A Dissertation

Entitled

Exploring Common Antecedents of Three Related Decision Biases

by

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Submitted as partial fulfillment of the requirements for
the *Doctor of Philosophy in Psychology*

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An Abstract of

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"Decision making inertia" is a term loosely used to describe the similar nature of a variety of decision making biases that predominantly favor a decision to maintain one course of action over switching to a new course. Three of these biases, the sunk cost effect, status-quo bias, and inaction inertia are discussed here. Combining earlier work on strength of handedness and the sunk cost effect along with new findings regarding counterfactual thought, this work principally seeks to determine if counterfactual thought may drive the three decision biases of note while also analyzing common relationships between the biases, strength of handedness, and the variables of regret and loss aversion. Over a series of experiments, it was found that handedness differences did exist in the three biases discussed, that amount and type of counterfactuals generated did not predict choice within the status-quo bias, and that the remaining variables potentially thought to drive the biases presented did not link causally to them. This is important as it suggests that decision making inertia, if it does exist, is not tied to one common antecedent.

To my wife, Karey,

The other half of our whole.

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Chapter I

Introduction

Psychological constructs may often be thought of as falling into groups. We observe behaviors which are grouped into categories such as approach or avoidance, cognition or emotion, spontaneous or premeditated. This tendency to group constructs has led to a particular set of decision biases to be grouped and theorized to share a common antecedent. The goal of the present project is to explore three common decision-making biases that I believe to have common antecedents (although traditionally they are not presented as related). By analyzing the findings of studies which have looked at the three phenomena, I plan to construct a series of experiments to identify a potential common link. In order to do this, an individual differences variable, strength of handedness, will be used. If consistent behaviors are observed with attention to this variable, for example a finding that mixed-handers and strong-handers behave similarly in each situation, yet differently compared to each other (e.g., mixed-handers engage in the bias more so than strong-handers or vice versa), it may indicate that common antecedents drive behavior within these biases. It is also possible that by analyzing the differences between mixed- and strong-handers within each scenario, more may be learned about this particular variable and its relationship to decision-making. In sum, this paper will attempt to explore possible antecedents of these three

decision biases, and then evaluate those possible antecedents using evidence collected and analyzed with attention to strength of handedness.

Individual Differences & Strength of Handedness

While the field of decision-making has not traditionally focused on individual differences variables, much can be learned by observing the relationship between these variables and behavior. Recently the field has begun to identify variables and assign decision makers into different classifications based on them. For example, research in consumer spending has led to some individuals being labeled "spendthrifts", while others get the label of "tightwad" (Cryder, Rick, & Loewenstein, 2008). Decision makers may also be said to be making a decision "in the heat of the moment" (Ariely & Loewenstein, 2006), or in other states that may affect their decision. Individual differences are an area of interest to decision making researchers.

Researchers in cognitive science recently have begun to explore the individual differences variable strength of handedness. This is the degree to which an individual prefers to use one hand or both hands for a variety of tasks. It has been shown to have a strong negative correlation with the size of the corpus callosum (Witelson & Goldsmith, 1991; Clarke & Zaidel, 1994; Denenberg, Kertesz, & Cowell, 1991), such that individuals who prefer to use one hand almost exclusively ("strong-handers") tend to have smaller corpora callosa than individuals who use both hands ("mixed-handers"). Recent research has found strength of handedness to predict differences within a variety of tasks. For example, mixed-handers exhibit better recall of episodic memories (Christman, Dion, & Propper, 2004; Christman, Phaneuf, & Propper, 2005; Christman, Propper, & Brown, 2006;), experience more interference in the Stroop task (Christman, 2001) and hold more accurate perceptions of body image (Christman, Bentle, & Niebauer, 2007). In decision-making, research has

found that mixed-handers show larger attribute- and message-framing effects than strong-handers (Jasper, Woolf, Fournier, & Christman manuscript under review), and that mixed-handers show larger anchoring effects when the anchor is informative or relevant (Jasper & Christman, 2005). Finally, mixed-handers are more prone to update beliefs (e.g., Aselage, Niebauer, & Schutte, 2002; Christman, Garvey, Niebauer, & Reid, 2004).

A theoretical interpretation for these findings exists suggesting that strength of handedness predicts the level of functional interhemispheric interaction within the individual. Individuals with larger corpora callosa (mixed-handers) appear to enjoy greater interhemispheric interaction relative to those with smaller corpora callosa (strong-handers). This interpretation is supported and further explained based on the specific domain in each of the papers cited above. For example, in the work cited regarding episodic memory, research has shown that encoding of episodic memories may occur within the left hemisphere, yet retrieval may utilize resources within the right hemisphere (Cabeza & Nyberg, 2000; Tulving, Kapur, Craik, Moscovitch, & Houle, 1994). Thus individuals with greater access to the right hemisphere exhibit better/higher recall rates relative to those with less access. Similarly, in research regarding belief updating, evidence has been presented suggesting that while the left hemisphere maintains one's current beliefs, the right hemisphere looks for anomalies and attempts to update beliefs (Ramachandran, 1995). Individuals with greater right hemisphere access again would have an advantage over those with limited access in detecting anomalies in existing beliefs (relative to new information) and subsequently updating those beliefs. A third example is found in research that shows mixed-handers are more sensitive to risk information than strong-handers, presumably arising from the facts that (i) mixed-handers have greater interhemispherically-mediated access to right hemisphere processing, and (ii) the right hemisphere appears to be more

sensitive to perceived risk (e.g., Davidson, 2000; Drake, 1985). Specifically, perceived risk appears to predict the likelihood with which mixed-handers will engage in risky activities while perceived benefits predict the same in strong-handers (Christman, Jasper, Sontam, & Cooil, 2007). Given the findings of previous research, it is reasonable to conclude that strength of handedness may be an important individual differences variable to consider within the field of decision-making, and theoretically, an important predictor of interhemispheric interaction within an individual.

Over the past five years, strength of handedness differences have been extended to a variety of decision-making situations. A subset of these, the sunk cost effect, inaction inertia, and status-quo bias are of interest in the current project. It has been theorized that these decision biases are linked and possibly originate from the same underlying antecedents (Anderson, 2003; Gal, 2006). Because of these proposed common links, these situations have been classified informally by Anderson and Gal as "decision making inertia", or the general finding that individuals tend to maintain existing decisions, situations, or environment rather than change them by making a new, inconsistent decision. Over the course of this introduction I will take each of these decision-making situations and explore the research history behind each one, the proposed antecedents for each situation, and recent findings related to strength of handedness. While each bias is interesting to examine by itself, adding the handedness variable allows us not only to view the three biases compared to each other, but also to compare individuals with presumably greater interhemispheric interaction (mixed-handers) to individuals with a lesser degree of such activity (strong-handers). Additionally, I aim to explain observed handedness differences by offering possible antecedents for such differences – a first step toward developing an experimental design to test for causal relationships. It is for these reasons that handedness

will be included within the current work and assessed within each experiment proposed. To clarify, the primary purpose of this work is to explore underlying antecedents for the three biases discussed. Handedness differences are discussed and analyzed as they may provide clues regarding these antecedents.

For the convenience of the reader, Tables 1-3 serve as a summary of the proposed antecedents of each effect. As each area is discussed, similarities and differences relevant to the current project will also be noted. The goal of the subsequent review, again, will be to understand possible common antecedents to the biases discussed, and how these antecedents may be viewed in light of handedness findings.

The Sunk Cost Effect

Background

The *sunk cost effect* is defined as the tendency for an individual to continue a project, or to pursue a plan of action, after an initial investment has been made to that project. In daily life we engage in the sunk cost effect often. For example, individuals aspiring to a position in business (and many other professions) often persevere through years of classes and, once they have graduated, follow the necessary procedures to find a job. It would seem strange to many, for example, to devote several years of one's life to biology and then abruptly decide to switch plans and become the manager of a fast food restaurant. However, rationally, there may be good reasons to switch courses of action after an initial investment has been made. For example, in the aforementioned job scenario, perhaps our job candidate had studied long and hard to become a successful biological researcher, specifically to find a cure for the common cold. If, on graduation day, a press release appears in the local paper proclaiming an excellent cure to be found, the candidate may be faced with an odd dilemma. On one hand, she may decide to continue in her chosen career and perhaps find a marginally

better cure, despite the fact that it is likely most of the jobs in the "common cold cures" industry will be taken and competition will be fierce to work in an area with little value placed on success. On the other hand, managing a fast food restaurant may provide much needed monetary assistance to a college graduate with student loans that need to be paid, and will provide steady work based on the principle that, for the foreseeable future, humanity will be required to eat on a regular basis. In this situation, honoring the sunk cost effect may lead to an irrational decision, in that the gains (both monetarily and emotionally) of working in the career our hapless heroine has chosen for the past several years may not outweigh the relative difficulty and losses expected given the current climate. However, in practical terms, it would be very hard to envision this scenario taking place in real life. Thus the sunk cost effect problem provides a paradox: One path leads to an outcome that may not be optimal, while the other may appear better but will be counterintuitive to pursue.

The sunk cost effect was documented in a landmark study by Arkes and Blumer (1985), detailing various scenarios where the sunk cost effect was manifested, and providing a proposed rationale for its existence. Aspects of the effect, however, had been shown in earlier works dating back to the late 1960s. For example, in a classic study by Inkster and Knox (1968), individuals at a race track were observed to rate the probability of a horse winning higher if they had just bet on the same horse than individuals who were about to bet on the horse. In Knox and Inkster's study, individuals who were about to bet $2.00 on a horse provided a median rating that corresponded to a "fair chance of winning", while individuals who had just bet $2.00 on a horse provided a rating that was significantly higher. This led the researchers to hypothesize that the act of betting $2.00 (in essence, investing in the success of a particular horse) inflated individuals' probability estimates of success. While

the researchers were interested in the inflation effect as a sign of reduction of cognitive dissonance, the inflation may also be seen as characteristic of the sunk cost effect.

Additional work showing characteristics now associated with the sunk cost effect was published by Staw in the late 1970s. Staw (1976) observed that, when the amount of personal responsibility for a project's success was high, individuals allocated more resources to that project than when the personal responsibility was low. In this experiment, Staw instructed business students to allocate funding to one of two divisions in a company. One division was underperforming, while the other was at par for the company. Students were additionally either told that a *former manager* had made poor decisions in the underperforming division (thus giving the student low personal responsibility for the division's performance) or were told that *they* formerly had made poor decisions in that division (giving them high personal responsibility). Students in the high personal responsibility group awarded more funding to the underperforming division than individuals in the low personal responsibility group, thus leading Staw to hypothesize that personal responsibility was an important factor for individuals making such decisions. The work of Staw and others has been labeled "escalation of commitment", a construct that shares many similarities with the sunk cost effect.

In sum, the ability of both the inflation of probability estimates and the increased personal responsibility to moderate the extent to which an individual engages in the sunk cost effect has been noted in subsequent works (Arkes & Blumer, 1985; Arkes & Hutzel, 2000), suggesting that the literature was rife with evidence of sunk cost effect before it was formally identified in the mid 1980s. It should be noted, however, that substantial reason exists to suggest that the sunk cost effect should not be assumed simply to be a part of other constructs (such as cognitive dissonance, or entrapment). There is evidence that the sunk

cost effect is in itself a valid construct to be considered in decision-making and economic study (Arkes & Blumer, 1985). Lastly, while the sunk cost effect may be a distinct construct within decision-making, the reasons why one would engage in it are not exclusive to this effect. Below I will provide various reasons given for engaging in the effect[1] and suggest that these reasons may also drive other effects addressed throughout this project.

Individuals engage in the sunk cost effect, yet their motivations are not conclusively supported by any one rationale. Some, for example, have argued that displays of the sunk cost effect are rooted in a desire not to appear wasteful (e.g., Arkes & Blumer, 1985; Bai, Jang, & Mattila, 2007) The arguments here suggest that the act of starting a project endows that project with resources that would be wasted if the project were to be terminated. Therefore, to preserve those resources (money, time, etc…), the project should be continued. Other arguments for the sunk cost effect have also been provided. In work done by Thames (1996), evidence suggests the sunk cost effect may be elicited through a variety of sources, including errors in mental accounting and the cost of honoring a sunk cost (e.g., how much money or how many resources will be required to sustain the project or plan of action). Thames also suggests that the endowment effect (or the finding that the subjective value of an object increases if the individual owns the object) may interact with mental accounting (such that a project, once started, is endowed with value purely because the individual "owns" it – and this inflated value undermines objective valuation), providing another reason individuals may choose to engage in the sunk cost effect. A third explanation argues that the sunk cost effect results from a need to justify previous decisions (Brockner, 1992; Staw 1991). Essentially, this explanation maintains that decision makers suffer feelings of guilt and resist admitting that they made an unsound decision in the first place, and have

[1] Within the reasons provided, one may infer overlapping rationale. This overlap suggests that the reasons cited and provided by researchers may not be as mutually exclusive as described in earlier work.

wasted money. As time goes on, they become more committed to their original decision as the desire to 'save face' prevents more rational judgment. In an ironic twist, the decision maker feels implicit regret at starting the project, but is unable to stop the project and thus labors forward fruitlessly. The last major explanation (Garland & Newport, 1991; Schaubroeck & Davis, 1994; Whyte, 1986) argues that the causal antecedent for the sunk cost effect is loss aversion. Loss aversion (see Kahneman & Tversky, 1979) argues that individuals essentially work to avoid a loss of most (if not all) costs. It hurts greatly to lose anything of value, and thus decision makers decide that the current project, however unfavorable the outcome may be, has been endowed with value and if terminated, that value would be lost. Thus decision makers tend to move onward with the project, despite its potential eventual failure. As summarized in Table 1, reasons for why individuals honor the sunk cost effect come down to the following four arguments: avoiding wastefulness, endowment / mental accounting, justification / saving face, and avoiding losses.

Handedness Findings

The link between handedness and the sunk cost effect has been explored over the past four years, culminating in a manuscript currently under review. In sum, mixed-handers generally show larger sunk cost effects than strong-handers (Westfall, Jasper, & Christman, manuscript under review). In the radar-blank plane problem (see Appendix C), mixed-handers were more likely to continue production of the plane. In another problem dealing with developing a medicine (and subsequently finding that another company had a superior product), mixed-handers again expressed more desire to continue development than strong-handers. However, when additional strong information is provided indicating that the project will no doubt fail (accomplished by adding additional sentences describing the

likelihood of product failure) the difference between mixed- and strong-handers decreased dramatically.

