Loss aversion in hotel choice: psychophysiological evidence

Abstract

The authors investigate the psychophysiological correlates of loss aversion in hotel choice. They note that consumers are frequently reluctant to shift their choice to a subsequent option from their first encountered hotel. The concept of loss aversion can explain this ordering effect. However, there is a knowledge gap about the detail of how loss aversion leads to such inertia. The present study provides a more direct measurement of this decision process by examining electrodermal activities and reaction times when consumers are making hotel choices. In terms of consumer behaviors, there is evidence of reluctance to switch to higher quality hotels, though not to lower rated properties. When consumers' electrodermal activity is measured as an indicator of physiology, the emotional engagement of switching is evident. Reaction time data are used to draw inferences. It is noted that swift decisions to "trade up" are associated with emotional arousal involving greater vigilance and attention. It is this, rather than cognitive conflict that characterizes difficult tradeoffs between hotels.

KEYWORDS: Loss aversion; hotel choice; psychophysiological correlates; electrodermal activity; skin conductance response; reaction time

It takes sweat and determination to bring your dreams into reality.

—Rohit Kokane

INTRODUCTION

When booking the hotel component of an upcoming trip, travelers frequently use search engines such as Trivago, Agoda and HotelsCombined. These sites commonly use their own recommendations to order the listings of search results, except when the traveler opts proactively for an alternative sorting based on attributes such as price and/or rating. Hotels evidently benefit from featuring earlier on the list, since most travelers will want to reach a decision before going through too many hotel options. It is notable that the literature attaches default status to the hotel that is first encountered on the list (e.g., Fisher & Rangel 2014; Reutskaja et al., 2011) and is therefore has the disproportionate favor of travelers (e.g., Román & Martín, 2016).

It is a common premise in choice theory that travelers make their choices independently of how the alternatives are presented. However, there is strong evidence that when consumers are presented with the same set of alternatives, their ultimate choices depend on the so-called "framing effect" - how they are framed, whether positively or negatively (Kahneman & Tversky, 1979). The commonplace opting for the default choice violates this seemingly reasonable assumption. It has been suggested that the presence of a default provides a reference point against which subsequent hotels are evaluated. Since travelers have imperfect information about hotel attributes, most will have little idea about their relative strengths and weaknesses. Price is a good example of this phenomenon, since it is affected by seasonal fluctuations as well as by destination related factors. Travelers commonly evaluate options against a default which

provides a benchmark. When decision makers are evaluating alternatives, the reference point may predispose them towards the status quo. The prospect of losing may be a bigger concern than the prospect or thrill of an equivalent gain. This asymmetrical perception of value has been described as loss aversion (Kahneman & Tversky, 1979) and has frequently been proposed to explain the framing effect.

Though loss aversion has been examined in many different contexts, the underlying processes have been poorly understood (Ariely, Huber, & Wertenbroch, 2005). Such limited understanding also applies to loss aversion in hotel choices. To date no researchers have examined the psychological mechanism leading to consumer inertia - staying with the first encountered hotel. Understanding has been limited by the overdependence of hospitality and tourism researchers on investigations based on self-reported data (Li et al., 2015). Previous researchers have proposed a mediating role for emotional arousal in loss aversion (Sokol-Hessner et al., 2009). In advancing the research agenda, the current study deploys physiological measures to acquire insights into the decision-making process. Specifically, the researchers monitor participants' electrodermal activity (EDA) and reaction times when choosing between two hotels exhibiting different attributes and prices. The study contributes to the hospitality and tourism literature by identifying the physiological correlates of the choice process. This both enables direct testing of the emotional arousal account of loss aversion, and offers the prospect of testing alternative explanations for loss aversion.

THEORETICAL FRAMEWORK

Loss aversion

When decision makers select from a set of available options across different dimensions or attributes, standard choice theory requires that the marginal rate of substitution among different attributes will be exclusively determined by the decision maker's taste for these attributes and the levels of the attributes, irrespective of how the decision is presented (Tversky & Kahnamen, 1991). The behaviors of loss-averse decision makers often violate this seemingly reasonable assumption. Consumers are evidently reluctant to lose and researchers have frequently observed that losses loom larger than equivalent gains (Kahneman & Tversky, 1979). The invariant rate of substitution requires that when offered the same set of options, the one that is chosen ultimately will not be influenced by the order of presentation. The evaluation of two options A and B on two attributes x and y provides an illustration. While A is high on x but low on y, the opposite is the case for B. When we ask someone who is presented with A and then B, he/she will evaluate the attributes of B based on how they compare with A's equivalents. He/she will likely find the gains on y insufficient as a compensation for losses on x. Loss aversion also implies that the same person would have found the gain on x to be less than sufficient as a substitute for the loss on y, if he/she had been presented first with B and then with A. Interestingly, a preference for A over B is implied in the former situation from a reluctance to switch, while the latter implies the opposite. This seems contradictory. The term *reference dependence* describes the phenomenon that decision maker preferences depend on the initial point of evaluation (whether A or B is presented first; also known as the *reference point*).

