether people will attempt to regulate their experienced action regret through consumptive objects and consequently develop stronger preferences for products that are capable of doing so (e.g., cold drinks). We seek to demonstrate that consumptive objects or experiences can be used as a regulatory strategy to ameliorate physiological imbalance that results from the experience of self-conscious emotion following action regret.

Procedure

One hundred sixty-five individuals completed an online experiment via Amazon Mechanical Turk (Buhrmester, Kwang, & Gosling, 2011). Due to failed attention checks and missing data, eight responses were eliminated, leaving 157 participants (66.7% male, mean age = 31.66). Participants were randomly assigned to one of two conditions: participants were either instructed to recall a situation where they experienced action regret deeply or where they experienced inaction regret deeply. Participants were then asked to report their perceptions of self-conscious emotions. Specifically, participants were asked whether they felt the four negative self-conscious emotions as reported in Kedia and Hilton (2011): shame, remorse, embarrassment, and guilt. The four items showed strong reliability ($\alpha = .87$) and were averaged into a single self-conscious emotion construct. Perceptions of other emotions (anger, irritation, frustration, disgust, contemplation, and concern) were also collected. Next, participants were provided with 10 food/drink items to consider, and were instructed to click on the items they currently desired using the computer mouse. Five of the presented items were hot items (hot coffee, hot chocolate, hot green tea, apple cider, and soup) while the other five items were cold items (iced latte, ice cream, cold Gatorade, a soft drink, and cold beer). After completing the choice task, participants completed a number of demographic items, were debriefed, and then released.

Dependent variables

For the dependent measure, a preference index was created (see Lee et al., 2014) by calculating the difference between the number of hot items chosen and cold items chosen and divided by the total number of items chosen. A zero indicates an equal number of hot and cold items chosen (neutral preference), a positive number indicates a preference for hot items, and a negative number indicates a preference for cold items. Participants on average selected a total of 2.38 items, comprising of an average 1.40 hot items and .98 cold items.

Results

Consistent with our theorizing and the results of Kedia and Hilton (2011), our results demonstrated a significant effect of condition on self-conscious emotions (i.e., shame, remorse, embarrassment, and guilt; $t(158) = 3.73$, $p < .001$, $\eta^2_p = .08$), with action regret resulting in stronger feelings of self-conscious

emotions ($M = 4.87$, $SD = 1.65$) compared to inaction regret ($M = 3.90$, $SD = 1.62$), but not for other felt emotions. The only exceptions were for disgust and concern, but these emotions did not predict preferences for cold/hot drinks (for a list of all emotion descriptive statistics, see Table 1 in the appendix). Supporting H1, mediation analysis (Model 4, Hayes, 2013) with a bootstrapping procedure (5000 resamples) revealed the predicted indirect effect; the feeling of self-conscious emotions mediated the influence of the regret condition (1 = Action Regret, 2 = Inaction Regret) on preference for cold versus hot products ($\beta = .078$, 95% CI: [.018, .187]), $\kappa^2 = .059$). In short, individuals in the action regret condition reported feeling more self-conscious emotions and subsequently preferred more cold items, ostensibly because they longed to achieve a temperature balance through self-regulatory decisions.

Moreover, while there were also significant differences for the emotions disgust and concern between the action and inaction regret conditions, neither of those emotions predicted preferences for cold vs. hot drinks ($\beta = .029$, 95% CI [−.02, .11], $\kappa^2 = .005$] and $\beta = .027$, 95% CI [−.02, .07], $\kappa^2 = .026$ respectively). For a summary table of all indirect effects, see Table 2 in the appendix. In addition, to rule out the argument that our effect was driven by differences in preference of hot or of items in general, we computed mediation analysis with self-conscious emotions on cold, hot and total items independently. As predicted, mediation was found for cold items only ($\beta = -.12$, 95% CI [−.27, −.02], $\kappa^2 = .052$) but not for hot items ($\beta = .07$, 95% CI [−.03, .24], $\kappa^2 = .031$) or total items ($\beta = -.041$, 95% CI [−.25, .13], $\kappa^2 = .013$).