Mixed-handers will continue a project with a potential bleak outcome until bombarded with information suggesting their project is doomed to fail. In this situation, mixed-handers must choose between a situation (continuing the project) with known odds and a situation (canceling the project) in which the odds are unknown. Unknown odds (in this case the likelihood that the money could be better spent elsewhere other than the project) may be seen to some as less desirable than known odds – even if those known odds predict almost certain failure. Previous research has shown mixed-handers, in addition to displaying a larger sunk cost effect, to be averse to ambiguity[2]. In an earlier project, mixed-handers preferred to choose an option with known odds over one with unknown odds of success (Westfall, Hart, Levin, Christman, & Jasper, 2005). One possibility is that mixed-handers choose the known option until enough information is presented to them to facilitate belief updating. Once this additional information is provided, the structure within the right hemisphere that detects and corrects anomalies is triggered and initiates a belief update within mixed-handers. While mixed-handers have greater access to this structure, they also must battle a known versus unknown scenario. In the end the two processes (one avoiding ambiguity and one avoiding loss of future investment) appear to cancel out the effects of the other, and mixed-handers' choose to terminate the project at about the same rate as strong-handers.

In sum, it appears that mixed-handers strongly believe that the information provided in a traditional sunk cost situation is insufficient to judge the project a failure more so than

[2] Within the field of decision making, avoiding the odds unknown option is referred to as ambiguity averse. Outside the field, this might be referred to as simply uncertainty. However throughout this work the term "ambiguity" will be used to maintain consistency with the field.

strong-handers. Additionally, they prefer a known alternative to an unknown. This leads to mixed-handers showing more aversion to terminating the project.

Status-Quo Bias

Background

It seems intuitive to human behavior to stick with something that works. Indeed, in most real-world situations, there exists the option to do absolutely nothing – in essence, to let something run its existing course, preserving the decision maker's original decision. After all, the saying goes "If it ain't broke, do not fix it," not "continually change to find the most optimal situation"! It has been shown empirically that individuals disproportionately choose to remain with their original decision rather than change their decision toward a new course of action (Samuelson & Zeckhauser, 1988). This finding is known within economics and psychology as the status-quo bias. Samuelson and Zeckhauser provide evidence for such a bias both empirically (using laboratory based decision-making experiments) and historically by utilizing records (for example, health-care coverage plan changes by employees able to choose between a variety of plans each year). Subsequent empirical research reports findings consistent with the status-quo bias. For example, in one study (Hartman, Doane, & Woo, 1991), 6.2% of consumers with highly reliable electric power service selected a similar plan to their current plan, despite the fact that the less reliable plan cost 30% less. Those with the less reliable plan, however, chose their status quo plan the majority of the time (58.3%). In fact, only 5.8% of the consumers in the lower-reliability plan chose to switch to the highly reliable plan. Status-quo bias has also been observed in financial transactions (Hendricks, Patel, & Zeckhauser, 1991), religious preference (Chaves & Montgomery, 1996), decision making strategy (Heller, Levin, & Goransson, 2002), conflict styles (where, not surprisingly, status-quo bias is seen in avoidant conflict styles) (Okuda, 2004) and group member

evaluation (such that those members of the group advocating the status quo are viewed more favorably than those advocating change) (Kray & Robinson, 2001).

Explanations for why a status-quo bias may exist and affect decision makers include an argument already visited, loss aversion. Kahneman, Knetsch, and Thaler (1991) argue that status-quo bias is a consequence of loss aversion, as "the disadvantages of a change loom larger than its advantages." They further argue that this status-quo bias will exist even when retaining the status quo is impossible (e.g., an individual is forced to give up an old option and pick between two or more new options). Evidence for this has been produced by using a hypothetical situation in which an individual forced to leave an internship and choose a permanent job (Kahneman, Knetsch, & Thaler, 1991). In sum, respondents preferred a new job with similar characteristics to the old job instead of an alternative which was more attractive in some regards than the internship. Other research also supports a loss aversion argument, and suggests possible moderating factors such as multiple reference points and framing effects (Hershey, Johnson, Kunreuther, & Meszaros, 1993; Schweitzer, 1995)

While loss aversion is one potential reason for a status-quo bias, another argument has also been proposed. This argument suggests that status-quo bias is only observed in situations where individuals choose not to cause any new action to occur, but rather to allow action to continue unhindered. In other words, individuals will only show a preference for the status quo when they are able to let something simply continue as they always have. Conversely, when individuals are forced to take an action, status-quo bias is not observed. This distinction, known as the difference between omission (passive interaction) and commission (active interaction), is argued to be key to understanding status-quo bias. For example, in a series of studies, Ritov and Baron (1992) demonstrate that participants are more willing to choose a course that allows an act of omission rather than requires an act of

commission. In fact, in situations where omission will result in change (e.g., a stockowner is asked only if he objects to his investment manager's decision to move funds from one company to another; if he does not object, the funds will be moved), individuals favor moving the funds (a change).

This seems contrary to a status-quo bias argument; however it is consistent with the idea that status-quo bias only exists where commission is required. Omission bias, a documented bias in itself (Ritov & Baron, 1990; Baron, Minsk, & Spranca, 1991) is therefore argued by others to be the real source of status-quo bias, not loss aversion. While not central to the theme of this paper, omission bias could be of interest to handedness research, given that mixed- and strong-handers may show different theorized effects; specifically that mixed-handers may show an overall preference for inaction through omission based on previous experiments. Therefore, omission / commission and its relationship to strength of handedness may be revisited in subsequent work and throughout the completion of the present project.

As shown in Table 2, two major theories have been proposed to explain status-quo bias, loss aversion and omission bias. While loss aversion has been implicated numerous times, the omission bias argument primarily centers around a belief that status-quo bias is only observed when new action is taken, not when pre-existing action is maintained.

Handedness Findings

Two experiments have been conducted recently in the University of Toledo Decision Research Lab exploring the relationship between handedness and status-quo bias (Jasper & Westfall, in preparation) In one study, participants were asked to choose between their existing power company or one of many companies that would be formed after a government break up of what was considered a monopoly (see Appendix B, Problem 1).

While normative theory within the field of decision making makes no prediction on this issue, strong-handers overwhelmingly preferred to stick with the same power company, even though the new company provided the same level of service. This was in contrast to mixed-handers who were evenly divided over staying with the same company or choosing the new company. This suggests that strong-handers exhibit a stronger status-quo bias than mixed-handers.

The second experiment involved a hiring decision and asked participants to pick who they felt would be a good replacement for a retiring manager (see Appendix B, Problem 2, which is adapted from Highhouse & Johnson, 1996). Two possible candidates were available, one candidate who matched the original manager on two of three rating criteria (the third criterion was unknown because the data had not been collected for the original manager), and another candidate, who for some was rated higher on one out of the three criteria. Here the status quo candidate was defined as the one consistent with the original manager, i.e., the one *at least* as highly rated, while the non status quo candidate was defined as the one at least as highly rated in the known categories or *better* than the original manager. Overall strong-handers preferred the status quo candidate to the non status quo candidate, while mixed-handers were again divided between candidates. This suggests that mixed-handers may have seen an opportunity available to not just maintain the current level of managerial expertise, but also to potentially increase it by choosing the non status quo candidate, while strong-handers elected to maintain the current state of affairs, by choosing a similar candidate (just as they preferred the same electric company in the previous problem). This may have potential links to counterfactual thinking, as discussed below.

Inaction Inertia

Background

Nobody likes to miss a great opportunity. Tickets at the 50-yard line for $10, clearance sales at a favorite store, alluring one-time offers at car dealerships, and even lucrative graduate school offers to be considered are all opportunities that one would feel unhappy about if missed. Furthermore, missing an opportunity may even, anecdotally, "bum" someone out to the point they do not feel like buying discounted tickets (perhaps grumbling to themselves "Even at $20, it isn't as good as that $10 deal") or buying a desired object at their favorite store ("It was $10 cheaper last week… I cannot justify buying it now for full price!"). "Inaction inertia" occurs when the act of bypassing an initial action (e.g., the $20 discount or the sale price) decreases the chances an individual will choose subsequent similar actions (e.g., pursuing the $10 discount, or buying the item later at full price) (Tykocinski, Pittman, & Tuttle, 1995).

An example of this can be seen in consumer purchasing behavior. It has been shown in research that individuals who miss a product on-sale will not pursue the product later when it returns to full price (Tykocinski & Pittman, 2001). Additionally, individuals who fail to take advantage of a great bargain, value subsequent modest bargains less than individuals who didn't miss the first bargain (Arkes, Kung, & Hutzel, 2002). For example, even though a discount of 20% is objectively better than no discount at all, someone who has passed on a 40% discount weeks earlier may subjectively value the 20% discount lower than an individual who took advantage of the 40% discount earlier or an individual who just happens to stumble upon the 20% discount with no prior knowledge of the 40% discount. In a sense, inaction inertia serves to non-rationally paralyze a decision maker's objectivity when viewing future opportunity, by recalling implicitly previous missed opportunities.

The term "inertia" has been used in the psychological literature for quite awhile, consistently referring to some sort of resistance to change (Pitz, 1969). Early work demonstrated ideas of inertia through constructs such as cognitive dissonance (Grabitz & Grabitz, 1972), childhood experiences of trauma (Levin, 1976), automatic processing (Dulaney, Ellis, & Woodley-Zanthos, 1989), and attention (specifically, that sustained attention produced better memory for an event) (Anderson & Burns, 1993). While inertia is used loosely in the psychological area, the term "inaction inertia" has exclusively been tagged by decision-making researchers and consumer scientists to describe the behaviors outlined in the previous paragraph. For the purposes of the present work, the term "inertia" will be used a bit more loosely to describe the simple persistence of decision, while "inaction inertia" will be used solely to refer to findings within that area of study.

Previous work suggests that individuals may engage in inaction inertia for a variety of reasons. Early theories focused on the possible role that counterfactualized thought may play, showing that if the reason the individual passed on the initial offer was removed (e.g., arriving at the store a day late, general procrastination), subsequent inaction inertia was decreased (Tykocinski & Pittman, 1995). The argument is that when individuals are not given the reason why they missed the first opportunity, counterfactuals cannot be created (e.g., if only I hadn't been there a day late…), which appears to lower the amount of inaction inertia displayed. Additional work adds support to this argument, finding that when information about the initial missed opportunity is ambiguous, hard to find, or just missing in general, inaction inertia decreases (Van Dijk, Van Putten, & Zellenberg, 2007). Other research suggests a second explanation, regret, may also play a key role, with some suggesting that anticipated regret explains why prior inaction causes subsequent action (Butler & Highhouse, 2000), and still others suggest that the simple act of considering regret

(e.g., recalling how unfortunate it was that one passed on the initial opportunity) turns attention away from financial advantage that taking the current bargain will provide (Harvey, Sevdalis, & Yip, 2006). However, others argue that regret does not drive inaction inertia as much as inaction inertia creates regret as a byproduct (Van Putten, & Zellenberg, 2005). Debate as to direction of regret's role also leaves open a possibility that regret and inaction inertia may feed into each other, creating a vicious circle.

A third reason posits that both regret and an act of devaluation contribute to inaction inertia, citing both as moderators of the overall effect, such that both increase inaction inertia in an individual (Arkes, Kung, & Hutzel, 2002). Research conducted by Tykocinski and colleagues (Tykocinski, Israel, & Pittman, 2004) in a fictional stock trading game, for example, found that the act of failing to take the first opportunity (in this case, to sell stock at a high price) causes the individual to devalue the second opportunity (to again sell the stock for a profit) relative to individuals who never encountered the first opportunity (those individuals sold the stock more often than individuals who had encountered the first opportunity). In sum, three arguments for why inaction inertia occurs are proposed: counterfactual thinking, regret, and a combination of regret and devaluation. See Table 3 for a summary.

Handedness Findings

The relationship between handedness and inaction inertia has yet to be investigated. The first experiment conducted below seeks to establish if a relationship exists, and the exact direction of such a relationship. I predict that a relationship will be observed for the following reasons:

1. Inaction inertia is similar in many ways to the sunk cost effect in that a decision maker must choose between an existing situation (the status quo, or continuing the project in a sunk cost effect problem) and an alternate course of action.
2. Counterfactual thought is theorized to drive inaction inertia. Handedness differences have also been observed in counterfactual thinking, which will be discussed in detail below.
3. Similarly, errors in valuation or mental accounting have been cited in arguments regarding both the sunk cost effect and inaction inertia.

If the antecedent responsible for handedness differences in the sunk cost effect is the same, then one would expect to see handedness differences in inaction inertia as well. Specifically, it is predicted that mixed-handers will show a larger inaction inertia effect than strong-handers, consistent with sunk cost effect findings.

To review, across all three of the decision biases discussed (sunk cost, status quo, and inaction inertia), handedness differences have been found or are theorized to exist based on existing research evidence and/or theory. A summary of handedness findings and predictions is provided in Table 4.

Common Themes

In each of the decision-making situations documented above, various explanations have been proposed to drive the effects. While various explanations exist, the common themes of loss aversion, regret, and counterfactual thinking may be present in two and perhaps all three of the explanations.

Loss Aversion

Loss Aversion has been argued to drive findings in both the sunk cost effect and status-quo bias. While no work has drawn an empirical link between loss aversion and inaction inertia, researchers have suggested that some inaction inertia findings are subtle forms of loss aversion (i.e., failing to take the second deal occurs due to a belief that a loss will be incurred in the form of the difference between the price of the first and the second deals) (Van Putten, & Zeelenberg, 2005). It is possible, therefore, that loss aversion is a common antecedent for all three situations. Individuals desire to avoid a loss, so they…

- fail to terminate a project that may become successful later (the sunk cost effect),
- choose to continue a course of action because its advantages outweigh the possible disadvantages of change (status quo),
- are reluctant to take a bargain after missing an initial opportunity because they believe the product (at regular price) is over-priced and purchasing it would incur a loss (inaction inertia).

In addition, loss aversion has been proposed to be related to handedness, such that mixed-handed individuals are believed to be more loss averse than strong-handers (Westfall, Jasper, & Christman, under review). Therefore, one might expect mixed-handers to exhibit the following behaviors: larger sunk cost effects, larger status-quo biases, and an increased likelihood of engaging in inaction inertia. At present, research has confirmed that mixed-handers do show larger sunk cost effects (Christman, Jasper, Sontam, & Cooil, 2007; Westfall, Jasper, & Christman, under review;). However, other handedness studies have shown that mixed-handers display smaller status-quo biases compared to strong-handers (Jasper & Westfall, in preparation). At present it is unknown if differences exist in inaction

inertia. As loss aversion seems to predict displays of the sunk cost effect within handedness (and possibly in inaction inertia), it will be considered here. However other explanations may be shown as more likely predictors of all three biases within strength of handedness.

Regret

Regret is theorized to play a role in inaction inertia, in causing a decision maker to pass on subsequent actions due to regret over missing an initial action. It may also be of importance to other biases discussed above. To avoid feeling regret, individuals may…

- continue a failing project believing it to be "worth it" and thus not regretting starting the project initially (sunk cost effect), and
- stay with a known option rather than choosing an unknown (status quo).