Many empirical studies have shown that the first option encountered by decision makers often becomes the default (e.g., Fisher & Rangel 2014; Reutskaja et al., 2011), thereby forming a reference point against which all subsequently encountered options are evaluated (Kahneman & Tversky, 1979). Since losses loom larger than gains, the marginal rates of substitution among

different options are not identical, and depend on the default status (Hanemann, 1991; Shogren et al., 1994). It always requires larger gains in some attributes from the alternative options to substitute for the unwelcome losses from the advantageous attributes enjoyed by the default. As a result, we can see that the default is favored over the alternative, given two otherwise equally attractive options. In another study measuring eye-tracking, the first encountered option received more attention and was thus more likely to be chosen (Meißner, Musalem, & Huber, 2016). Intuitively, one might expect that the mere feeling of ownership might prompt consumers to attach greater value to the first encountered option. They might be reluctant to give it up and require more compensation for their sacrifices.

Travelers who are choosing between hotel options disproportionately choose the "default" property which is listed first on the website. Drawing upon the foregoing discussion, the following behavioral hypotheses are proposed which draw upon the standard choice model and predict that choices should be unaffected by their order of presentation, namely:

$H1_0$: The presentation order of the hotels has no influence on the choice probabilities.

The order of presentation will be influential when participants are loss averse and evaluate their choices against a reference point. The earlier presented option has a notably higher choice probability and hence an advantage, as a reference point to evaluate options presented later. Thus we hypothesize that:

$H1_a$: The presentation order of the hotels affects the choice probabilities. In particular, the first presented option will be selected more frequently.

Explaining the psychological process underlying loss-averse choices

While loss aversion provides a theoretical explanation for this ordering effect, previous scholars who identified the influence of loss aversion on decision making have generally been agnostic about the surrounding process. Investigations into the psychological process underlying loss aversion is still ongoing (e.g., Lui & Hsu, 2018). Willemsen, Böckenholt and Johnson (2011) argued that the process should be better understood since "Even identical choice outcomes could be the result of different processes and underlying mechanisms. This observation may apply especially to loss aversion. Because it is so robust, it is likely to have multiple causes. Thus, additional information about the underlying choice process is needed to identify constraints and provide facts that may help modify current accounts and lead to more detailed theories of loss aversion" (p.303).

Researchers have been increasingly interested in the process of loss aversion. One established psychological explanation is emotional processing of the information which suggests the possibility of potential losses. According to Bastiaansen et al. "Emotions are biologically based responses to situations that are seen as personally relevant and constitute the main driving force of human behavior" (2019, p.654). Scholars from a variety of disciplines have recognized the role of emotions in decision making including in economics (Loewenstein et al., 2001), psychology (Schwarz, 2000) and neuroscience (Bechara, Damasio, & Damasio, 2003).

Psychologists have a long history of studying emotions. One popular approach is to characterize different types of emotional engagements parsimoniously on two dimensions—valence (pleasure vs. displeasure) and arousal (low vs. high; Russell 1980). For instance, excitement is characterized by pleasure with high arousal, whereas depression is displeasure with low arousal. Tourism researchers have adopted this approach to examine traveler evaluations of destinations (e.g., Walmsley & Young, 1998). Distressing places are characterized as mildly

unpleasant and high in arousal (e.g., Singapore). Other relaxing destinations considered are characterized as pleasant and low in arousal (e.g., Fiji). Different physiological measures pick up different signals of these two dimension of emotional engagement (vanOyen Witvliet & Vrana, 1995). Specifically, EDA is good at distinguishing emotional engagements with different arousal. In the following section, the researchers will discuss the role of emotional arousal in loss aversion.

Several studies have evidenced emotional arousal in the specific context of loss aversion. Bibby and Ferguson (2011) found that alexithymia (a subclinical inability to identify and describe emotions), is associated with attenuated loss aversion. This finding suggests that an ability to process emotional information is a psychological prerequisite in the process of loss aversion. In another study, participants were shown pictures of sexual stimuli or neutral contents before making risky decisions. They were identified as less loss averse after seeing the sexual stimuli than was the case with the neutral pictures (Lui & Hsu, 2018). The authors explained that the sexual stimuli distracted the participants and thus interfered with their attention to the loss of information. Interestingly, participants not only exhibited less loss aversion, but also an attenuated emotional response to the losses. This suggests that emotions are important during decision making. When skin conductance response was measured in the case of a gambling task, participants were found to be more aroused by the prospect of losses than gains (Sokol-Hessner et al., 2009). Interestingly, the intentional regulation of emotions may attenuate participants' behavioral loss aversion and their physiological responses. While Bibby and Ferguson (2011) provided correlational evidence of emotion and loss aversion, the latter two directly manipulated emotional processing and provided causal evidence to the emotional account.