Experiment 1

Discussion

The results of experiment 1 support H1. Following the regret manipulation, participants who experienced action regret reported feeling more self-conscious emotions (e.g. guilt and remorse) and subsequently preferred cold items to hot items. Additionally, this relationship was mediated by the intensity of those self-conscious emotions. These results further bolster the argument that experiencing regret, similar to other sources of emotional warmth or cold (Bargh & Shalev, 2012; IJzerman et al., 2012), can lead to the physiological experience of cold versus warm and a desire to ameliorate that feeling via consumption behavior. Further, these results discount the notion that embodied effects are simply a consequence of increased accessibility: if this was the case, then we would expect to observe a preference for warm or hot foods. Finally, because individuals appear to be attempting to regulate their physiological temperature by preferring cold versus warm foods, we suggest that experiencing psychological heat resulting from experiencing regret can affect product perceptions and desirability.

However, the results of experiment 1 do not rule out the possibility that increased arousal or the intensity of the emotion of regret due to situations of action regret, rather than the self-conscious emotions, are the driving force behind the preference for cold (versus hot) drinks. It is possible, rather than

self-conscious emotions affecting perceptions of warmth and subsequent preference for cold, that our effect is driven simply by the fact that action regret can be a more intense emotion and may subsequently result in greater arousal or regret. To rule out this possibility, experiment 2 was designed to assess the intensity of regret and arousal level and determine whether they may be competing explanations.

Experiment 2

Procedure

One hundred seventeen participants (53% male, mean age = 34.78) were recruited via Amazon Mechanical Turk. Eight participants were excluded for failed attention checks and missing data. Participants were assigned to a 2 (Regret type: action/inaction) \times 2 (Tea preference: hot/cold) between-subjects design. As in the previous experiment, regret was manipulated by asking participants to “recall a time when you experienced a lot of regret as a result of your own actions/decisions”, while in the inaction regret condition participants were asked, “Recall a time when you experienced a lot of regret as a result of failing to act, (e.g., missed opportunities)”. As in study 1, participants were then asked to type a description of their experience in a text box and then report their current emotions regarding the experience (Kedia & Hilton, 2011). As in experiment 1, participants were asked whether they felt shame, remorse, embarrassment, and guilt along with a number of other emotions (anger, irritation, frustration, etc.). In addition, to rule out the effect of arousal and regret, this experiment also employed a 10-item ($\alpha = .85$) perceived arousal questionnaire (Anderson, Anderson, & Deuser, 1996; Anderson, Deuser, & Deneve, 1995) and a single-item regret question (how much do you regret this experience?). Participants were then shown an image of a loose leaf tea product manipulated for temperature. In the hot tea preference condition, participants were told that the tea was best served hot, while in the cold tea preference condition, participants were told the tea was best served cold (Lee et al., 2014). Participants were then asked how much they currently desired the tea (3 item scale, e.g., “How desirable is the tea?” 1 = not at all desirable, 7 = very desirable, $\alpha = .97$).

Results

As in Experiment 1, recalling an experience action regret resulted in significantly greater self-conscious emotions ($M = 4.84$, $SD = 1.69$) compared to recalling an experience of inaction regret ($M = 3.43$, $SD = 1.81$; $t(115) = 4.34$, $p < .001$, $\eta^2_p = .14$). However, there were no significant differences on arousal between action regret ($M = 4.41$, $SD = .67$) and inaction regret ($M = 4.47$, $SD = .81$; $t(115) = -.37$, $p = .72$). Similarly, there were no significant effects for the other, non-self-conscious emotions (e.g. anger) or the emotion of regret ($M_{\text{action}} = 5.66$, $SD_{\text{action}} = 1.80$ vs. $M_{\text{inaction}} = 5.53$, $SD_{\text{inaction}} = 1.67$, $t(115) = .40$, $p = .69$). Please refer to Tables 3 and 4 in the appendix for details.

An ANOVA demonstrated the predicted interaction of regret type on tea preference ($F(1, 113) = 7.74$, $p = .006$, $\eta^2_p = .06$). Simple main effects revealed that participants preferred the cold

drink more after experiencing action regret ($M = 5.33$, $SD = 1.27$) versus inaction regret ($M = 4.47$, $SD = 1.97$; $p = .03$), whereas participants marginally preferred the warm drink more after inaction regret ($M = 5.49$, $SD = 1.56$) compared to action regret ($M = 4.79$, $SD = 1.56$; $p = .08$). See Fig. 1 for a graphical representation of these results.