Because regret may play a role in the biases discussed, it would be interesting to measure the anticipated regret levels of participants when responding to decision making problems in these areas. Additionally, regret has been linked to strength of handedness. Recently, in our lab, participants were asked to rate the amount of regret they felt they would experience after purchasing a new computer (a task adapted from Mannetti, Pierro, & Kruglanski, 2007). For some, the computer was the same brand that the person had previously owned, for others it was a different brand. It was found that mixed-handers felt the least regret in situations where they chose a different brand and things had turned out well (i.e., the computer had no problems) while strong-handers felt the least amount of regret in situations where they had stayed with the same brand and it had worked out well. This appears to be consistent with an overall desire by strong-handers to stick with the status quo, while mixed-handers may see the opportunity to switch to a new brand as potentially better than staying with their original.

Furthermore, it demonstrates that regret levels may differ between handedness groups, and while regret certainly plays a role in decision-making, it is unlikely that it plays an equally important role in all three of the decision-making situations described above. It is possible, however, that the amount of regret moderates the size of the effect for both inaction inertia and status-quo bias. Therefore it may be important to measure it, which is another goal of the present investigation.

Counterfactual Thinking

Decision makers often must consider the past in order to form a decision about the present. Recalling what has happened can often aid in predicting what may occur in the future, and while recalling previous facts can be helpful, sometimes ruminating on the possible outcomes that did not occur can be just as beneficial to the decision-making process. These fictional outcomes, the thoughts that begin with "if only…" or in some cases "at least" (e.g., "if only I hadn't hit the last hurdle, I would have won the race" or "at least I finished the race") are known as counterfactuals. According to Roese (1997), "Counterfactuals are mental representations of alternatives to the past". They allow decision makers to take an actual event, mentally alter the outcome, and assess the implications of such an outcome. Often this type of thinking can be helpful when deciding on a course of action, especially if past experience is strongly predictive of future events or behaviors. For example, an individual may decide against oysters for dinner due to the thought "If only I hadn't eaten those oysters last week, I wouldn't have been sick". Likewise, a decision maker may choose to continue an activity based on a counterfactual such as "at least if I take the local, I won't risk falling asleep on the express and miss my stop".

Counterfactual thinking and its implications can easily be applied to the three biases discussed above. For example, counterfactuals may inspire an individual to…

- continue the project: "At least the project will be useful for training, even if it may not turn a profit" (the sunk cost effect), or
- persist in a course of action: "At least ordering my favorite sandwich provides a sense of security that I'll enjoy my lunch" (status quo), or
- change their mind: "If only I had taken the new route, I wouldn't have been stuck in traffic" (status quo), or even
- pass up a deal: "If I'd only bought the tickets last week, I wouldn't have to spend as much now" (inaction inertia).

Because counterfactual thinking can intuitively be linked to these biases, it is worth exploring what counterfactuals individuals may generate while answering problems addressing these biases. In doing so, we may find a common link.

Within the area of handedness, it has been shown recently that mixed-handers produce more upward and downward counterfactuals than strong-handers when asked to generate them in a lab experiment (Jasper, Barry, & Christman, 2008). Neurological implications aside (i.e., increased counterfactual production indicates increased interhemispheric interaction for mixed-handers), it is useful to consider the fact that mixed-handers may indeed simply consider more alternate outcomes and consequences than strong-handers. One can see how sunk cost effect problems may be especially prone to alternate outcomes affecting the decision to continue or terminate. If an individual can generate enough possible "good" outcomes, he / she can justify continuing the project in

spite of the overwhelming predictions of failure. Mixed-hander's abilities to generate more counterfactuals may then explain why they engage in the sunk cost effect more so than strong-handers, and if the previously predicted relationship between the sunk cost effect and inaction inertia is correct, it would also imply that mixed-handers may be more prone than strong-handers to inaction inertia. Considering status-quo bias, a reverse finding is possible, such that particular counterfactual arguments may be more compelling toward the status-quo, and some more compelling against. This will be revisited below.

The Present Work

Based on the common themes above, it is possible that common antecedents for the sunk cost effect, status-quo bias, and inaction inertia include counterfactual thought, loss aversion, and regret. Based on previous handedness findings, it appears that counterfactual thought may be the theme most appropriate to initially explore for the following reasons:

1. The finding that mixed-handers are more likely to generate both upward and downward counterfactuals has been shown empirically in recent published work.

2. Strong arguments have been made that mixed-handers are more loss averse; however it has yet to be shown empirically that mixed-handers' objective versus subjective loss curve is different than that of strong-handers. Work looking to map these curves is currently underway, but has yet to produce results. This suggests that levels of loss aversion between handedness groups may still moderate the effects of these biases.

3. Actual regret (versus predicted), while theorized to be a driving force behind these biases is not often amenable to testing within a lab or controlled environment.

The present work proposes to begin the exploration of common antecedents for the biases discussed by first looking at counterfactual thinking. If counterfactual thinking does not prove successful as a likely antecedent, additional experiments will be designed to look at loss aversion and regret in that order (primarily due to the complexities of measuring actual regret in a lab based study). At the outset, however, counterfactual thinking is proposed to have the largest impact on the biases discussed.

Before counterfactual thinking can be given a causal role, several important questions must first be answered:

1. Are there handedness differences within the area of inaction inertia? At present, it is unknown. It is possible that the sunk cost effect differences noted above generalize to inaction inertia, as the sunk cost effect can be considered a form of inaction inertia (failure to terminate a project effectively paralyzes future decisions to terminate). Therefore, because mixed-handers have shown larger sunk cost effects than strong-handers, it is proposed that mixed-handers will show larger inaction inertia effects than strong-handers as discussed above.
2. Does the type of counterfactual generated predict a decision maker's degree of status-quo bias? This is also not known; however, it is hypothesized that the type of counterfactual generated will predict the degree of status-quo bias, such that upward counterfactual arguments (e.g., "If only I had stopped for that red light, I wouldn't have gotten in the accident") will be perceived as stronger and thus impact behavior more so than downward arguments (e.g., "At least I only wrecked my car"). The distinction between upward and downward arguments and the proposed change in status quo behavior is discussed in more detail in the introduction for Experiment 2.

3. Does counterfactual generation underlie the three biases discussed above, such that increased generation of counterfactuals (or the type of counterfactual, in the case of status-quo bias) predicts stronger sunk cost effects, stronger inaction inertia effects, and the directionality of status-quo bias effects?

In sum a series of experiments were conducted to answer the three questions above. Based on the outcome of these experiments it is believed that support may be provided to the argument that a common antecedent, in this case counterfactual generation and type, drives the sunk cost effect, inaction inertia effects, and status-quo biases (See Figure 1).

Chapter II

Experiment 1

Experiment 1 was designed to explore handedness differences in inaction inertia. Because the sunk cost effect and inaction inertia are similar, both are theorized to be due to counterfactual thought. Errors in valuation and mental accounting errors have also been cited in both biases. To determine if handedness differences exist, two inaction inertia scenarios (adapted from Zeelenberg, Nijstad, van Putten, & van Dijk, 2006) were used. The scenarios provide a situation in which an individual fails to take an action at one time, and is given the chance to take a similar action later. Previous results show that the majority of individuals will engage in inaction inertia and be less likely to take an action once they have passed on a previous action. It is predicted that mixed-handers will engage in inaction inertia more so than strong-handers based on previous research.

Method

Participants

One hundred eighty nine undergraduate students enrolled in Introduction to Psychology at The University of Toledo were selected to participate. Seventy one percent of

participants were female, with an average age for both sexes of 19.2 years (SD = 3.1). Participants received course credit for their time, which lasted 20 minutes on average.

Materials

Participants were presented with two problems (see Appendix A) adapted from Zeelenberg et al. (2006), in the context of a larger decision making study. These materials measured inaction inertia and regret for missing the initial opportunity. Both questions involved a missed opportunity (in the experimental condition) or an opportunity currently available (in the control condition). For example, in the couch problem, participants were told they were interested in buying a couch, and that yesterday it was on sale. When they returned today, the sale (in the experimental condition) was over, yet the price was still reduced (albeit not as reduced as the day before). In the control condition, the sale price was still available. Two dependent variables were measured: the individual's likelihood to take the deal offered, and the individual's estimated regret rating had they missed (or having missed) the deal. For both variables, participants were asked to respond using a scale of 0 – 100 (with 100 being highly likely to take the deal or highest amount of estimated regret, respectively). Data collection was done in the lab using paper and pencil.

Following these decision problems, participants were given the Edinburgh Handedness Inventory (EHI; See Appendix D) to determine their strength of handedness score. The Edinburgh Handedness Inventory was developed in 1971 by R. C. Oldfield. The scale, composed of ten common tasks (e.g., drawing, throwing) asks participants to rate the frequency with which they perform each task with their left or right hand. Participants are asked to indicate their hand preference on the following scale: always left, sometimes left, no preference, sometimes right, or always right. Factor-analysis work comparing the EHI with another handedness inventory (the Crovitz-Zener Questionnaire) and parental handedness

scores indicates that it correlates highly with other measures of handedness and is valid (Bryden, 1977). The EHI has also been shown to be highly reliable when analyzed for direction of handedness (Bryden, 1977). Standard demographic information was also collected. Finally, the participants were granted credit, debriefed as to the aims of the research, thanked for their participation, and dismissed.

It is important to note that the handedness variable throughout this project was converted from a continuous to a dichotomous variable using a median split on absolute EHI scores. This was done for two reasons. First, it provides equal groups by definition. When viewed continuously, strength of handedness shows an extreme negative skew, such that the modal response is 10. By using a median split, the effects this natural skew has on parametric statistics may be slightly alleviated. A second reason is proposed for discussion and theoretical purposes. Throughout the literature, strength of handedness is compared between two groups: strongly handed and mixed handed. If not dichotomized, it may be unclear to the reader how the classification of mixed- or strong-handed was determined. That said, analyses using handedness as a continuous variable were conducted, and reported at the end of the results section for comparison.

Results

Data was analyzed by comparing both problems together and separately. When combined, individuals indicated they would be more likely (M = 7.4) to purchase the sofa or trip when they had not missed the original deal (the control condition). In the condition in which they missed the deal, they were less likely to take the deal (M = 5.5). A t-test for independent groups found this difference to be significant ($t(187) = 4.99$, $p < .001$, Cohen's $d = .61$). Interestingly, regret ratings did not vary. Individuals who missed the deal reported

similar regret scores (M = 7.6) as individuals who got the deal anticipated they would feel (M = 7.0).

When analyzed by problem, similar results were found. In the Couch problem, individuals again reported higher likelihood ratings to purchase the item when they received the deal than when they missed it, ($t(95) = 2.89$, $p = .005$, d = .76). In the Daytona Beach problem, individuals also reported the same pattern of findings ($t(90) = 4.22$, $p < .001$, d= .88). Regret ratings were not significantly different for either problem. For a full report of descriptive statistics, see Table 5.

Initially two problems were used to avoid any possible scenario-based effect. However, when analyzed by problem (couch or Daytona Beach), t-tests for independent groups revealed the differences in likelihood ($t(187) = -.58$, $p = .56$) and regret ratings ($t(187) = -1.07$, $p = .28$) were not significant. Therefore subsequent analyses did not include problem as a factor. Analyzing for handedness was accomplished by conducting a 2 x 2 analysis of variance comparing problem condition (received deal or missed deal) and handedness (strong or mixed). Results indicated that problem condition had a significant main effect ($F(1, 185)=24.56$, $p < .001$, $\eta^2 = .12$), such that individuals who had received the deal were more likely to act on it compared to individuals who had missed the deal. Handedness had no main effect ($F(1, 185)= .39$, $p = .531$); however an interaction was found (see Table 6 and Figure 2) between handedness and problem condition ($F(1, 185)=4.25$, $p = .041$, $\eta^2 = .02$). Simple effects t-tests were conducted comparing mixed- and strong-handers likelihood ratings by problem condition. While strong-handers showed a significant difference between received deal (M = 7.1) and missed deal conditions (M = 6.0), $t(89) = 2.06$, $p = .04$, $d = .43$, mixed-handers showed a larger difference between received

(M = 7.69) and missed deal conditions (M = 5.0), $t(96) = 4.96$, $p < .001$, $d = .60$. This indicates the inaction inertia effect is stronger for mixed-handers than strong-handers. This difference may also be seen in the scatterplots provided in Figure 3 which show likelihood ratings by absolute value EHI score.

Regret ratings were also analyzed by handedness. A 2 x 2 (problem condition x handedness) ANOVA revealed no main effects. The interaction between handedness and problem condition was marginally significant, $F(1,185) = 3.47$, $p = .064$, $\eta^2 = .02$, such that mixed-handers when receiving the deal gave descriptively lower mean regret ratings (M = 6.6) than strong-handers (M = 7.4; See Figure 34). However when the deal was missed, mixed-handers provided higher mean regret ratings (M=8.0) than strong-handers (7.3). The scatterplots provided in Figure 4 showing regret ratings by absolute value EHI scores demonstrate this weak relationship.

When demographic data was analyzed solely or in addition to the analyses reported above, no significant interactions or main effects of gender, age, or other collected data were found. It should also be noted that when using handedness as a continuous variable (absolute value EHI scores as opposed to dichotomies of mixed- and strong-handers), the findings above were not replicated. Specifically, there was no correlation between absolute value EHI scores and likelihood to buy in the missed deal condition, $r = .072$, $p = .49$, where the data above would suggest a negative correlation. This may be due to the non-normal J-curve distribution of handedness scores (see Figure 5). Common transformations such as logarithmic or square root do not usually normalize these data (see Figures 6 and 7 for this particular set of data), making analyses using handedness as a continuous variable especially difficult.

Discussion

The results above provide evidence that mixed-handers do show a larger inaction inertia effect relative to strong-handers, answering the first question posed above. This indicates a possible shared antecedent that prompts mixed-handers to engage more so in inaction inertia and the sunk cost effect. Mixed-handers also display a marginally significant effect in regret ratings. Without further research, conclusions cannot be drawn; however one possibility to explain this difference may be of interest. It may be that mixed-handers underestimate the amount of regret they would feel had they missed the deal. This could indicate that strong-handers are better predictors of their own regret ratings. Future work should be done to further investigate this difference.

Based on these results, subsequent experiments were conducted on the premise that handedness differences were present in all three decision making biases. Furthermore the presence of these differences may allow insight into the antecedents driving the paradigms overall.

Chapter III

Experiment 2

Experiment 2 was designed to determine if the type of counterfactual generated (upward or "if only" versus downward or "at least") predicts the extent to which one will engage in the status-quo bias. Individuals were given two status-quo bias problems, asked to generate counterfactuals ("prefactuals", in this case; see Byrne & Egan, 2004) before making a decision, and then made a decision.