The presence of loss aversion extends beyond humankind to include primates (Chen, Lakshminarayanan, & Santos, 2006). This suggests an innate quality and a potential for biological hardwiring. An accumulation of evidence supporting this view has sought to unveil the biological substrates of loss aversion using measures of psychophysiology (Sokol-Hessner et al., 2009) and of neuroimaging (Sokol-Hessner et al., 2013; Tom et al., 2007). These studies identified the engagement of the amygdala in the role of loss aversion. The amygdala is a detector of potential threat and modulates moment-to-moment vigilance (Whalen et al., 2002). It is responsible for defense appraisal and helps prevent engagement in potential danger (Öhman, 2002). It has also been found that the amygdala response results in arousal (Adolphs, 2010), increased vigilance, alertness, and cortical attention (Phelps & LeDoux, 2005). These responses can happen "under the radar" of our consciousness (LeDoux, 1992). In support of this latter proposition, it has been suggested that decision makers should devote greater attention to the causes of emotional arousal, namely information about losses rather than gains (Yechiam & Hochman, 2011). This tendency may have advantaged humanity through the evolutionary process by heightening vigilance to the risk of loss, thereby providing protection. This notion may also be applied to contemporary consumers. When travelers are deciding whether to switch from the default to an alternative, the potential loss represents a potential threat, thereby eliciting a stronger emotional arousal. To summarize:

$H2_a$: The choice of the default option is associated with greater emotional arousal.

Alternatively, if emotion has no role in aversion to loss when choosing a hotel, the emotional arousal should not depend on the acceptance or rejection of the default. This leads us to the following hypothesis:

$H2_0$: Choosing the default option has no effect on the emotional arousal of the decision maker.

Scholars have proposed several potential causes of loss aversion (Willemsen, Böckenholt, & Johnson, 2011). The hypothesis of cognitive conflict provides one compelling explanation. According to this explanation, emotional arousal may arise from the greater cognitive conflict associated with loss aversion, rather than from heightened alertness. It is a well-established principle in the decision making literature that rejecting an option is more difficult than choosing (Shafir, 1993). The difficulty of deciding to reject often exacerbates cognitive conflict and thus leads to negative emotions (Luce, 1998). When choosing a hotel, consumers are likely to attribute a default status to the first encountered option. This may associate switching away to deciding to reject, which likely results in decision difficulty. The decision maker experiences cognitive conflict as a consequence of the greater difficulty of switching from the default. It has been shown that the time taken to decide reflects the level of cognitive conflict encountered (Knutson et al., 2007; Kuhnen & Knutson, 2005; Lui & Hsu, 2018). Generally, the longer the time for decision making, the higher the conflict. We thus hypothesize that:

$H3_a$: Choosing the default option is associated with a prolonged decision time.

Alternatively, if loss aversion does not generate higher cognitive conflict, decision time will have no relationship with the choice or rejection of the default. This brings the researchers to the following proposition:

$H3_0$: Choosing the default option has no effect on decision time.

BEYOND SELF-REPORTING DATA

In the following section, the authors discuss how psychophysiological measures can be used to test the hypotheses. The approach is timely because psychological processes cannot be observed directly: "[c]onsumers' mental processing … is treated as a 'black box' mediating between consumers' exposure to stimuli and their attitude development, and has rarely been explored" (p.1763, Li et al., 2018a). There is now an opportunity to peer inside this "black box" by relying on traces that are observable and manifest through the process. This approach has been described as the *inversion of causal models* (Bach & Friston, 2013) and refers to a method that "aims at estimating unobservable processes from observable ones, such that inference can be drawn on the unobservable variable directly" (p.15). It fills a potential gap because previous hospitality and tourism studies have examined only the "post-exposure effects rather than mental processing during exposure – the internal mechanism that generates these resulting effects" (p.1762, Li et al., 2018a). In the following section, we will discuss the approaches that have been adopted previously by hospitality and tourism researchers. These comprise three broad categoriies: self-reporting, observation and psychophysiological response (Kim & Fesenmaier, 2015).

Self-reporting

Self-report approaches are most prevalent and typically take the form of interviews, surveys and focus groups. These methods are unobtrusive, relatively inexpensive, simple to deploy and are readily adaptable to different situations. Respondents are able to stay anonymous and are relatively free from the observer effect. However, there is no guarantee that respondents report what they really think – they may be tempted to provide socially desirable responses. When measuring the underlying psychological processes, scholars commonly assume that

respondents are conscious of the process and have the capacity to remember and to articulate (Wilhelm & Grossman, 2010). However, some respondent feelings and emotions may be unconscious (Winkielman & Berridge, 2004). Thus the self-reported emotion may simply reflect cognitive appraisal (Russell, 2003), which attributes the elicitation of emotional responses to some specific associates (Frijda, 2013). The appraisal may be affected by the timing and purpose of the self-report, and by the goal of the experience (Urry, 2009). Retrospective recall of emotion is also susceptible to emotional coping, including the repression of negative emotions (Bastiaansen et al., 2019).