Finally, moderated mediation analysis (Hayes, 2013, Model 14) with a bootstrapping procedure (5000 resamples) revealed the same mediation pattern as described in experiment 1. Specifically, the relationship between regret condition (1 = Action Regret, 2 = Inaction Regret) and preference for tea was significantly mediated through self-conscious emotions for cold tea ($\beta = -.41$, (95% CI: $[-.963, -.061]$), but not for hot tea, ($\beta = -.16$, (95% CI: $[-.460, .086]$). That is, after recalling an instance of action regret, people reported more self-conscious emotions and subsequently preferred the cold tea, but not the hot tea. Further, neither level of arousal, regret, or any of the non-self-conscious emotions (See Table 5 in the appendix) mediated the aforementioned relationship. The one exception was disgust; however, this effect disappeared when controlling for self-conscious emotions ($\beta = -.04$, (95% CI: $[-.251, .087]$).

Experiment 2

Discussion

The results of experiment 2 further support H1. As in experiment 1, participants who recalled an experience of action regret felt more self-conscious emotions and subsequently preferred cold items to hot items. In addition, experiment 2 ruled out the potential effect of arousal and overall regret. Participants did not feel more regret or greater arousal from recalling an experience that lead to action versus inaction regret.

However, the results of the first two experiments have not yet established the mechanism by which self-conscious feelings due to experiencing action regret affect preferences for cold drinks. We suggest that preference for colder drinks may be due to people feeling literally warmer as a result of feeling these self-conscious emotions. Specifically, we argue that experiencing

self-conscious emotions after action regret leads to greater perceptions of warmth, which in turn predicts the consumption of cold vs. warm drinks. Thus, experiment 3 was designed to test the mechanisms.

Experiment 3

Procedure

One hundred forty participants were recruited via Amazon Mechanical Turk. We eliminated 19 responses due to failed attention checks and incomplete responses, leaving a total of 121. As in experiment 2, participants were asked to either recall an instance of action regret or inaction regret. In order to better control for differences in time, we asked participants to recall an instance of regret in the past 2 weeks. Following the regret manipulation, participants were asked the extent to which they felt various emotions, regret, and level of arousal (10 questions, $\alpha = .75$) using the same scales as experiment 3. Different from experiment 2, the regret measure was changed to a more robust, 4-item regret scale (Lee & Cotte, 2009; $\alpha = .80$). Next, participants were asked whether recalling their experience made them feel more flush and warm (e.g. Writing about the experience made me feel ‘flush in the face,’ and Writing about the experience made me warmer, 1 = Strongly Disagree, 7 = Strongly Agree, 3 questions, $\alpha = .83$) and were aggregated into a single ‘flushness’ construct. Finally, participants completed the same tea desirability measure as in experiment 2 ($\alpha = .98$).

Results

Consistent with experiments 1 and 2, recalling and the experience of action regret resulted in feeling significantly more self-conscious emotions ($M = 4.89$, $SD = 1.31$) compared to inaction regret ($M = 4.12$, $SD = 1.71$) $t(119) = 2.79$, $p = .006$, $\eta^2_p = .06$). Further, we found no effect on the multi-item score of regret ($M_{action} = 4.61$, $SD = 1.01$ versus $M_{inaction} = 4.37$, $SD = 1.16$; $t(119) = 1.23$, $p = .22$) or arousal ($t(119) = -1.70$, $p = .09$, $M_{action} = 4.13$, $SD = .44$ vs. $M_{inaction} = 4.28$, $SD = .47$). While a few main effects related to the other, non-self-conscious emotions

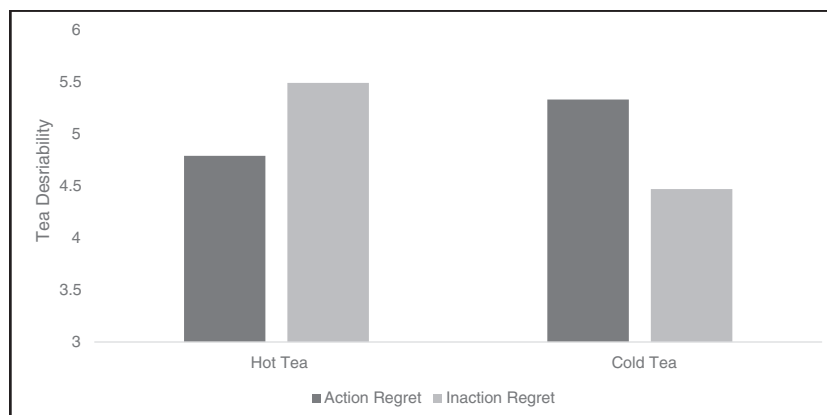


Fig. 1. Graphical representation of Experiment 2 results.