While status quo effects, empirically, have not been linked to counterfactual generation in the literature, a relationship between the two may exist. Lack of research evidence may be due, in part, to the belief that inaction (maintaining a status quo) is not often utilized when generating a counterfactual thought (Roese, 1997). Participants are not likely to see an inaction as something that should have been changed in order to alter the consequences. Instead it is action that is more salient to counterfactual content (Kahneman & Miller, 1986). For example, when evaluating a common counterfactual situation (such as a car accident), it is more common to see counterfactuals based on actions (e.g., "If I had only left 5 minutes earlier…") than inactions (e.g., "If the other car had only been held up in

traffic"). Given this, it is reasonable to believe that a link has not been made by researchers due to predictions that none would be found.

It is possible, however, that the relationship depends on type of variable measured. That is, while number of counterfactuals may be irrelevant to status-quo bias, type of counterfactual may not. Upward ("if only") counterfactuals, if solicited, may prompt an individual to break the status-quo bias, while downward ("at least") counterfactuals may have the opposite effect. Previous research has shown that type of counterfactual generated can predict decision making style, such as beliefs about luck (Wohl & Enzle, 2003), task persistence (Markman, McMullen, Elizaga, & Mizoguchi, 2006), and beliefs about the self (Haynes, Sorrentino, Olson, Szeto, Wirkki, & O'Connor, 2007). Given this finding, it is not unreasonable to assume a relationship exists between type of counterfactual and decision making style within status-quo bias. It may be possible that generating more of a certain type of counterfactual could alter the decision made.

Upward counterfactuals require individuals to consider past actions, which are seldom present in a status-quo bias problem (i.e., it would be rare to find a situation where one could say "if only he had done this" in a status-quo bias, as the whole point of status-quo bias problems is to show a past condition had been present indefinitely, not recently decided). Rather inactions are given. In contrast, downward counterfactuals prompt individuals to consider the previous state as one potentially interrupted or changed by the decision. To make this clearer, consider the following vignette:

> Martin is a T.A. who has never spent very much time or attention grading papers. Recently he had a student turn in a plagiarized paper, something he did not notice and thus the student received a high grade. Once the semester is over, Martin realizes that the paper was plagiarized and that the student "got away" with it. Now Martin must decide between continuing to grade papers in a style that allows these things to

> slip through the cracks (but allows him to have more time to work on other pursuits) or to change his grading style to be more stringent, at the expense of his other projects (or simply at the expense of free time and other malarkey).

If asked to generate upward counterfactuals, individuals may provide responses such as "If Martin only had looked closer, he would have identified the plagiarized text" or "If he had changed his grading style, he would feel less regret". Both statements would prompt Martin to change his style and focus on changing his current state (i.e., his pre-existing grading style). However, if asked to generate downward counterfactuals, responses such as "At least the other students didn't find out and Martin wasn't called on the issue" or "At least all that happened was that a student got a better grade, which is trivial in the long run" may be likely. Both of these statements focus on the positives of the lax and naïve approach Martin has towards grading, which may make Martin more inclined to write off the current incident as unimportant, and persist in the status quo. Changing the type of counterfactual, upward or downward, may in fact persuade Martin to change his policies or stay the same.

This kind of thinking may be present not only in hypothetical vignettes, but also in everyday life situations such as losing weight or impulse buying. For example, "If only I wouldn't eat this cheeseburger, I'd lose weight" is a stronger motivator to diet than "At least I didn't order cheese on the fries, that's healthy – right?". Similarly, "If only I hadn't bought the Slice-o-matic on that infomercial, I'd have more money" is a stronger motivator to save money than "At least it didn't cost more than 5 easy payments of $49.95"). In Experiment 2, it was my intention to explore this relationship to see if status-quo bias and type of counterfactual thinking are indeed linked.

Method

Participants

One hundred ninety-one undergraduate students from the same pool as Experiment 1 were recruited to participate. Participants' average age was 19.2 years old (SD = 1.6), and 62.3% of participants were female. Participants received course credit for their participation, which lasted approximately 30 minutes, with the status quo and counterfactual questions being included within a packet of other decision-making problems.

Materials

Participants were presented with the two status quo problems shown in Appendix B. One problem asked participants to choose between their existing electric company, or a new company they'd recently been assigned to as part of a government plan to break up a monopoly. The second question focused on an employee hiring decision, where one candidate had similar ratings as the previous manager, and another had slightly different ratings. These problems were modified to include 3 counterfactual generation conditions as noted in Appendix B. The counterfactual generation conditions included text describing what a counterfactual argument was, and how it normally was structured. Four between-subjects counterfactual conditions were used. In the first, participants were asked to provide any counterfactuals they could think of (to reduce response variation, an example of a counterfactual was provided). In the second and third conditions, respectively, participants were asked to provide upward ("If only" / "Things could be better") or downward ("at least" / "Things could be worse") counterfactuals only. The fourth condition served as a control, where participants were not asked for counterfactuals. Data collection was done utilizing paper and pencil printed material, administered in the lab. Participants were given as

much time as they needed to complete the experiment, rarely exceeding 20 minutes to complete all portions. Following the packet of decision making problems, participants were given the EHI to determine their handedness score. For Experiment 2, the median EHI score was 75. Thus individuals scoring 75 or lower were considered mixed-handed, providing a pool of 97 mixed-handers (50.8%) and 94 strong-handers (49.2%). Standard demographic information was also collected as in Experiment 1. Finally, the participants were granted credit, debriefed, and thanked for their participation.

Results

Data for Experiment 2 were analyzed separately for each problem using both logistic regression and simple chi-square comparisons. For both questions, number and type of counterfactuals were determined by two independent raters who were not aware of the hypothesis. Two raters were instructed in scoring (see Appendix E for instructions) and their scores were significantly correlated for counterfactual number and type variables (average correlation between raters was .62, $\kappa = .16$). Since the correlation of agreement was relatively low, disputes were resolved by the experimenter by averaging the number of counterfactuals each rater determined together. Thus if Rater 1 scored a participant as generating 3 counterfactuals, while Rater 2 scored as generating 5, the overall number of counterfactuals was set to 4. Appendix F includes example statements made by participants, and the coding for each statement. Results here are reported first by condition, then by problem.

Control Condition

In the electric company problem, participants did not significantly prefer one choice over the other with 41.7% choosing to accept the new company while 58.3% decided to stay with their old provider, $\chi^2(1, N=48) = 1.33, p = .248$. When analyzed with handedness as an

additional factor, no significant difference was found between groups, $\chi^2(1, N=48) = .10, p = .922$.

In the employee choice problem, participants overwhelmingly preferred the status quo candidate (S. Zac; 73%) over the other candidate (W. Walters; 27%). This difference was significant, $\chi^2(1, N=48) = 1.10, p = .001$. When analyzed with handedness, however, no significant difference was found, $\chi^2(1, N=48) = .001, p = .978$.

Analyzing with handedness as a continuous variable, a one-way ANOVA was conducted with absolute value EHI score as the dependent variable, and choice of electric company (new versus old) as the independent variable. No significant difference was found, $F(1, 46) = 2.20, p = .15$. A similar ANOVA run for the job choice problem was also not significant, $F(1, 46) = .31, p = .58$.

Counterfactuals and Choice

A logistic regression was run for each problem. In the electric company problem, the regression model included handedness, number of upward counterfactuals generated, number of downward counterfactuals generated, and counterfactual generation condition (e.g., participants instructions to create either upward, downward, or either). This model was not significant, $\chi^2(4, N=143) = 3.71, p = .446$. This first regression was across all three counterfactual generation conditions. A second regression was conducted including only the upward and downward conditions. This regression was also not significant, $\chi^2(4, N=95) = 2.77, p = .597$. In sum, neither regression model predicted choice of company.

Similarly in the employee choice problem, a regression model including handedness, number of upward counterfactuals, number of downward counterfactuals, and

counterfactual condition was used. Interestingly, this model was a significant predictor of employee choice, $\chi^2(5, N=143) = 15.13, p = .01$. The only significant predictor of choice was number of upward counterfactuals ($\beta = .845, p = .008$). Within this model, as the number of upward counterfactuals increased, individuals were more likely to choose the status quo candidate. When the analysis was run including only the upward and downward conditions (omitting the condition which allowed subjects to produce either type of counterfactual), the model remained significant, $\chi^2(4, N=95) = 14.70, p = .005$, with number of upward counterfactuals generated again the only significant predictor ($\beta=1.07, p = .006$).

Counterfactual Generation and Handedness

Previous work has found differences in counterfactual generation and handedness such that mixed-handers tend to produce more counterfactuals than strong-handers (Jasper, Barry, & Christman 2008). The present study found that mixed-handers generated more total counterfactuals in the electric problem, $t(140)=-2.13, p = .035$, marginally more downward counterfactuals in the employee choice problem, $t(140)=-1.8, p = .074$, and more total counterfactuals in the employee choice problem, $t(141)=-2.73, p = .007$.

When demographic data was analyzed solely or in addition to the analyses reported above, no significant interactions or main effects of gender, age, or other collected data were found.

Discussion

Experiment 2 predicted that mixed-handers would generate more counterfactuals than strong-handers and that individuals asked to generate upward counterfactuals would be more likely to choose the non status quo option. Support for the first prediction was found. Mixed-handers statistically did generate more counterfactuals in two of the six counterfactual

variables (more total counterfactuals in both problems). They also, at least descriptively, did the same for the other four variables (total upward and total downward in both problems). This replicates previous research; however since the counterfactual generation method employed may be more properly thought of as generating 'prefactuals', these findings, in effect, extend the handedness literature. That is, it appears that mixed-handers not only generate more counterfactuals than strong-handers, but they also produce more prefactuals. Aside from this, no other handedness differences were observed in Experiment 2.

Support for the second prediction was not found. Counterfactual generation condition was not a significant predictor in any regression model. Additionally, the regression models that were significant (in this case, the employee choice problems) suggest that generating more upward counterfactuals actually made individuals more likely to choose the status quo option. This was opposite the original hypothesis that upward counterfactuals would make individuals more likely to choose the non status quo option.

It is also important to note that the control condition found no handedness differences. This does not replicate previous findings, which showed strong-handers to prefer the status quo option more so than mixed-handers. Since the questions were the same as used in previous studies, it suggests that the data for Experiment 2 may have been affected by situational or individual differences not controlled for (e.g., a sample of participants dissimilar from previous samples).Another issue, in the employee choice problem, was the lack of counterbalancing names (Zac or Walters). It is possible that individuals preferred one name over the other consistently and thus made their decision based on a variable other than status quo. Lastly, the overall low levels of agreement by raters in the prefactual generation conditions were also troubling. While the instructions

were clear to the raters, it is possible that they encountered problems due to the rather unusual instructions provided to participants. By asking participants to generate prefactuals, statements generated implicitly during a decision making process yet seldom explicitly stated, participants may not have adequately understood what sorts of statements we wanted them to make. Raters, in turn, had difficulty agreeing on if a statement was a true prefactual or simply a statement.

Based on the evidence provided in Experiment 2, it now appears unlikely that number and type of counterfactuals generated affects choice in the status-quo bias in any broad sense. This suggests that other variables may mediate a decision maker's choice in status quo situations more so than counterfactual thought. Without evidence suggesting that counterfactual or prefactual thought reliably predicts choice in the two status quo problems, switching directions may be most appropriate. Recall that while counterfactual thinking appeared the most likely variable to predict change, others were discussed above that still may be relevant. To provide further information on possible antecedents driving thesebiases, Experiment 3 was redesigned to collect additional data on the other variables discussed earlier. Specifically, Experiment 3 will explore a variety of measures associated with loss aversion, omission bias, and regret.

Chapter IV

Experiment 3

To measure the variables discussed above, Experiment 3 used existing scales and questionnaire items. These items, not specific to any of the biases discussed, may be helpful in understanding at least at an exploratory level the relationship between each variable and why individuals choose one way or another. It will also help understand if underlying handedness differences may exist within each of these variables. I will measure and analyze each variable and then relate it to each of the three decision biases discussed. Then handedness differences will be evaluated for each variable. In this manner, it is hoped that not only will the variable's role in that bias be known, but also any role it may play in the handedness effects previously observed. Also, if a link is found, it should provide insight into future directions of this research.

Method

Participants

One hundred and fifty-nine undergraduate students from the same pool as Experiments 1 and 2 were recruited to participate. Participants average age was 19.5 years

old (SD=3.45), and 63.5% of participants were female. Participants received course credit for their participation, which lasted approximately 20 minutes, with the scales and problems of interest being included within a packet of other decision-making tasks. Participants who did not understand the instructions, or who failed to follow instructions were excluded from analyses. Only when analyzing the loss aversion data were select subjects dropped from analyses, for reasons discussed below.

Materials

Participants were presented with the following measures of loss aversion. omission bias, and regret (provided in Appendix G):

a) Loss aversion was measured by utilizing 10 paired choices. The options were arranged such that the expected utility of the first option decreased over the course of the measure while the second option remained constant (see Brink, 2008). For example, the first choice consisted of one option being a 50% chance of gaining $5 or 50% chance of losing $1.40 and a second option being a 50% chance of gaining $1 or 50% chance of losing $1. In the last choice, the choice was between a first option of a 50% chance of gaining $5 or 50% chance of losing $7 with the same second option as in the first choice. Over the course of the 10 choices, it is expected that an individual should increasingly prefer the static option as the losses in the first option become greater. The point at which an individual prefers the second option over the first should indicate one's level of loss aversion, such that waiting until the very last choice to switch would indicate relative loss neutrality ($.75<\lambda<1.25$, λ representing Kahneman and Tversky's relative loss aversion coefficient [1979]).
b) Omission bias was measured using an established problem from that area. The problem asked participants to indicate the level of acceptable risk in a fictional

compulsory vaccination program (see Ritov & Barron, 1990). Participants were presented with a table listing the cost to develop various vaccines, and the number of children who would die from each vaccine. From the 10 vaccines presented, each with ascending cost yet decending risk to the children, the participant was asked to choose the acceptable level of risk. In other words, what vaccine is both cost effective yet provides an acceptable level of health risk. In one condition, participants were told that children who would die from the side effects of the vaccination would have been killed by the present disease regardless of vaccination. This allowed an opportunity for omission, whereby participants could choose a riskier vaccination program yet not "cause" any more deaths than were already expected. In the other (commission) condition, participants were not told that children dying from the vaccine would have died from the disease anyway. The levels of risk chosen by participants in this condition are expected to be lower since many participants will see themselves as directly contributing to the deaths.

c) Regret was measured using a simple 5-item measure (see Schwartz, Ward, Monterosso, Lyubomirsky, White, & Lehman, 2002). Questions measured different types of regret, using items such as "Whenever I make a choice, I'm curious about what would have happened if I had chosen differently", or "Once I make a decision, I do not look back". Each item was measured using a 5-point Likert-type scale. One item was reverse scored, and all five items were then summed to create the dependent variable.