Observations

Researchers who adopt this approach make passive observations about respondent facial expressions, gestures and speech. Such observations benefit from being unobtrusive. However, one deficiency is shared with self-reporting, namely that respondents may follow what is socially desirable. Researchers may also be unable to identify subtle responses. Most importantly, any observations are subject to researcher interpretations. The investigation may seek evidence that confirms their expected results, while neglecting those that are disconfirmatory.

Psychophysiological responses

Psychophysiological measures refer to bodily physiological reactions that result from psychological responses to changes in the external environment (Cacioppo, Tassinary, & Berntson, 2007). The measures include EDA, pupil dilation, facial electromyography, pulse rate, blood pressure and brain activity. Since they are automatic and largely uncontrollable, they

provide an objective and unbiased measure of affective responses with minimal interference from cognitive processing (Li et al., 2018a). This allows researchers to track subliminal responses without the conscious awareness of respondents. Since it is possible to detect moment-to-moment measures continuously online, there is no reliance on remembering. Specifically, since emotions can be expressed physiologically, bodily changes in measures such as heart rate, blood pressure and EDA can be useful measures of emotional engagement (Bastiaansen et al., 2019). To date hospitality and tourism researchers have used EDA to measure emotional responses to destination advertisements (Li et al., 2018a; b) and during heritage tours (Kim & Fesenmaier, 2015).

Skin-conductance response (SCR)

In the current study, the researchers opt to measure respondent EDAs during their engagement in choosing a hotel. The task will be introduced in the next subsection. EDA refers to the skin's electrical properties (potential and resistance) as a result of varying sweat secretion. The current flow and its fluctuations are measured by applying a low constant voltage non-invasively between two points of skin contact. EDA is the most commonly used physiological indicator of emotional engagement (Figner & Murphy 2010). Its biological basis is well established. While thermoregulation is the main purpose of sweat glands, it is exclusively innervated by the sympathetic branch of the autonomic nervous system (ANS). Thus EDA consists of all passive and active responses of sweat secretion and proxies the activation of an ANS, which is in turn associated with emotion arousal (Critchley, 2002). In particular, the ANS is activated when a person is aroused by events such as excitement and anticipation. Consistent with other physiological measures, EDA is not susceptible to cognitive appraisal since implicit

arousal can be detected without respondents being consciously aware. It may be considered as an objective measure of emotional states for the reasons mentioned previously (Bastiaansen et al., 2019).

Skin conductance refers to a particular type of EDA. The time series of skin conductance can be decomposed into a slowly varying tonic activity - skin conductance level (SCL) - and a fast varying phasic activity - skin conductance responses (SCRs). The SCL is the slower-acting component of the EDA and responds to external stimuli lasting for at least 30 seconds. The SCR lasts for only a few seconds and shows a sharp increase in EDA during this time. It subsequently declines slowly back to the baseline. The absolute difference between the onset of the SCR and the peak response is referred to as the amplitude. Occurring within a period (typically 1 – 4 seconds) the SCRs are attributed to the stimulus. In the present study, the researchers examine the psychophysiological correlates of loss aversion in hotel choices to test the hypotheses regarding emotional arousal (H2) and cognitive conflict (H3). Specifically, they monitor respondent EDAs when participants are making hotel choices. The EDA data provide information to test the psychological process of a loss aversion effect. Since the hotel choices are presented over intervals of approximately 12 seconds, the focus of current interest is on the SCRs at the time of decision making.

METHODS

Participants

The researchers undertook recruitment through an online recruitment website leading to participation by 109 undergraduate students at a Macau-based university. All participants

provided written informed consent. The researchers originally intended to recruit 100 participants, based on the practice of previous researchers. It is noted that studies by Li et al. (2018a; b), Lui and Hsu (2018), Sokol-Hessner et al. (2009) and by Stadler, Jepson, and Wood (2018) engaged 38, 101, 34, 52 and 56 participants respectively. In the current study eight participants were non-responders in their EDA and hence were excluded from the analysis.

Hotel choice task

In the current experiment participants were asked the question: "Which of these two hotels would you choose?" (see Figure 1). A total of 50 trials were undertaken in Chinese. In each case, the participants were presented with three of the eight attributes (price; service and food quality; national, recognized brand; sports facility; comfortable; entertaining; room quality; and atmosphere; Kim & Park, 2017) and the prices of the two hotels. Before participants proceeded with the hotel choice task they received written instructions and an information sheet outlining the star ratings applicable to each attribute. They were then asked to familiarize themselves with the materials. They were shown the first hotel during the task for a period of five seconds. They were then shown the second hotel after a fixation of around three seconds. During this time, they could respond by pressing "1" on their keyboard for the first hotel or "4" for the second hotel. After confirming their choice and another fixation, the participants were led to the next trial.