were obtained, these effects disappeared when we controlled for self-conscious emotions. Regressing all of the emotion measures on the measure of flushness revealed that only the self-conscious emotions (shame, guilt, embarrassment, remorse) significantly predicted flushness ($\beta = .32$, $p = .001$, all other p 's $> .15$). As one might expect, anger was also correlated with flushness, $r = .22$, $p = .02$. However, it was also highly correlated with self-conscious emotions $r = .43$, $p < .001$. When both anger and self-conscious emotions were regressed, only the self-conscious emotions significantly predicted flushness ($\beta = .29$, $p = .003$), while anger did not ($\beta = .09$, $p = .34$). Importantly, the emotion of regret did not predict flushness, ($\beta = .093$, $p = .31$) nor did level of arousal ($\beta = .091$, $p = .32$), providing further evidence that the feelings of warmth were a function of self-conscious emotions and not other emotional states. Please see Tables 6 and 7 in the appendix for details.

A path analysis was computed on our full model. The model showed strong fit ($\chi^2 = 10.94$, CFI = .97, RMSEA = .028, TLI = .96). As a point of comparison, substituting self-conscious emotions with arousal ($\chi^2 = 16.92$, CFI = .71, RMSEA = .076, TLI = .57), anger ($\chi^2 = 16.05$, CFI = .82, RMSEA = .071, TLI = .72) or regret ($\chi^2 = 14.78$, CFI = .77, RMSEA = .063, TLI = .65), all showed significantly worse fit. Lastly, there was a significant flushness by tea-condition interaction on desirability, $\beta = .20$, $p = .018$. Examining the interaction reveals an effect of flushness for cold tea ($t(119) = 4.08$, $p < .001$), but no effect for hot tea ($t(119) = 1.21$, $p = .22$). To provide additional support for our model, we also computed a moderated mediation analysis (Hayes, 2013, Model 14) with 5000 bootstraps assessing the link between self-conscious emotions to preference for cold versus hot tea. Consistent with our theorizing, the effect of self-conscious emotions on drink preference was mediated by feelings of flushness for cold drinks ($\beta = .187$, SE = .07, [95% CI: .08, .35]), but not for hot drinks ($\beta = .05$, SE = .04, [95% CI: -.02, .15]). Please see Fig. 2 for the theoretical model along with the path analysis.

Experiment 3

Discussion

The results of experiment 3 provide additional evidence for the relationship between feeling self-conscious emotions due to experiencing action regret and consumption preferences. Specifically, individuals who experience action regret experience greater self-conscious emotions which in turn lead to greater feelings of warmth (flushness) and subsequently desire for colder drinks. This is an important finding as it shows the process mechanism that underlies the regret-consumption regulatory link.

In the next experiment, we test hypothesis 2 by investigating whether the effects of experiencing regret can be mitigated via imagined experience. Previous research suggests that imagining warmth or coldness (i.e., thinking about holding a cup of hot/iced coffee) can result in embodied responses when an event was imagined from an egocentric (first-person) perspective (Macrae et al., 2013). In line with this notion, we suggest that the effects of experienced regret may not be limited to situations where a

physical product is available. We believe merely imagining a consumption experience can mitigate the effects of experienced regret. Specifically, we investigate whether marketing promotions (advertisements) that feature attributes related to temperature can be a source for mitigating action regret. This notion builds on the emerging fields of sensory marketing (Elder & Krishna, 2012; Krishna, 2012) and embodied cognition (Barsalou, 1999; Wilson-Mendenhall et al., 2011), which suggests that consumption-based objects or materials can be an effective regulator of consumption-related emotions (i.e., regret).

Experiment 4

Procedures

One hundred thirty-seven participants completed an online experiment via Amazon Mechanical Turk. Eighteen participants were eliminated due to incomplete responses or failing the attention check, leaving a final tally of 119 participants (63.9% male, mean age = 29.76). Participants were assigned to a 2 (Regret: action/inaction) \times 2 (Advertisement temperature: winter/summer) between subjects design. Regret was manipulated using a stock-choice manipulation. A pretest ($n = 52$) confirmed that individuals felt considerably more self-conscious emotions after a situation of action regret ($M = 3.28$, $SD = 1.90$) compared to inaction regret ($M = 1.79$, $SD = 1.06$). $t(50) = 3.61$, $p = .001$.