In addition to the items above, participants were asked to complete the questions used in earlier experiments on inaction inertia (the couch or Daytona Beach problem), the sunk cost effect (the radar-blank plane problem or the migraine medicine problem) and the status-quo

bias (the electric company and employee choice problems). Data collection on the decision problems was done utilizing paper and pencil printed material, administered in the lab. Following these and other decision problems, participants were given the EHI to determine their handedness score. For Experiment 3, the median EHI score was 80. Thus individuals scoring 80 or lower were considered mixed-handed, providing a pool of 89 mixed-handers (56%) and 70 strong-handers (44%). Four participants provided incomplete handedness inventories and were excluded from handedness analyses. Standard demographic information was also collected as in Experiments 1 and 2. Finally, the participants were granted credit, debriefed, and thanked for their participation.

Results

Each measure was analyzed to assess its relationship to the three biases, and to explain handedness differences, discussed in individual sections below.

Loss Aversion

For each set of participant data, the point at which individuals switched from a preference for the first option to the second was determined. Individuals who did not switch preferences, or displayed multiple switch points were excluded from analyses, consistent with previous research (This occurred in approximately 10% of participants). The average switch point was 6.85 (SD=2.56), with strong-handers switching slightly earlier (showing more loss aversion) (M=6.56, SD=2.72) than mixed-handers (M=7.05, SD=2.4).

The loss aversion measure was incorporated into a number of other analyses, the first assessing overall differences by problem. A 2 x 2 (sunk cost condition [radar-blank plane or migraine medicine] by sunk cost choice [continue or terminate]) ANOVA (with loss aversion as the dependent variable) revealed no main effect of choice ($F(1, 146) = .52$, $p =$

.47), no main effect of condition ($F(1, 146) = .10, p = .75$) and no interaction between sunk cost condition and choice ($F(1, 146) = 1.72, p = .19$).

A correlational analysis was then conducted on the inaction inertia dependent variables (likelihood to buy and estimated regret) and the loss aversion measure. No significant correlation was found in any of the experimental conditions (where the individual had missed the deal). However a correlation was found in the control condition (where the deal was still available). Loss aversion was positively correlated with likelihood to buy the couch ($r = .35, p = .03$).

Two separate t-tests were conducted for the status-quo problems, comparing mean loss aversion scores for individuals choosing the status quo or non status quo option. No significant difference was found in the electric company problem, $t(147) = .42, p = .68$, or in the employment problem, $t(148) = -.13, p = .89$).

When comparing mixed- and strong-handers, no difference was observed in the loss aversion measure, ($t(148) = -1.134, p = .26$). Participants on average were classified as moderately loss averse according to both Kahneman and Tversky's (1979) and Brink's (2008) classifications.

Interestingly enough, previous research has found a link between loss aversion and gender, such that females tend to be more loss averse than males (Wong & White, 2001). To explore this, a 2 x 2 (handedness by gender) analysis of variance was conducted, revealing a main effect of gender on loss aversion, $F(1, 146) = 6.41, p = .012, \eta^2 = .04$. Indeed, females displayed slightly more loss aversion (M=6.39, SE= .26) than males (M=7.52, SE= .36). However, No handedness by gender interaction was observed, $F(1, 146) = .2, p = .66$, nor was there a main effect of handedness, $F(1, 146) = .78, p = .38$. Additionally, absolute value

handedness scores were not significantly correlated with loss aversion, $r = -.05$, $p = .57$. Further analysis of demographic data did not show any difference in levels of loss aversion.

Omission Bias

In the omission bias problem, maximum allowed risk was first analyzed by condition (omission versus commission). Higher maximum allowed risk scores indicate a preference for riskier vaccination programs. The average maximum allowed risk for all participants was low (M = 3.81, SD = 2.9). When broken down by condition, little descriptive difference was observed between the commission condition (M=3.97, SD=2.87, N=75) and the omission condition (M = 3.64, SD = 3.03, N = 76). This difference was not significant, $t(149) = .68$, $p = .5$. This does not replicate previous data reported by Ritov and Baron (1990).

When analyzed for handedness differences, a small descriptive difference was observed such that strong-handers' preferences were slightly riskier (M = 4.0, SD = 3) than mixed-handers (M = 3.69, SD = 2.92). This difference though was not significant, $F(1,147) = .20$, $p = .65$, and no handedness by condition interaction was found, $F(1,147) = .001$, $p = .99$. No demographic differences were found in subsequent analyses. Additionally, no main effect of condition was found, $F(1,147) = .31$, $p = .59$, likely due to the overall conservative nature of the participants in the context of making life and death decisions dealing with children. Finally, no correlations were found between absolute value handedness scores and maximum allowed risk in either the omission ($r = .08$, $p = .49$) or commission ($r = -.02$, $p = .86$) conditions.

Regret

The regret scale was coded and summed using the same scoring as the original source (Schwartz et. al., 2002), with higher scores indicating a tendency to feel more regret in situations. The average score was 18.85 (SD = 4.26; Min = 5, Max = 27).

The regret measure was first analyzed for differences by decision bias. In the sunk cost problem, individuals who terminated the project had nominally higher regret scores (M = 21.1, SD = 4.65) than those who chose to continue (M=18.51, SD = 4.13), $t(76) = -1.81$, $p = .073$. In the inaction inertia problems, no significant correlations between regret ratings and likelihood to buy were observed in any conditions. However, significant correlations were found in problem specific regret ratings and overall regret measure scores ($r = .445$, $p < .001$), suggesting that both specific regret ratings and an overall regret scale measure participant's anticipated regret reliably. Finally, regret scores were analyzed using independent samples t-tests for the electric company problem and the employment problem. Neither the tests for the electric company, $t(75) = -.74$, $p = .46$, nor the employment problem, $t(76) = .24$, $p = .81$, were significant.

When the regret measure was analyzed for handedness, a slight descriptive difference was observed with strong-handers showing lower regret scores (M = 18.3, SD = 3.95) than mixed-handers (M = 19.24, SD = 4.47). This difference though was not significant, $t(76) = -.97$, $p = .33$. Additionally, absolute value handedness scores were not significantly correlated with the regret measure, $r = -.001$, $p = .94$.

Aside from specific analyses cited above including gender, no significant interactions or main effects of gender, age, or other collected demographic data were found (e.g., year in school, grade point average, etc..).

Discussion

Over the three variables measured (loss aversion, omission bias, and regret), few relationships between these variables and the biases were observed, and there were no significant handedness differences. One of the most interesting findings is that little descriptive (and no significant) difference was observed in levels of loss aversion. While Brink's (2008) measure is highly correlated with previous measures, it strikes me as odd that no difference would be found between mixed- and strong-handers, or between conditions in the sunk cost problems. The argument that loss aversion drives the sunk cost effect (discussed earlier) seems to be very robust, with numerous researchers supporting it. Yet in this measure, individuals with low levels of loss aversion (a theorized driver of decision choice) behaved similarly to those with high levels. Similarly, one would expect that other variables which historically show differences in the sunk cost effect (such as handedness) would show differences in loss aversion if loss aversion were underlying the effect. With no reason to doubt Brink's measure, and no way to further test loss aversion in the time constraints of this project, it leaves an unanswered question for future research.

A second finding of interest is the significant correlation between loss aversion and the likelihood to purchase the couch. Individuals who were more loss averse reported a higher likelihood of purchasing the couch (however this correlation was not true of the Daytona Beach trip problem). It is interesting though to consider that a couch may be considered by some to be more necessary than a trip to Daytona Beach (in fact those who enjoy sitting in a living room may readily agree to forgo a trip rather than do without a couch). Might this imply that loss aversion is only correlated with likelihood ratings for "essential" items? If so, this leads to the suggestion that for more loss averse individuals, inaction inertia may only occur when the item in question is non-essential. For essential

items, inaction inertia may not hold such a firm grip. Strictly speaking, though, a couch is not as essential as, say, toilet paper or food – items that one would be foolish to let inaction inertia paralyze them from purchasing. Future research should address this question as well as where the line of "essential" runs within inaction inertia, and what characteristics of items allow them to overcome the inaction inertia effect.

While loss aversion was rife with findings meriting discussion, the measures of regret and omission bias were not quite as enlightening. While it may simply be that these variables play no role in the biases, they also may play a role that was not detected here. This failure to detect their role may be for a number of reasons. First, the regret measure was general in nature. While it did correlate with the specific regret data collected in the inaction inertia problem, it may not have measured the specific type of regret that plays a role in the three biases discussed. It also was not experienced regret, merely a self-report measure. If regret were induced, it may impact choice in the three scenarios by making feelings of regret much more salient. Similarly, the omission bias question may have simply been too general or complex for the sample to either apply or understand. By failing to replicate Ritov and Baron (1990), the possibility that the nature of the problem went "over the heads" of the participants seems viable. It may simply be that the additional information meant to convey action as safer (i.e., by stating that individuals who would die by vaccine would have also died by the virus) may not have been attended to or worse – individuals may have felt that there was nothing they could do to save potential victims. Before concluding that there are no effects, future researchers may wish to use a simpler omission bias problem to gauge overall effects on the biases discussed as well as handedness effects.

Returning to handedness, it's surprising that no differences were found with the variables in question in Experiment 3. The simplest explanation for this is that the variables discussed above are not antecedents of the three biases. The lack of differences between handedness groups coupled with the lack of differences between the variables and the biases suggests that the observed results are exactly what could be predicted. Namely, if loss aversion (or reported regret, or omission bias) does not drive any of the three biases, then an individual differences variable that is associated with those biases would not be expected to vary either. Why would one expect mixed-handers, for example, to show different levels of loss aversion than strong-handers if loss aversion does not seem to drive the decision bias?

In sum, the present experiment does not support loss aversion, omission bias, or self-reported anticipated regret as antecedents of the sunk cost effect, status-quo bias, or inaction inertia. Further, there are no differences between mixed- and strong-handers in relation to the three variables observed. If the variables investigated do play a role in these biases, they do not do this individually. However points for future research and follow-up have been raised, and may help to better understand the role these or other variables may play in the biases discussed.

Chapter V

General Discussion

This work was conducted to explore the underlying common antecedents that prompt individuals to display the sunk cost effect, status-quo bias, and inaction inertia. One particular antecedent, counterfactual generation, was theorized to be the most likely antecedent to explain all three biases. By analyzing differences in how mixed- and strong-handers approached these decision biases, it was believed that evidence could be found to support counterfactual generation as the underlying antecedent. Before this could be done, however, three questions needed to be answered.

Do Handedness Differences Exist in Inaction Inertia?

Based on the evidence of Experiment 1, handedness differences do exist in displays of inaction inertia. Mixed-handers show a larger inaction inertia effect relative to strong-handers. This was hypothesized due to the similarities between inaction inertia (failing to take an action once a precedent of inaction was established) and the sunk cost effect (failing to take an action once a precedent of previous investment was established).

Does Type of Counterfactual Predict Degree of Status-quo Bias?

In Experiment 2, the type of counterfactual generated was analyzed along with the choices that decision-makers made. No relationship was found to suggest that the type of counterfactual - upward or downward - impacted one'schoice. While it was true that mixed-handers, as in previous research, produced more counterfactual statements (in this case, more prefactual statements) than strong-handers, this did not seem to relate to their choices in either of two different status quo problems.

Does Amount and Type of Counterfactuals Generated Underlie the Biases Discussed?

Based on the evidence collected in Experiment 2, it appeared unlikely that the type and number of counterfactual statements generated changed the decision one was likely to make in a status-quo bias context. Because of this, Experiment 3 was modified to look for links between three other possible antecedents and strength of handedness. It was proposed that by analyzing the relationship between handedness and these antecedents first, it would better aid me in identifying future directions to continue this line of research.

Might loss aversion, omission bias, or regret be possible antecedents to the biases?

Experiment 3 was designed to identify differences between the possible antecedents remaining and the biases discussed. Loss aversion, omission bias, and reported regret were all measured via a variety of general indices, but none predicted choice in a sunk cost effect, status-quo bias, or inaction inertia problem. Further, handedness differences were not observed in any of the three measures. This suggests that the variables in question do not play a simple, direct causal role. Further research should be conducted, however, to

determine if a more complex relationship between these variables, the biases, and other individual differences variables such as gender may exist.

Conclusions and Future Directions

As noted above, the present work was designed to provide further insight into the concept of decision making inertia, proposed by Anderson (2003) and Gal (2006). Overall I find that the results of this work do not support a single unified antecedent for the decision biases discussed. While the concept that underlying antecedents may cause similar findings across these problems is noble, it now appears that identifying one or two of them as primary forces in the decision process is too simplistic of a view. Rather, the interaction between multiple variables is more likely the cause of decision making inertia, if indeed these biases are linked together. The present work dissuades the theoretically simple view that a magic variable may be found (and thus manipulated) to produce a wide range of differences within these biases.

Throughout this project, the variable strength of handedness was used as a sort of theoretical "lens" in which to view the findings of multiple experiments. As discussed above, this was done to provide another view on the possible antecedents discussed. While handedness differences were found in all three biases, these differences did not provide sufficient evidence to strengthen any particular argument regarding the antecedents discussed. The findings do, however, contribute to the overall argument that strength of handedness is an individual differences variable potentially indicating greater interhemispheric interaction. If indeed mixed- and strong-handers differ in levels of interhemispheric interaction, the findings here would suggest that in all three biases, cognitive processes required to answer the question are distributed between the

hemispheres. It is possible that given greater access to one hemisphere (due to greater interhemisperhic interaction), mixed-hander's responses may be influenced more heavily than strong-handers. For example, in the sunk cost effect, perhaps a process that favorably views increasing resources after an investment is made is more readily available to mixed-handers. Perhaps in the status quo bias, a process that views change as a positive thing may localize to the opposite hemisphere as a "change is bad" process. One handedness group (strong-handers) with limited access to both processes (as compared to mixed-handers) may then be more biased toward the status quo.

While evidence suggests handedness may relates to interhemispheric interaction, it must be noted that it only does so as a proxy variable. As a proxy variable, it does not provide direct evidence of interaction differences and thus may not be powerful enough to fully explain observed behavior. A further limitation of this research is its highly empirical nature – as yet, no unifying theory has been developed to explain differences in strength of handedness within decision making. However with findings such as the difference in regret ratings in Experiment 1 (where mixed-handers tended to provide higher regret ratings than strong-handers when a deal was missed, but lower ratings than strong-handers when the deal was not missed) potential new avenues of research into handedness differences in other variables have been identified that may, with further investigation, lead to a unified theory.

Moving forward, I plan to conduct additional research to further understand the antecedents of the biases discussed as well as the motivations mixed- and strong-handers may have that cause handedness differences to occur. The following conclusions are proposed based on this work:

1. The amount of counterfactuals generated does not depend on type specification. Individuals when prompted can produce equal numbers of upward and downward counterfactuals.