--insert Figure 1 here—

Data acquisition

Empatica E4 wristbands were used to measure Participant EDAs (https://www.empatica.com/en-int/research/e4/). These are comfortable and unobtrusive wrist-worn devices with a wireless sensor and have been used in other tourism investigations (e.g., Stadler, Jepson, & Wood, 2018). Eprime 2.0 is used to present and tested the hotel choice task with groups of four or five participants. The task was presented on a 21-inch monitor with participants seated comfortably in a reclining armchair. They wore the wristband on their non-dominant hand while working with their dominant hand. The temperature of the computer laboratory was set at 24 degree Celsius. The SCR data was event-related with time-lock for each trial at the onset of the decision time (see Figure 2 for an example).

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Data preprocessing and analysis

The EDA data represent a time series that is marked by the various choice task events. They were sampled at 4 Hz, and smoothed (16 sample kernel), using Ledalab (www.ledalab.de), a MATLAB script developed by Benedek and Kaernbach (2010). Previous measurements of the SCR to a given stimulus have used the trough-to-peak (TTP) amplitude difference in skin conductance of the largest response. The TTP method defines the SCR amplitude as the

difference between the peak of the SCR and its preceding trough. This approach may underestimate the SCRs because temporally proximal SCRs superpose additively. To ensure that the amplitude of the subsequent SCR is not underestimated, the researchers should consider the declining trail of the preceding SCR.

Instead of deploying the TTP, the current authors opted for a model-based technique called continuous deconvolution analysis (CDA; Benedek & Kaernbach, 2010). This method capitalizes on knowledge about the signal characteristics of the underlying activity of the sudomotor nerve. It assumes a certain intrapersonal stability in the general shape of the SCR and that variations in the shape of the SCR are due to pore opening processes in close temporal proximity to the SCR peak (Edelberg, 1993). Temporal precision is enhanced which is particularly beneficial in the current case when the interstimulus interval is short. The CDA decomposes the tonic and phasic components of the EDA, resulting in the extraction of unsuperposed response components. The approach allows an unbiased estimation of the SCR amplitude. The event-related SCRs are extracted using the scoring rule of the sum of amplitude (Benedek & Kaernbach, 2010). They represent the sum of all SCR amplitudes greater than 0.01 μS within the response window of 1 to 4 seconds. On average, .90 (S.D. = .94) SCRs are detected within the 3-second response window. After averaging across the 50 trials, the within-subject means across participants vary from 0 to 2.02.

RESULTS

Behavioral results

Figure 3 plots the choice probability of the alternative option against the difference in quality ratings between the default and alternative options (i.e., $\text{Rating}_{\text{alternative}} - \text{Rating}_{\text{default}}$). This difference measures the quality difference between the two options. It is negative when the default option is of higher quality than the alternative, and vice versa. The generally upward trend implies that participants prefer quality. There is an increased probability of switching to the alternative from the default as the relative quality of the alternative option rises. Expressed differently, more participants are willing to pay for the higher quality option for a given price increase, than those staying with the lower priced and quality option. The price-quality ratio for the higher priced options was more attractive for participants.

A dip in the upward trend is observed at the point when the difference in total rating between the default and alternative options turns from negative to positive. The default option was of higher quality, and thus priced higher than the alternative when the difference was negative. The alternative represented a higher quality and more expensive hotel when the difference turned from negative to positive. Henceforth, we will use the term *upgrade* decision to refer to the former situations where participants decide whether to switch from a lower quality, lower priced default to a higher quality, higher priced alternative. The term *downgrade* decision will apply in the latter scenario when the decision is a choice between staying with a higher quality and priced default and switching to a lower quality and priced alternative.

The researchers conducted a logit regression as a more formal analysis of the choice pattern of preferring a higher quality hotel and its interaction with the order of presentation. The choice for switching from the default to the alternative (0 = default, 1 = alternative) enters the regression model as the dependent variable. The binary variable of upgrade (0 = no, 1 = yes), the difference in rating between the two options (i.e., $\text{Rating}_{\text{alternative}} - \text{Rating}_{\text{default}}$) and their

interaction enter the model as explanatory variables. Variances are clustered by participants. The constant term is significant (b = .2563, z = 3.64, p < .001). In addition, both upgrade (b = -.3300, z = -2.62, p < .01) and the rating difference (b = .0694, z = 3.82, p < .001) are significant. The interaction is not significant (b = .0204, z = .81, p > .4). On this basis $H1_0$ is rejected. It was found that the order of presentation affects participant choices. Hence $H1_a$ is partially supported. Participants are less willing to switch from the default to the alternative and do so only when the switch results in choosing a higher quality hotel. While the greater value attached to the default option is not unconditional, participants exhibit loss aversion by discounting the advantageous quality difference from the alternative relative to the default option. Interestingly, the discounting applies independently of the magnitude of the quality difference. In the following section, we examine decision times and the SCR when the participants are deciding.