Each participant was provided with information about a fictitious pharmaceutical stock (Verap Pharmaceuticals, current stock price \$2.50). Participants had the option to invest or not invest in the stock. To induce action regret, participants who invested in the stock were later informed that the stock price dropped by to \$1.25 (a 50% loss on their investment). To induce inaction regret, participants who did not invest in the stock were later informed that the stock price rose to \$3.75 (a 50% gain on their investment). 53.8% of participants ($n = 64$) chose to invest and experienced action regret, while 46.2% ($n = 55$) chose not to invest and experienced inaction regret.

Following the regret manipulation, participants were instructed to review an advertisement for a Royal Caribbean cruise vacation. The advertisements were manipulated such that half of the participants viewed an ad promoting an Alaskan adventure, while the other half viewed an ad that was promoting a Caribbean adventure. Participants were then instructed to imagine themselves on the cruise, and then asked questions about what it would be like to be on this particular vacation. After imagining themselves on the cruise, participants were asked to estimate the temperature (in Fahrenheit) of the vacation's location. Immediately following these questions, participants were instructed to complete a four-item seven-point Likert regret scale (regret due to foregone alternatives; Lee & Cotte, 2009) regarding the stock choice (Verap) that they have made earlier. The scale was anchored with strongly disagree and strongly agree. Sample items include, "I regret the choice I made" and "I should have chosen differently than the one I decided" ($\alpha = .92$). In addition to these questions, we collected demographic variables along with their happiness; however, these variables did not influence the overall results and

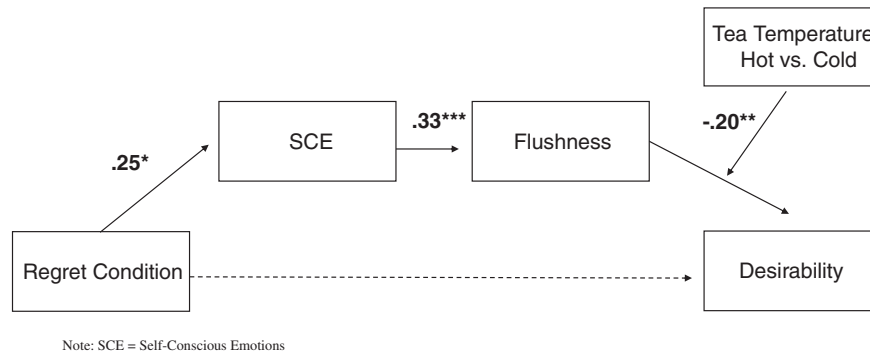


Fig. 2. Theoretical framework and path analysis (Experiment 3).

thus are omitted from final analysis. The advertisements are included as Appendix A.

Results

Analysis of the temperature estimation measure revealed that participants in the Caribbean advertisement condition estimated the temperature to be higher than people in the Alaska advertisement condition ($M_{\text{Caribbean}} = 67.38^\circ\text{F}$ versus $M_{\text{Alaska}} = 30.18^\circ\text{F}$, $t(115) = 7.90$, $p < .001$). This result served as a manipulation check. Supporting hypotheses 3, ANOVA analysis revealed the predicted interaction ($F(1, 116) = 9.92$, $p < .01$, $\eta_p^2 = .08$). Simple effects revealed that participants experiencing action regret experienced less regret after observing the Alaskan cruise advertisement than the Caribbean cruise advertisement ($M_{\text{Alaska}} = 4.53$; $M_{\text{Caribbean}} = 5.21$; $F(1116) = 3.64$, $p = .06$). Interestingly, simple effects revealed that participants experiencing inaction regret experienced less regret after observing the Caribbean cruise advertisement compared to those who observed the Alaskan cruise advertisement ($M_{\text{Caribbean}} = 3.49$ vs. $M_{\text{Alaska}} = 4.46$; $F(1116) = 6.30$, $p < .05$). Finally, consistent with prior studies on the temporal pattern of regret (Gilovich & Medvec, 1995), a main effect of type of regret obtained, such that people regretted action regret more than inaction regret (at least in the short term; $F(1116) = 11.70$, $p < .01$, $\eta_p^2 = .08$). Fig. 3 provides a graphical representation of these results.