2. Loss aversion, omission bias, and regret are not causally linked to the biases discussed as a sole or primary antecedent.

3. Further research should be conducted on handedness, omission bias, and status-quo bias.

Conclusion 1

While individuals may be more or less inclined to produce counterfactuals (e.g., mixed-handers increased production versus strong-handers), it does not appear that specifying the type of counterfactual interacts with the amount of counterfactuals produced. This is interesting for two reasons. First, while counterfactual thinking encompasses both positive and negative affect, individuals tend to ruminate more so on negative events than positive (and increased rumination is linked with various psychological disorders [Ehring, Frank, & Ehlers, 2008; Luminet, Zech, Rime, & Wagner, 2000]). Anecdotally, scenarios such as a car accident or missed opportunity elicit "if only" statements without much prompting. This seems to indicate that upward counterfactuals are more easily generated than downward; however the results of the present work do not seem to show this relationship. If prompted, individuals generate a similar number of counterfactuals in both upward and downward conditions.

Conclusion 2

While possible links still may tie loss aversion, omission bias, and regret to the biases discussed, a clean causal link between one of these variables and the biases discussed was not observed in the present work. This suggests that the processes that drive these inertia biases may not be easily identified, manipulated, or understood at the present time. Further research into some of the findings presented here (such as the loss aversion, gender, and sunk cost effect interaction) may help understand the complex mesh of processes that drive these biases. A lasting conclusion of this project is simply that it may be futile to focus solely on one variable as a driver within seemingly simple yet ultimately complex decision biases.

Conclusion 3

While some maintain status-quo bias to merely be a manifestation of omission bias (Ritov and Baron, 1990), others argue they are qualitatively different phenomenon (Schweitzer, 1994). Within the handedness research area, the differences between omission bias and status-quo have not fully been explored on the same level as Schweitzer's attempt to separate the two into distinct biases. To fully understand mixed- and strong-handers decisions, an attempt should be made to design an experiment that will compare orthogonally the two biases. This may lead to reported tendencies within both mixed- and strong-handers to behave differently, when encountering different situations involving the status quo.

While the present work was unable to draw a common link between the three biases discussed and the possible antecedents proposed, it does provide meaningful contributions to the current understanding of these biases as related to the conclusions above. The present work also provides insight into future directions in understanding the complex relationships

these variables and biases share. Lastly, it further advances the progress made in understanding the role strength of handedness plays within the field of decision making.

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Table 1: Review of explanations for the sunk cost effect

Argument	Rationale	Citations
Wastefulness	Decision makers feel that terminating the project would be a waste and may over-estimate likelihood of success to justify continued action and investment.	• Arkes & Blumer, 1985 • Arkes & Hutzel, 2000
Mental Accounting	Decision makers do not understand the potential costs of the project, they endow more value onto the prospective project than actually exists	• Thames, 1996
Save Face	Decision makers feel that they are stuck in the situation, possibly feeling a high degree of personal responsibility. Thus, while they may implicitly know the project is doomed, they continue to invest to save face with peers and themselves.	• Staw, 1976 • Brockner, 1992 • Staw 1991
Loss Aversion	Decision makers feel that the project has value, and that terminating it would cause a loss of something valuable (the money or time already invested), unacceptable to loss averse individuals. Continuing the project provides a way to avoid a present loss, at the risk of a possible larger loss in the future.	• Whyte 1986 • Garland & Newport, 1991 • Schaubroeck & Davis, 1994

Table 2: Review of explanations for the status-quo bias.

Argument	Rationale	Citations
Loss Aversion	Decision makers who are more loss averse see possible disadvantages of switching as worse than the possible advantages, and thus choose the status quo.	• Kahneman, Knetsch, & Thaler, 1991 • Schweitzer, 1995
Omission Bias	Only in situations where an action must be committed will status-quo bias be readily seen. In situations where Decision makers can avoid committing an act, whatever option allows omission will be taken.	• Ritov & Baron, 1992

Table 3: Review of explanations for inaction inertia.

Argument	Rationale	Citations
Counterfactual Thinking	Decision makers engage in counterfactualized thought, which can take attention away from the present opportunity and cause Decision makers to lose objective value of the present opportunity. Removing information (such as the amount of the previous discount) reduces counterfactual thinking and inaction inertia.	• Tykocinski & Pittman, 1995 • van Putten, Zeelenberg, & van Dijk (2007)
Regret	Individuals' regret for not taking the first opportunity turns attention away from the objective value of the current opportunity. In this view, devaluation is seen as being driven by regret.	• Harvey, Sevdalis, & Yip, 2006 • Tykocinski & Pittman, 2001 • Butler & Highhouse, 2000
Devaluation & Regret	A combination of regret and devaluation causes individuals to focus attention away from the current opportunity and to value the current opportunity lower than individuals who either did not miss the first opportunity or did not have the first opportunity available at all. The general idea is that regret is a byproduct of devaluation and has no causal role by itself.	• Zeelenberg, Nijstad, & van Putten, 2006 • Arkes, Kung, & Hutzel, 2002.

Table 4: Review of handedness findings across the three decision phenomena (sunk cost effect, Status-quo bias, & inaction inertia) as well as measures of decision regret and counterfactual thinking.

Phenomena / Measure	Handedness Findings	Predictions
The sunk cost effect	Mixed-handers show larger sunk cost effects. Mixed-handers and strong-handers terminate the project at the same frequency when given overwhelming information the project will fail (Westfall, Jasper, & Christman, under review)	• Mixed-handers may be more loss averse. • Mixed-handers may generate more counterfactual arguments for continuing the project than strong-handers.
Status-quo bias	Strong-handers show larger status-quo bias effects than mixed-handers. Mixed-handers either elect to choose at chance levels between status quo and non status quo, or in some cases, choose the non status quo.	• Mixed-handers may generate more counterfactuals overall in status quo conditions, providing strong arguments for their position relative to strong-handers, who simply choose the status quo.
Inaction Inertia	None	Predicted relationship that mixed-handers will show higher inaction inertia effects based on evidence that: • Inaction inertia is related to the sunk cost effect, • Loss aversion is predicted to drive both effects and handedness differences in loss aversion have been provided and • Counterfactual thinking is likewise predicted to drive the effects in some way.
Measure: Counterfactual Thinking	Mixed-handers generate more counterfactuals than strong-handers. (Jasper, Barry, & Christman, in press)	Counterfactual thinking may drive all three situations mentioned above, with both the number and type of counterfactual being of importance.

Table 5: Descriptive Statistics for Experiment 1

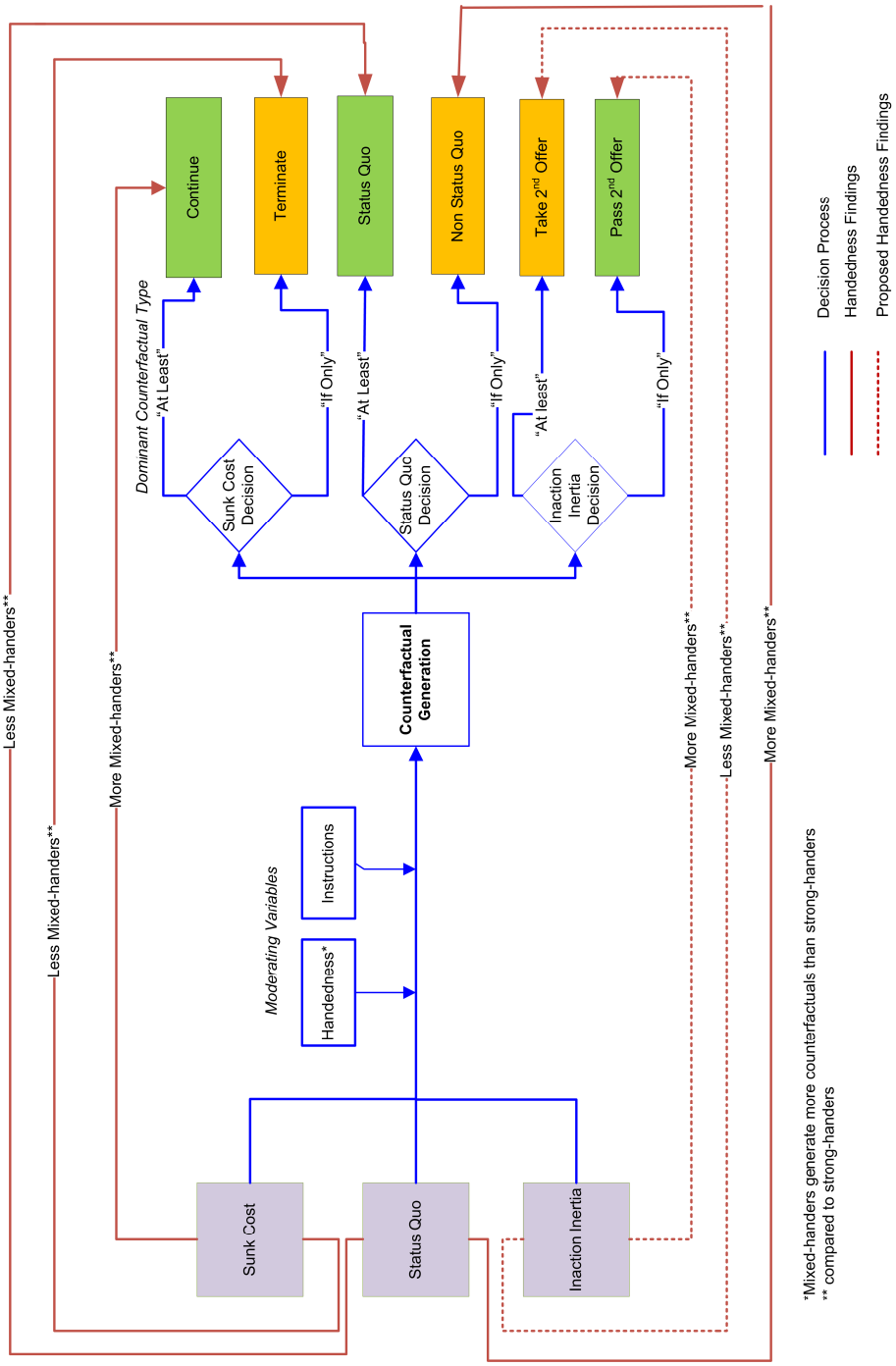
Problem (Condition)	N	Mean Likelihood To Buy Rating* (SD)	Mean Regret Rating* (SD)
Couch (Received Deal)	49	7.15 (2.35)	6.9 (2.48)
Couch (Missed Deal)	48	5.56 (3.04)	7.31 (2.80)
Daytona (Received Deal)	46	7.73 (2.72)	7.09 (3.3)
Daytona (Missed Deal)	46	5.48 (2.34)	7.98 (2.27)
Overall (Received Deal)	95	7.43 (2.54)	7.0 (2.9)
Overall (Missed Deal)	94	5.52 (2.72)	7.64 (2.56)

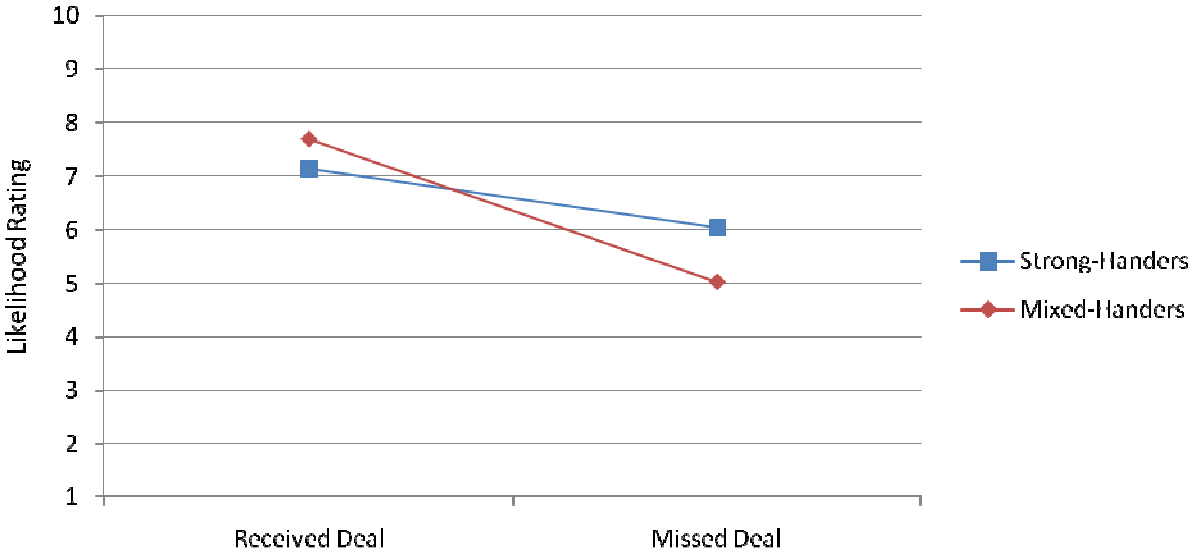
* Ratings on scale of 1 (very unlikely / low regret) to 10 (highly likely / high regret)

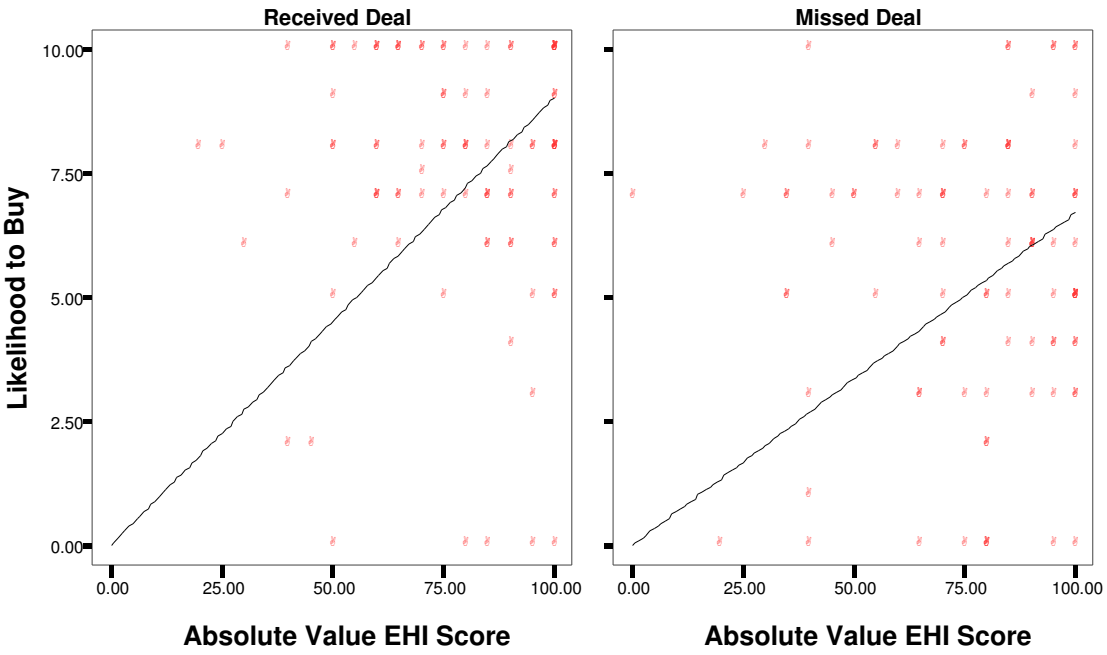
Table 6: Descriptive Statistics for Experiment 1 by Handedness over both problems.