--insert Figure 3 here--

Skin-conductance responses

We conducted a two-way ANOVA (choice: default vs. alternative × change: upgrade vs. downgrade; see Figure 4) testing the effect of loss aversion on SCR (H2) for a better understanding of the underlying process. The effect of choice is highly significant (F = 13.47, p < .001). More SCR (M = .1504) is elicited when switching from the default to the alternative, than when participants persist with the default option (M = .1223). While the effect of upgrading or downgrading has no effect on SCR (F = .18, p > .6), its interaction with the default choice approaches significance (F = 3.04, p < .09). Simple contrasts show that choosing the alternative

only elicits significantly higher SCR in the case of upgrade decisions, ($M_{alternative}$ = .1596, $M_{default}$ = .1162, F = 13.51, p < .001) but not in the case of a downgrade ($M_{alternative}$ = .1423, $M_{default}$ = .1268, F = 2.31, p > .1). The researchers concluded that $H2_0$ is rejected and $H2_a$ is supported. It was found that participants are more emotionally involved when switching from the default to the alternative option. This is especially the case when the switch results in upgrading to a higher quality hotel.

--insert Figure 4 here--

The data is winsorized at the 99% level in order to minimize the impact of outliers. The results remain the same qualitatively. Specifically, the effect of choice is highly significant (F = 13.61, p < .001). While the effect of upgrading or downgrading has no effect on SCR (F = .24, p > .6), its interaction with the default choice approaches significance (F = 3.31, p < .07). Simple contrasts show that choosing the alternative elicits significantly higher SCR for upgrade decisions (F = 11.92, p < .001). This is not the case for downgrading (F = 2.21, p > .1).

Decision times

The researchers conducted a two-way ANOVA to test H3. They evaluated the effect of loss aversion on the time taken to decide (choice: default vs. alternative × change: upgrade vs. downgrade; see Figure 5). The effect of choice was found to be highly significant (F = 15.99, p < .001). Participants spend less time deciding when switching from the default to the alternative

(M = 3,100), than staying with the default option (M = 3,791). While the effect of upgrading or downgrading has no effect on decision time (F = 1.90, p > .1), its interaction with the default choice approaches significance (F = 3.09, p < .08). Simple contrasts show that participants only spend less time in switching to the alternative when making upgrading decisions ($M_{alternative}$ = 2,806, $M_{default}$ = 3,830, F = 18.23, p < .001). This is not the case when downgrading ($M_{alternative}$ = 3,364, $M_{default}$ = 3,763, F = 2.17, p > .1). On the basis of the preceding both $H3_0$ and $H3_a$ are rejected.

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DISCUSSION

The current study has investigated a well-established tendency in hospitality and tourism behavior, namely the effect of loss aversion on hotel choices (Román & Martín, 2016). Specifically, we have studied the relevant psychophysiological correlates to examine the psychological process underlying loss aversion in hotel choices. It would not have been possible to investigate the research question without access to the SCR data.

We first hypothesize that participant choices exhibit loss aversion and are affected by the order in which options are presented. In particular, the first encountered option forms a reference point to evaluate subsequent options. Thus loss aversion predicts that the gains from the switch will be discounted, while the loss from the switch is exaggerated. As a result, the default option enjoys a higher choice probability when controlling for quality differences. However, this hypothesis ($H1_a$) is only partially supported. Specifically, participants are willing to switch from

the default to the alternative only when this is a higher quality hotel. The preference for the default is moderated by whether it is an upgrade or downgrade decision. Deciding to trade up to a higher quality option is less welcoming than staying with the higher quality default option. The greater propensity to stay with the lower-priced default implies that the loss-averse decision maker finds the increased quality too costly, while the same magnitude of quality reduction would not be justified by the cost saving of the same amount had the higher-priced hotel been presented first. This asymmetric response to price difference — whether positive or negative — has been widely studied in the marketing literature on reference pricing (e.g., Kalyanaram & Winer, 1995). A similar asymmetry was found by tourism researchers, when consumers are deciding between different tour packages (Jin et al., 2012). Meanwhile in the context of hotel choices, consumers are less willing to pay for quality improvement than to accept the same change in service level (Román & Martín, 2016). While these previous studies quantified the sizes of the applicable asymmetries, the current purpose has been to study the underlying psychological process.