Experiment 4

Discussion

The results of experiment 4 support hypotheses H2. Following the action regret manipulation, participants who viewed an advertisement that promoted a cold-climate destination reported feeling less regret than those who viewed an advertisement that promoted a warm-climate destination. As noted, the main effect of regret in this study is consistent with prior research in which situations of action regret tend to elicit greater regret in the short-term but not in the long-term (Gilovich & Medvec, 1995; Kahneman & Tversky, 1982). Counterfactual thoughts are easier to generate following an action, but also prompt greater dissonance reducing strategies (see Gilovich & Medvec, 1995 for a review). Whereas

Experiment 1, 2, and 3 employed a recall task which measured the regret of events that happened in the past, this study differed in that it measured regret almost immediately after a decision was made.

Interestingly, those participants who experienced inaction regret and subsequently viewed an advertisement that promoted a warm-climate destination reported less regret than those participants who viewed an advertisement that promoted a cold-climate destination. Part of this reason may be that a warm cruise is simply more relaxing and thus more calming than a cold cruise. This is consistent with previous research that suggests that imagining an experience can be similar to an actual experience (Dahl et al., 2001). Overall, we find that imagining a consumptive experience leads to self-regulatory behavior, rather than the effects reported by Macrae et al. (2013). Thus, we believe that this is the first time that imagining a particular consumptive experience via advertising has been shown to alleviate an experience of an emotion.

General discussion

In summary, we suggest that experiencing regret induces a change in psychological temperature, motivating individuals to ameliorate that change via interaction with consumptive objects that are perceived to be physically or psychologically opposite in temperature. We find that action regret induces self-conscious emotions which in turn create warmth (flushness) that leads to desire for colder drinks. Furthermore, we find that promotional materials, such as advertisements that represent warm or cold climates or beverages that can be served either hot or cold, can serve as a source for temperature mitigation and regret reduction. Further, we contribute to our understanding of the mechanisms underlying embodied cognition effects. Although other research has examined the role of construct accessibility (e.g., Lee & Schwarz, 2012), we demonstrate that some embodied effects are the result of regulatory behaviors that are attempts to achieve physiological balance. One might wonder why our results lead to compensatory and not an assimilation effect. Recent research (Zhang & Risen, 2014; Zhang, Risen, & Hosey, 2014) has demonstrated that embodied effects can result in goal activation. Specifically, when an unpleasant state is activated, individuals are motivated to engage in behaviors that undo that physical or

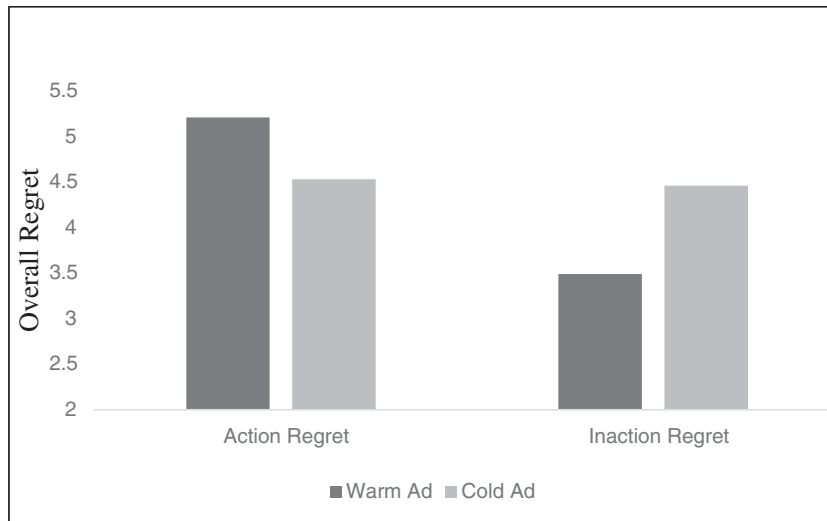


Fig. 3. Graphical representation of Experiment 4 results.

psychological state. Similarly, we argue that just as an individual will seek to regulate their temperature by desiring to cool off when they are too warm (e.g., homeostasis, see Benzinger, 1969), individuals will desire products that are opposite in perceived temperature to psychologically “cool off” after the unpleasant experience of regret.