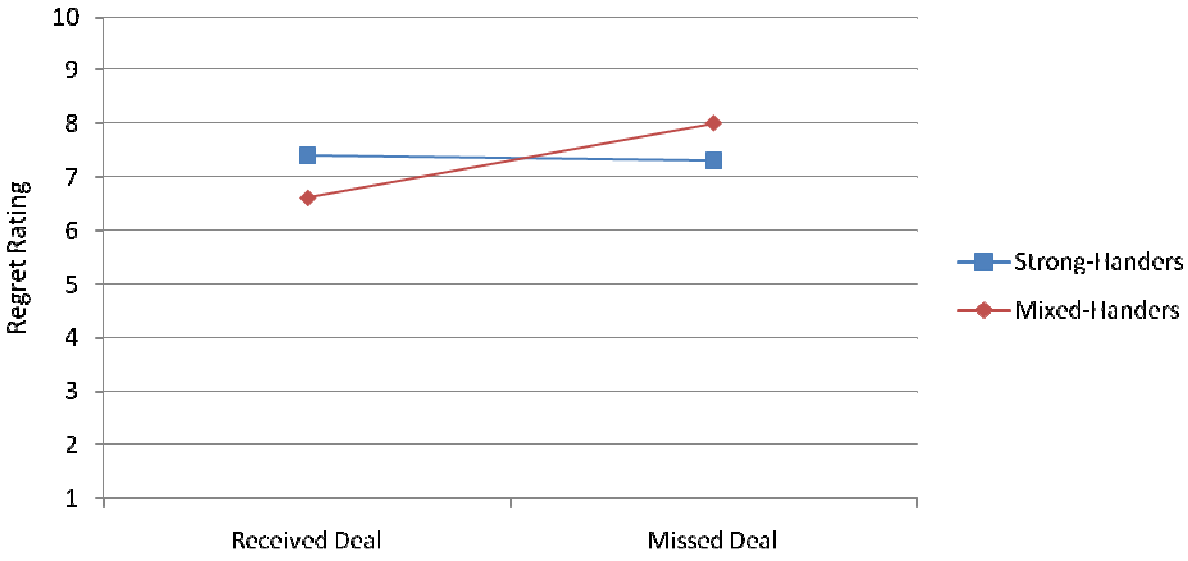
Condition	Handedness	N	Mean Likelihood To Buy Rating* (SD)	Mean Regret Rating* (SD)
Received Deal	Strong-handed	45	7.14 (2.62)	7.42 (2.55)
	Mixed-handed	50	7.69 (2.46)	6.60 (3.13)
Missed Deal	Strong-handed	46	6.04 (2.49)	7.30 (2.62)
	Mixed-handed	48	5.02 (2.85)	8 (2.49)

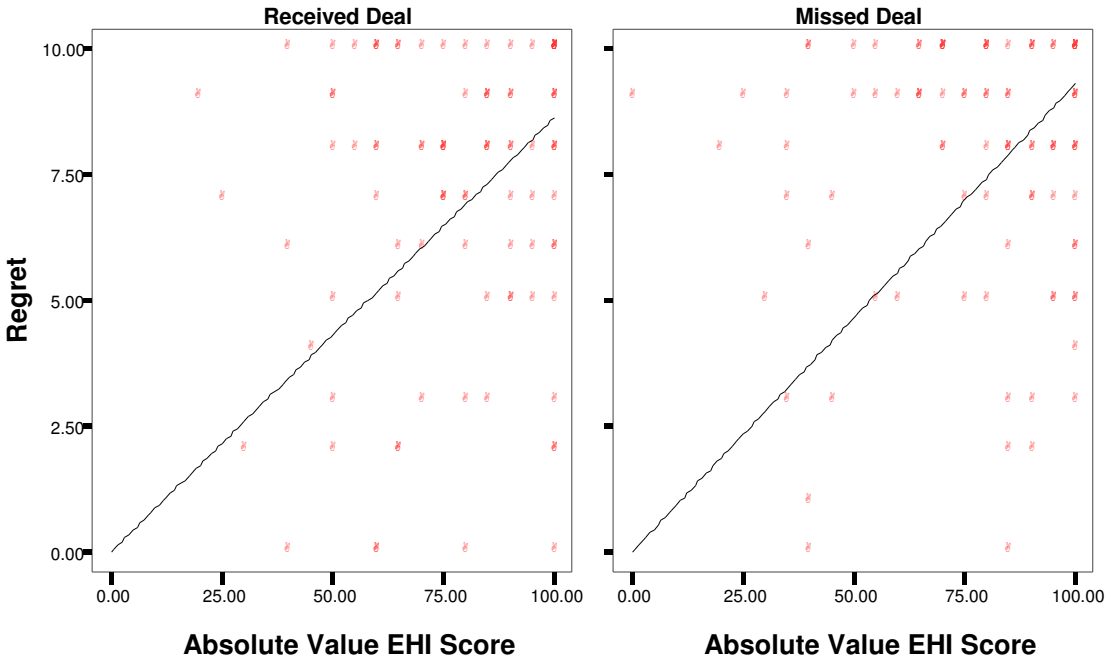
* Ratings on scale of 1 (very unlikely; very low) to 10 (highly likely; very high).

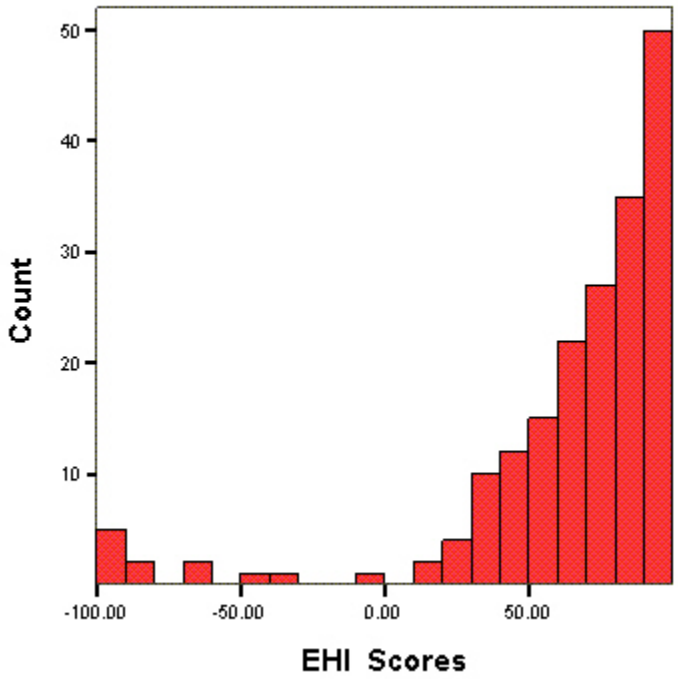

Continue
Terminate
Status Quo
Non Status Quo
Take 2nd Offer
Pass 2nd Offer
Dominant Counterfactual Type
"At Least"
"If Only"
"At Least"
"If Only"
"At least"
"If Only"
Sunk Cost Decision
Status Quo Decision
Inaction Inertia Decision
Counterfactual Generation
Moderating Variables
Instructions
Handedness*
Sunk Cost
Status Quo
Inaction Inertia
Less Mixed-handers**
More Mixed-handers**
Less Mixed-handers**
More Mixed-handers**
More Mixed-handers**
Less Mixed-handers**
Decision Process
Handedness Findings
Proposed Handedness Findings
*Mixed-handers generate more counterfactuals than strong-handers
** compared to strong-handers

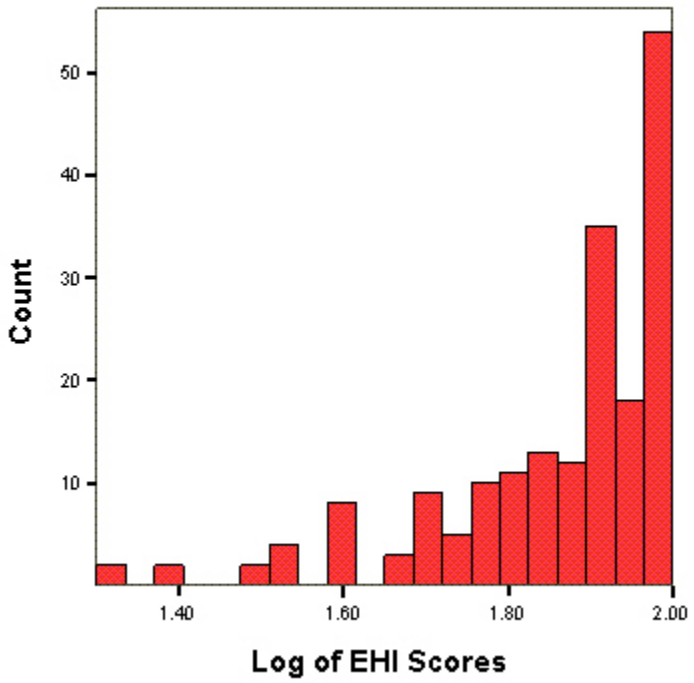

10
9
8
7
6
5
4
3
2
1
Likelihood Rating
Received Deal
Missed Deal
Strong-Handers
Mixed-Handers

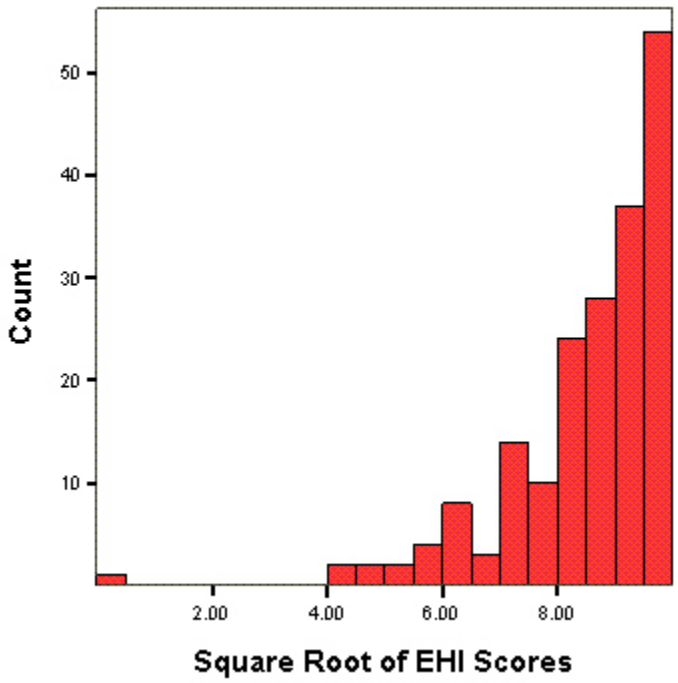

Received Deal
Missed Deal
Likelihood to Buy
10.00
7.50
5.00
2.50
0.00
0.00
25.00
50.00
75.00
100.00
Absolute Value EHI Score
Absolute Value EHI Score


10
9
8
7
6
5
4
3
2
1
Regret Rating
Received Deal
Missed Deal
Strong-Handers
Mixed-Handers


Received Deal
Missed Deal
Regret
10.00
7.50
5.00
2.50
0.00
0.00
25.00
50.00
75.00
100.00
Absolute Value EHI Score
Absolute Value EHI Score


Count
50
40
30
20
10
-100.00
-50.00
0.00
50.00
EHI Scores


Count
50
40
30
20
10
1.40
1.60
1.80
2.00
Log of EHI Scores


Count
50
40
30
20
10
2.00
4.00
6.00
8.00
Square Root of EHI Scores

Appendix A: Inaction Inertia Problems (Experiment 1)

In both of the following problems, two conditions are given. The first is an inaction inertia situation, whereas the second is a control. After each question, inaction inertia participants will be asked "On a scale of 1-10, how much regret would you feel after missing the opportunity", while control participants were asked: "how much regret would you have felt if you had missed the opportunity".

Problem 1: Couch

Inaction Inertia:
You would like to have a couch in your room. In the window of a furniture shop you saw some nice examples yesterday that had a 50% discount. Although you were interested you did not get to the shop right away. When you arrive at the shop today, the owner tells you that you are a day late and the 50% discount does not apply anymore. He tells you that there is a 20% discount on the couch this coming week. On a scale of 0-10, what is the likelihood that you would buy the couch at 20% discount?

Control:
You would like to have a couch in your room. In the window of a furniture shop you saw some nice examples yesterday that had a 50% discount. Although you were interested you did not get to the shop right away. When you arrive at the shop today, the owner tells you that this is the last day the couch will be on sale at 50% discount. On a scale of 0-10, what is the likelihood that you would buy the couch at 50% discount?

Problem 2: Trip to Daytona Beach

Inaction Inertia:
You adore Daytona Beach, Florida! Next week you have a whole week without lectures and you have not yet planned anything. A friend calls you and informs you about a completely organized three-day trip to Daytona that is available up until tomorrow for $200 instead of the usual $38. The trip includes airfare, and two nights on the beach. It sounded like a good idea, but you forgot to book the trip within these two days. Now your friend calls you again and tells you that, although you missed the prior opportunity, you can still book the trip this week for $315. On a scale of 0 - 10, What is the likelihood that you would book the trip for $315?

Control:
You adore Daytona Beach, Florida! Next week you have a whole week without lectures and you have not yet planned anything. A friend calls you and informs you about a completely organized three-day trip to Daytona that is available up until tomorrow for $200 instead of the usual $38. The trip includes airfare, and two nights on the beach. It sounds like a good idea. What is the likelihood that you would book the trip for $200?

Appendix B: Status Quo Problems (Experiment 2)

The following four conditions of the Status Quo problems will be presented. The first condition simply presents the two status quo problems in their original form, while the second, third, and fourth conditions ask decision makers to first consider counterfactual thoughts, then read and reflect on the current problem, generate counterfactuals, and finally provide a response to the problem. The problems in Appendix C will use a similar wording, tailored only to the specific problem:

Condition 1

Problem 1: Electric Company Breakup

Imagine that the U.S. government decides that your current electric company is a monopoly and has to be broken up. The government's plan is to randomly reassign customers to one of three electric companies (one of which is yours). Keep in mind that if you get switched, the quality of service will remain the same. If you had a choice which one of the following options would you select?