The researchers next examined the psychophysiological correlates of loss aversion in hotel choices. We hypothesized that measured by SCR, emotional arousal is higher when participants switch from the default option to a higher quality alternative ($H2_a$). This hypothesis was supported. It was found that participants are more emotionally aroused when switching from the default to the alternative. This result is consistent with previous findings of the role of emotional arousal in loss aversion in risky decision making (Bibby & Ferguson, 2011; Lui & Hsu, 2018; Sokol-Hessner et al., 2009). When trading up to a pricier hotel the emotional arousal is also compatible with the neuroscientific findings about the engagement of the amygdala in the role of loss aversion (Sokol-Hessner et al., 2013; Tom et al., 2007). The amygdala response are

often the result of increased vigilance and alertness (Phelps & LeDoux, 2005), and responsible for defense appraisal (Öhman, 2002). When deciding to switch away from the default, the potential loss alerts the decision maker by eliciting stronger emotional arousal.

Interestingly, we found that the pattern of decision times differs from the SCRs. This conclusion does not support the cognitive conflict account of loss aversion. The latter account suggests that switching to the higher quality alternative from the default would elicit choice difficulty, which in turn triggers emotional arousal. Contrary to this prediction, participants spend less time deciding when they are switching from the default to the alternative than when they stay with the default. This leads to the rejection of both $H3_0$ and $H3_a$. It has previously been established in the psychology literature that the decision time reflects the amount of deliberation arising from the difficulty of the choice task (e.g., Pleskac & Busemeyer, 2010) and the level of cognitive conflict that is encountered (Knutson et al., 2007; Kuhnen & Knutson, 2005; Lui & Hsu, 2018). The significantly shorter times suggest that it is indeed easier deciding to upgrade, while deciding to downgrade is tougher and involves longer deliberation. This different decision timings indicate a significantly different threshold for switching away from the default between upgrading and downgrading decisions. With a lower threshold, decision makers considering a downgrade need a lesser advantage for the alternative to be chosen. However, for an equivalent tradeoff, the same loss-averse decision makers require the upgrade alternative to present a clear advantage over the default to be induced to give up on the latter. In the current study we observed a much shorter decision time when participants decided to upgrade rather than abstaining, whereas the decision to downgrade took similar time as one abstaining from it. This asymmetry in switching thresholds mirrors an asymmetry in willingness to pay for upgrading and a willingness to accept downgrading (Jin et al., 2012; Román & Martín, 2016).

Contributions to the literature

The current paper makes several contributions to the hospitality and tourism literature. First, the authors found that loss aversion affects decisions when the decision maker switches to a higher quality alternative away from the default option, but not to a lower quality one. Previous hospitality and tourism studies have focused on loss aversion in hotel choices in price and non-price attributes (e.g., Román & Martín, 2016). The current authors have documented a loss aversion mainly on the price dimension. Specifically, participants were reluctant to switch to a higher-priced alternative when they first saw a cheaper default. For loss-averse participants the loss for paying a higher price loomed large and was not compensated by gaining through higher quality. At the same time, the same participant would have chosen the higher-priced option if it had been presented first as the default, since the loss in quality loomed less and could therefore be compensated by monetary savings and gain. The authors have identified another interesting choice pattern in addition to the clear identification of this asymmetric response to price difference. The reluctance to upgrade does not interact with different quality. As is manifest in the choice probability, the price-quality tradeoff is unaffected by whether it is an upgrade or downgrade. Loss aversion only applies at a fixed discount of about 5 – 10% to the choice probability. This proposed pattern of asymmetry to price difference is new in the hospitality and tourism literature.

Secondly, our findings contribute to the literature by identifying the psychological process underlying loss aversion in hotel choices. Loss aversion is a robust phenomenon and can be better understood by tracking the emotional route. More specifically, the behavioral results suggest consumer reluctance to pay extra to switch to higher-quality alternatives, though not

when they can save money by sacrificing quality. SCR is only greater when the choice involves extra cost. The emotional arousal suggests that the reluctance to pay extra is caused by an increased vigilance and attention on the part of the decision maker when the choice has financial resource implications.

Thirdly, and in addition to supporting the emotional account, the current findings ruled out an alternative explanation. It takes participants less, rather than more time to switch to a higher quality hotel. The cognitive conflict explanation has been ruled out. This shorter reaction time suggests that decision makers require a higher threshold which guarantees that the higher-priced alternative is clearly superior to the default. The previous traveler decision making literature has been agnostic about the underlying process of loss aversion. The SCR, together with the reaction time results, provide a better understanding of the loss aversion mechanism on hotel choices. Specifically, switching to a higher-priced alternative is emotionally aroused and arises from increased vigilance and attention rather than from cognitive conflict.