Given that emotional responses to experiencing action regret are negative (Gilovich & Medvec, 1995), we posit that the motivation to regulate is due to a desire to alleviate a negative emotional state. Research has shown that people are motivated to seek remedies to reduce the negative emotions that they are feeling (Cooper, Frone, Russell, & Mudar, 1995). Thus, it is reasonable to believe that regulatory behavior observed here is a response to people’s desire to reduce their regretful emotion. If one was to experience a positive emotion (e.g., joy), it is unlikely that they will employ such strategies to regulate their positive state. These behaviors also coincide with research on compensatory consumption. Indeed, prior research has demonstrated that individuals attempt to use products to “fill their emotional gap”. For example, individuals made to feel powerless seek products that help them maintain or enhance their status (Rucker & Galinsky, 2008). We contribute to this domain of literature by demonstrating that such regulatory compensatory effects can be embodied in nature. To our knowledge, no research to date has examined how regret might affect physical perceptions of temperature or how the physiological response to the cognitive emotion of regret might affect subsequent consumptive behavior, and whether marketing efforts (i.e., advertisements) might mitigate the effects of regret.

More importantly, we reveal that action regret can be mitigated through getting people to imagine a cool temperature setting via advertisements. This parallels the findings of Strack, Martin, and Stepper (1988) who showed that a cartoon comic was perceived funnier when the viewer’s face was able to respond with a smile vs. when the viewer was unable to smile due to interference (i.e., holding a pen in the mouth). Further, interrelated research demonstrates that Botox injections (hindering muscle movement

of the face) were associated with reduced affective experiences and impaired processing of emotional words (Davis, Senghas, Brandt, & Ochsner, 2010; Havas, Glenberg, Gutowski, Lucarelli, & Davidson, 2010). Taken together, given that emotional responses are associated with certain physical experiences, impairing the bodily experience would subsequently impair individual’s ability to realize their felt emotion. Hence, when we asked individuals to imagine experiencing a vacation in a location known to be opposite in physical temperature to what they were feeling emotionally, we believe it impaired their emotional response to experience regret.

Finally, although this paper presents novel evidence linking emotions to an embodied physiological process and the first evidence demonstrating an embodied element of regret, it does lead us to an interesting inquiry: if feelings of regret guide us toward more positive behavior in the future, why would ameliorating the effects of regret via embodied methods be adaptive? The resolution to this inquiry might be that we as humans need to “wipe the slate clean” of our regret, through whatever means available—once encoded into the memory of a regretted experience, there is no more need for a moment-to-moment reminder of one’s negative behavior. In this sense, embodied responses such as those described here are just one of any number of mechanisms for achieving this. Moreover, individuals who are unable to move on from regret may exhibit a number of mental health issues. For example, past research has demonstrated a connection between regret and both anxiety and depression (Roesse et al., 2009). In this instance, we suggest that using temperature may provide an important regulatory mechanism for assisting with these types of health concerns and improving people’s overall well-being.

Understanding why consumers feel regret is critical to marketers as it is part of their objective to minimize the negative emotion experienced by their customers. Here, we provide a simple solution for businesses to help ameliorate the effects of consumer regret. If people are experiencing action regret, a customer service attendant can offer a cold drink to subtly mitigate their negative emotion. Finally, companies trying to sell ‘risky’ products (e.g. one that may elicit action

regret) would likely benefit from keeping the store a little cooler or offering colder drinks as samples. Exploring the link between risk and temperature may be a fruitful investigation in the future, especially in retail settings.

Limitations and future directions

With respect to limitations, it is important to acknowledge that the temperature measurements employed in the current research are *perceived*, rather than objectively measured. Given that we did not provide thermometers to our participants, it is difficult to assume that their bodily temperature was affected by our manipulation of regret. Thus, future research should incorporate people's actual bodily temperature to see whether there is a true connection between regret and bodily temperature. Additionally, in experiment 4, we acknowledge that it is possible that the thought of an Alaskan adventure may be unpleasant (compared to the thought of a Caribbean adventure) and that the intensity of the emotion provoked may differ as a result. Moreover, it may be more appropriate to test this theory in retail settings to see how retailer can use advertisements to reduce the level of regret that individuals may experience from a purchase.

We believe that the embodied phenomenon discovered in this research is not just limited to regret. Future research may benefit from investigating regulatory mechanisms in other negatively-laden emotions (i.e., anger, sadness, shame, fear, depression). Given that our research shows that products or ads can mitigate people's level of regret, it may be a worthwhile endeavor to investigate whether physiological remedies (e.g., hot/cold drink) can also mitigate psychological discrepancies that arise from other negative emotions. Hence, researchers are encouraged to further explore this connection to assist marketers in alleviating the negative emotions experienced by consumers.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.jcps.2016.08.008>.

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