A. Accept the electric company that the government randomly reassigns me to
B. Stick with my old electric company.

Problem 2: Replacing a Manager (Adapted from Highhouse & Johnson, 1996)
The original problem has been adapted to remove a loss/gain variable. The new problem simply asks participants to choose between a candidate similar to the original, or one different.

As head of the human relations department at Balco Industries, you are given the duty to hire a new Operations Manager. An Operations Manager (OM) must ensure high productivity, work well with people, set high standards, and build employee trust and morale. After an extensive screening process, the field of 25 potential hires has been narrowed down to two: W. Walters or S. Zac. These two candidates have been judged on three characteristics.

Production orientation- The tendency to provide direction for employees, set high work standards, and clarify expectations.

People orientation – The tendency to establish good employee relationships, show concern, and provide support and encouragement.

Stress tolerance- The ability to adapt and cope with stressful situations

For your information, J. John, the previous operations manager, was transferred to another plant in order to be closer to his family. We have included his scores below in comparison to the new candidates. Since the last OM was hired before we started assessing people orientation, we do not have a people orientation score for him.

Employee Name	Production Orientation	People Orientation	Stress Tolerance
J. John	Excellent	----------	Excellent
W. Walters	Poor	Excellent	Excellent
S. Zac	Excellent	Poor	Excellent

Knowing all this information, whom would you hire? A) W. Walters B) S. Zac

Conditions 2-4 (Slight wording changes exist between conditions principally to remove one type of counterfactual (e.g., condition 3 omits "things could be worse" wording & responses, while condition 4 omits "things could be better" wording & responses)

People often have thoughts about the future when thinking about upcoming decisions. Specifically, they may play out a future decision in their minds, pretending to choose one path or another and imagining how they would feel about their decision if certain events were to occur. Sometimes these thoughts can be about things that are better than what they expect will actually happen, and sometimes these thoughts can be about things that are worse than what they expect will actually happen. For example, if I were shopping for a car and debating between a compact or an SUV, I may imagine buying the compact and then think about how I would feel if I were in an accident. This may lead me to think "If I had bought the car, things would be worse because I would have suffered more severe injuries".

In other words, things might be better with an SUV. Or perhaps I'd think about skyrocketing gas prices and how things might be worse with that SUV. If this were the case, I would thankfully exclaim "If I had bought the SUV, things would be worse because I'd be paying more in gas". While these future events, the accident or the gas purchase, have yet to occur, they may influence my decision regarding which car to purchase in the first place.

In this part of the study, we are going to ask you to read two different scenarios. Each scenario will describe a different situation in which you are to imagine yourself as the person in the story. After each scenario, you will be asked to think about and describe as many of these alternative "future things" as you can.

Imagine that the U.S. government decides that your current electric company is a monopoly and has to be broken up. The government's plan is to randomly reassign customers to one of three electric companies (one of which is yours). Keep in mind that if you get switched, the quality of service will remain the same.

Please stop for a moment and consider the imagined situation you are now in. Think about what you expect to actually happen if you choose to accept the new electric company or if you decide to stick with the old company. Then think about how things could be better or worse. It's these "things could be better" or "things could be worse" thoughts that we want you to write down – as many as you can. Again, try to concentrate only on how things could be better or worse than what you expect will actually happen. These "things could be better" and "these things could be worse" statements usually take the following form:

"If I _____ then things would be better because _____ OR

"If I _____ then things would be worse because _____"

Please take a few minutes and write down as many of these types of statements as you can think of relating to the situation above (choosing a power plant). Remember, we're asking you to consider both of your options and what things may occur in the future, and then to write down what thoughts you might have if a given thing were to occur. Please use the same format as the example sentences given above (e.g., If I _____ then things would be better/worse because _____)

_____
_____
_____
_____
_____
_____

Now, after reflecting on the situation and writing down different outcomes above, which one of the following options would you select?

____ Accept the electric company that the government randomly reassigns me to

____ Stick with my old electric company.

As head of the human relations department at Balco Industries, you are given the duty to hire a new Operations Manager. An Operations Manager (OM) must ensure high productivity, work well with people, set high standards, and build employee trust and morale. After an extensive screening process, the field of 25 potential hires has been narrowed down to two: W. Walters or S. Zac. These two candidates have been judged on three characteristics.

Production orientation- The tendency to provide direction for employees, set high work standards, and clarify expectations.

People orientation – The tendency to establish good employee relationships, show concern, and provide support and encouragement.

Stress tolerance- The ability to adapt and cope with stressful situations

For your information, J. John, the previous operations manager, was transferred to another plant in order to be closer to his family. We have included his scores below in comparison to the new candidates. Since the last OM was hired before we started assessing people orientation, we do not have a people orientation score for him.

Employee Name	Production Orientation	People Orientation	Stress Tolerance
J. John	Excellent	----------	Excellent
W. Walters	Poor	Excellent	Excellent
S. Zac	Excellent	Poor	Excellent

Please stop for a moment and consider the imagined situation you are now in. Think about what you expect to actually happen if you choose to hire W. Walters or if you choose to hire S. Zac. Then think about how things could be better or worse. It's these "things could be better" or "things could be worse" thoughts that we want you to write down – as many as you can. Again, try to concentrate only on how things could be better or worse than what you expect will actually happen. These "things could be better" and "things could be worse" statements usually take the following form:

"If I _____ then things would be better because _____ OR

"If I _____ then things would be worse because _____"

Please take a few minutes and write down as many of these types of statements as you can think of relating to the situation above (hiring a new manager). Remember, we're asking you to consider both of your options and what things may occur in the future, and then to write down what thoughts you might have if a given thing were to occur. Please use the same format as the example sentences given above (e.g., If I _____ then things would be better/worse because _____)

_____
_____
_____
_____
_____
_____

Knowing all this information and after reflecting on what may happen depending on whom you choose, who would you hire?

___ W. Walters

___ S. Zac

Appendix C: Sunk Cost Problems
(Used in Westfall, Jasper, & Christman, under review) (Experiment 3)

The following problems use the same counterfactual generation exercises as outlined in Appendix B.

Problem 1: Radar Blank Plane (Adapted from Arkes & Blumer, 1985)

> As the president of an airline company, you have invested 10 million dollars of the company's money into a research project. The purpose was to build a plane that would not be detected by conventional radar, in other words, a radar-blank plane. When the project is 90% completed, another firm begins marketing a plane that cannot be detected by radar. Also, it is apparent that their plane is much faster and far more economical than the plane your company is building.
>
> [counterfactual generation exercise]
>
> Should you invest the last 10% of the research funds to finish your radar-blank plane?
>
> _____ Yes _____ No

Problem 2: The Migraine Medicine (Adapted from van Dijk & Zeelenberg, 2003)

The problem below originally included a variable amount of money invested in the project; this variable has been removed and set at $800,00.

> As a president of a relatively small factory in the health sector you are developing several new health products. As part of this endeavor, you are preparing to market a new medicine against migraine. You are considering whether or not to go ahead with introduction of the medicine. The costs of such a course of action would be $1 million.Your factory has already made an investment of $800,000 At this moment you learn that one of the world's largest suppliers of health products is also planning to introduce a medicine against migraine. There is an apt possibility that their medicine will outperform yours.
>
> [counterfactual generation exercise]
>
> Now, what would you decide? Would you continue the development and introduction of the medicine against migraine? Or would you stop the migraine project, and use your funds for development of an alternative product?

Appendix D: The Edinburgh Handedness Inventory

Please indicate your preference in the use of hands for each of the following activities/objects by placing a check in the appropriate column

	Always Left	Usually Left	No Preference	Usually Right	Always Right
Writing					
Drawing					
Spoon					
Open Jars					
Toothbrush					
Throwing					
Broom (upper hand)					
Scissors					
Knife					
Striking a Match					

Is your mother left-handed? _____

Is your father left-handed? _____

How many brothers and sisters to you have? _____

Are any of your brothers and/or sisters left-handed? _____

Appendix E: Instructions to Counterfactual Raters

"For each problem, read each statement separately. For each statement, decide if the person took the mental position that they had made a decision, and were reflecting on how that decision could affect them in the future. If they did this, the statement counts as a counterfactual.

Next decide the type. While words such as "If only" (for upward counterfactuals) or "atleast" (for downward counterfactuals) may provide a clue, do not rely on them solely. An upward counterfactual requires the person to first take the mental position that they had made a decision, and then reflect on how things *could have been better if they had made a different decision*! A downward counterfactual, similarly, has the person reflecting on how things could have been *worse* if they had made a different decision.

In the spreadsheet, record the number of counterfactuals overall, the number of upward counterfactuals, and the number of downward counterfactuals.

Lastly, be careful in the conditions where participants were only asked to create upward or downward counterfactuals. While they were told to do only one or the other, it is possible they didn't follow these directions. In other words, do not automatically put "0" in the column for the counterfactual type they were not told to generate – they may have done so anyway!"

Appendix F: Example Counterfactual Statements

The following table lists statements made by participants in Experiment 2. It is indicated what scoring each statement received.

Statement	**Is this a Counterfactual?**	**Type of Counterfactual**
At least if I stay with my current power plant then I do not have to worry about the hassle of switching to a new business.	Yes	Downward (Individual sees themselves as better off than the alternative)
It is not a good thing to move a company but atleast then the quality will be the same	Yes	Downward
If I choose w walters, then better employee attitudes might exist	Yes	Downward
At least if I stick with my old electric company then I will be familiar with the service and cost	Yes	Downward
If only I'd picked Walters, then we'd have good people orientation	Yes	Upward (Individual sees themselves as worse off by picking Zac)
If I only started out with a different power plant then I wouldn't have to deal with this.	No (Individual does not put self in present or future, but in the past)	
At least if I knew more then I could help with the company	No (Individual appears confused at instructions)	
If only I didn't create a monopoly, then I wouldn't be in this	No (Individual confuses role they play in the scenario)	

Appendix G: Loss aversion, omission bias, and regret measures used in Experiment 3.

Loss Aversion (Brink, 2008):

Below are 10 sets of gambles, each with two options. For each set, indicate which option you would take if you were working with real money. The gambles only change slightly, so be sure to read each one carefully. Place a check mark in the box below the option you'd choose in each gamble. Please only check one box for each gamble.

Gamble 1

A 50% chance of gaining $5, or a 50% chance of losing $1.40	A 50% chance of gaining $1, or a 50% chance of losing $1.

Gamble 2

A 50% chance of gaining $5, or a 50% chance of losing $1.50	A 50% chance of gaining $1, or a 50% chance of losing $1.

Gamble 3

A 50% chance of gaining $5, or a 50% chance of losing $1.60	A 50% chance of gaining $1, or a 50% chance of losing $1.

Gamble 4

A 50% chance of gaining $5, or a 50% chance of losing $1.75	A 50% chance of gaining $1, or a 50% chance of losing $1.

Gamble 5

A 50% chance of gaining $5, or a 50% chance of losing $1.90	A 50% chance of gaining $1, or a 50% chance of losing $1.

Gamble 6

A 50% chance of gaining $5, or a 50% chance of losing $2.10	A 50% chance of gaining $1, or a 50% chance of losing $1.

Gamble 7

A 50% chance of gaining $5, or a 50% chance of losing $2.40	A 50% chance of gaining $1, or a 50% chance of losing $1.

Gamble 8

A 50% chance of gaining $5, or a 50% chance of losing $2.90	A 50% chance of gaining $1, or a 50% chance of losing $1.

Gamble 9

A 50% chance of gaining $5, or a 50% chance of losing $3.95	A 50% chance of gaining $1, or a 50% chance of losing $1.

Gamble 10

A 50% chance of gaining $5, or a 50% chance of losing $7.00	A 50% chance of gaining $1, or a 50% chance of losing $1.

Regret Measure (Schwartz, Ward, Monterosso, Lyubomirsky, White, & Lehman, 2002):

Please rate how much you agree or disagree with the statements below using the following scale:

1. Completely Disagree
2. Disagree
3. Slightly Disagree
4. Neither Agree nor Disagree
5. Agree
6. Completely Agree

____ Whenever I make a choice, I'm curious about what would have happened if I had chosen differently

____ Whenever I make a choice, I try to get information about how the other alternatives turned out.

____ If I make a choice and it turns out well, I still feel like something of a failure if I find out that another choice would have turned out better.

____ When I think about how I'm doing in life, I often assess opportunities I have passed up.

____ Once I make a decision, I do not look back.

Omission Bias (Ritov & Barron, 1990) (Bracketed portion not included in commission condition):
Imagine there is a large epidemic of a deadly disease affecting the United States this year. The disease kills 10 out of every 10,000 children. A vaccine, which costs $2 per child, can prevent the disease in everyone. However the vaccine has side effects that kill some children.

In the table below are different levels of risk associated with this vaccine program. Your job is to decide at what point the risk is acceptable to mandate the vaccine be given to all children in the United States. The government, based on your recommendation, would set up a compulsory vaccination program in which children would be required to be vaccinated. Think of the different levels of risk as different variations of the vaccine, some less risky yet more expensive.

The table is set up so that the most risky (and economical) situations are presented toward the top, the least risky (and more costly) toward the bottom. Place a check mark in the "Maximum Risk" box for the plan you feel is the **most risky, yet still acceptable to require all children be vaccinated**. **Only check 1 "maximum risk" box.**

- "Risk of death from side effects" lists the number of children that would die from side effects if that vaccine was adopted.
- "Net decrease in probability of death" is simply the inverse: the number of children that won't die due to side effects.
- "Cost per life saved" is the amount of additional money this vaccine would cost (per life saved) to make it safer.

Please think carefully and make your recommendation for the vaccine that is most risky, yet still would be acceptable to require parents to vaccinate their children.
[Additionally, you should know that it has been discovered that the children who are susceptible to death from the disease are the same ones who are susceptible to death from

the side effects of the vaccine. Thus, the "net decrease in probability of death" represents actual lives saved, children who would have died from the disease if they had not been given the vaccine. There would be no children who would die from the vaccine who would not have died anyway (from the disease)]

Risk of Death from Side Effects	Net decrease in probability of death	Cost per life saved	Maximum Risk?
9 out of 10,000	1 in 10,000	$2,000	
8 out of 10,000	2 in 10,000	$4,000	
7 out of 10,000	3 in 10,000	$6,000	
6 out of 10,000	4 in 10,000	$8,000	
5 out of 10,000	5 in 10,000	$10,000	
4 out of 10,000	6 in 10,000	$12,000	
3 out of 10,000	7 in 10,000	$14,000	
2 out of 10,000	8 in 10,000	$16,000	
1 out of 10,000	9 in 10,000	$18,000	
0 out of 10,000	10 in 10,000	$20,000	