This paper has addressed calls to use more innovative research methods in hospitality and tourism research (e.g., Li et al., 2015; Rakic and Chambers, 2010). In particular, Bastiaansen et al. (2019) urged researchers to "go beyond the traditional toolbox used for studying the cognitive appraisal of experiences and adopt additional methods that are more suitable for studying the temporal dynamics of emotional responses during an experience" (p. 662). Previous hospitality and tourism research has relied on EDA data, with only a few notable exceptions (e.g., Kim & Fesenmaier, 2015; Li et al., 2018a; b; Stadler, Jepson, & Wood, 2018). The current authors have used EDA data to examine the psychophysiological correlates of loss aversion in hotel choices. The concept is especially important when the psychological process underlying loss aversion is unknown (Willemsen, Böckenholt, & Johnson, 2011). The current study has been the first to use

EDA data adopting a hypothesis-driven approach to test different process explanations for a commonplace traveler decision-making phenomenon.

Implications for practice

Hotels around the world are confronting keen competition in the current environment of health related anxieties, economic and social uncertainty, border closures and volatile demand. In such circumstances, hoteliers need to understand consumer preferences beyond the objective measurement of attributes. With advances in information technology and the widespread use of search engines and online booking platforms, suppliers are competing to present themselves first to consumers. Our previously reported findings about traveler behaviors provide a theory-based explanation for its importance. It has been found that consumers may interpret a common set of attributes differently, depending on their order of appearance. Striving to become a default choice is particularly important for hotels that are not "top-of-the-line". Appearing first may offer some protection for these "underdogs". Empirically, our findings suggest that such default status may give them a boost of choice probability by approximately 5 – 10%. In order to improve their rankings in a search by Google or alternative engines, it is suggested that hotel managers might increase the amount and relevance of information on their company or property website (support.google.com). They may also participate in sponsored search auctions to secure listing as sponsored search results, since these appear prior to the regular search results (Agarwal et al., 2011).

Our psychophysiological insights can inform the process shaping the design of relevant interventions. The SCR findings have provided support for the emotional account of loss

aversion. It is evident that decision makers who are making an upgrade decision are relatively more emotionally aroused. Our results suggest that the reluctance to switch to higher-priced alternatives from the default is caused by an unwillingness to pay extra, which was found to be especially pronounced amongst some consumers. For instance, when measured by a simple scale (Rick et al., 2008) "tightwads", as opposed to "spendthrifts", were found to have a chronic tendency to avoid high-priced products. These consumers are more susceptible to the effect of loss aversion. The literature has suggested alternative ways to alleviate this effect. For instance, price often acts as an important signal for quality in the product category with primarily experience, instead of search, qualities such as hotel (e.g., Rao and Monroe 1989). Hoteliers could try to strengthen this price-quality perception in order to enhance the anticipatory pleasure of consumers about the hotel experience which might help counter the effect of loss aversion (Prelec and Loewenstein 1998). The psychology of opportunity neglect concept can be used as a reference point when consumers are being induced to switch from a higher quality and priced default to lower-priced alternatives (Frederick et al., 2009). The latter authors found that consumers are more likely to choose a lower-priced alternative when the provider highlights opportunity cost along with the price difference (e.g., staying two nights at a five-star hotel vs. staying two nights at a four-star hotel with dinner at a Michelin 3-star restaurant).

Limitations and prospects for future research

In the current study the authors have deployed EDA data to examine relevant psychophysiological correlates. It is acknowledged that the SCR are only an indication of emotional arousal and it has not been possible to pinpoint the precise emotion that is being triggered. Future researchers are encouraged to deploy other psychophysiological measures such

as facial electromyography and neuroimaging to investigate the emotional processing of loss aversion. Another study limitation has been that the deployment of relevant psychophysiological measures typically involve using special equipment. While the Empatica E4 wristbands are highly portable, future studies could be conducted in a controlled laboratory setting, thereby reducing the "noise" (e.g., room temperature) that was associated with the heterogeneity of the testing environment. The current authors downplay this problem in the present case, since most travelers select hotels online and because our participants have prior experience of making hotel bookings online. It is acknowledged that ideally, there should be no or minimal difference between the laboratory and real hotel choice experiences. Future research into related topics should seriously consider applications in a simulated laboratory environment. Lastly, we must admit that the recording of EDA data is both delicate and susceptible to potential distortion and pollution (Stadler, Jepson, & Wood, 2018). It has been suggested that as many as 10% of the participants will not respond in their EDA (Benedek & Kaernbach, 2010; Braithwaite et al., 2013). Fortunately, the current study fits within the acceptable range with a non-response rate of 8 out of 109.

CONCLUDING REMARKS

In this paper the investigators have considered the incidence of loss aversion amongst hotel choices. Behaviorally, they have highlighted traveler reluctance to switch from their first encountered option to an alternative when the switch results in an upgrade to a higher quality hotel. It was found that this was not the case when downgrading to a lower quality property. We also measured EDA to examine the psychophysiological correlates of loss aversion and found more emotional engagement amongst participants when choosing a switch to higher quality

hotels. Such upgrading decisions also take less time. When considered together, these findings: 1) support the emotional account of loss aversion, 2) rule out the cognitive conflict account, and 3) suggest that upgrading decisions are associated with greater vigilance and attention.

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