Psychological mechanisms in project investment decisions: the role of psychological burden*

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Abstract

Abstract. Decision makers in project management often have to make difficult decisions about whether to continue supporting projects that are at risk of failure. The hypothesis developed by Gilad Feldman and Kin Fai Ellick Wong states that when people receive adverse feedback, their decisions are influenced by the framework of their actions. According to the study, even though a project may not be the best choice, decision makers may view it as a positive reaction to a previous adverse outcome; Therefore, decision makers should be mindful of the implications of the framework for action [@feldman2018action]. In the process of restoring the experimental data, we also found that the commitment tendency of decision-makers is significantly affected by psychological stress, and the decision-making process is crucial to change the outcome of decision-making. The conclusions we draw are similar to those in the original article.

Contents

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*Code and data are available at: A replication of various aspects in this paper are available at: https://osf.io/c6wm5/

1 Introduction

Introduction: In the face of non-recoverable costs that have already been incurred, individuals often make irrational decisions because of the sunk cost fallacy. This concept describes when people mistakenly consider costs that have already been spent and cannot be recovered when making decisions [@tversky1996reality]. For example, if we pay $30 for a movie ticket, only to find that the ticket is lost when we arrive at the theater, we are faced with two choices: buy a new ticket or choose to leave. Decision-making in this context can be further analyzed through an action framework that distinguishes the psychological difference between viewing a choice as an "action" versus viewing it as an "inaction." Girard-feldman and Jianhui Huang's research shows that this framework significantly influences individuals' behavioral choices when faced with a difficult situation, especially in the context of whether to continue investing in a failed project. Research has found that when a choice is framed as "action," people are more likely to choose it because action is often associated with actively trying to solve a problem. In contrast, inaction can be seen as a negative action, even though it might be the more rational choice. This type of decision making is sometimes called "commitment escalation", which means sticking to the original investment decision despite signs that the project may fail [@feldman2018action]. We believe that in order to reduce unnecessary waste of resources and optimize the decision-making process, it is critical to identify the factors that influence commitment escalation decisions. Psychological burden is a key aspect that affects the decision-making process, of which the sunk cost fallacy, decision inertia, and the psychological mechanisms of enhanced emotional projection are the main causes [@starcke2016effects]. Individuals may continue to invest in their projects because they are unwilling to accept failure, despite objective evidence that may point in the other direction [@tversky1996reality]. At the same time, failure to take action may cause individuals to worry about damage to their social image, resulting in bias in decision-making [@patt2000action]. To explore these factors, we set up three scenarios: In the "upgrade group," continuing to purchase tickets is considered an "action" and choosing to leave is considered a "no action"; In the "demoted group," this framework is reversed; Finally, the framework for action is not explicitly provided in the "fuzzy group" [@feldman2018action]. By analyzing and comparing these three sets of situations, we aim to gain a deeper understanding of how psychological stress affects commitment escalation or de-escalation in the decision-making process. We reproduced the paper by Gilad Feldman and Kin Fai Ellick Wong, focusing on the following questions: 1. Between the promotion group and the demotion group, which group is more willing to continue the project? 2. Not providing a clear framework for action, which group is more willing to continue the project compared to the promotion group or the demotion group? 3. On the basis of the second experiment, when participants were asked two options (action or inaction) and two outcomes (positive or negative), which group would prefer to continue the project?

All data processing and analysis were conducted using the R programming language, as referenced in [@citeR], and employed various packages from the tidyverse suite, specifically mentioned as [@citetidyverse], janitor[@citejanitor], car[@citecar] to clean the data, bookdown[@citebookdown] to cross reference the figure, and use R packages ggplot2 [@citeggplot2] to draw the figures. In addition, we use here [@citehere] to produce the date.

2 Data

2.1 Data Source and Methodology

2.1.1 Experiment 1

The data from the first experiment are provided by a total of 104 undergraduate students from a university in Hong Kong who participated in exchange for partial course credit. This is a psychological study focusing on escalation of commitment, specifically investigating how individuals decide to continue or discontinue investment in a project when faced with negative feedback and a competitive threat. The study utilized a scenario in which participants, acting as vice presidents of a high-tech firm, had to decide on the future of a radar-scrambling device project after discovering that a competitor had launched a superior product. The participants were divided into two conditions: escalation-as-action, where continuing the project required active budget allocation, and de-escalation-as-action, where stopping the project required active intervention. Their willingness to proceed with the project was measured on a scale from 0 to 100, and they were asked to

explain their decisions. This setup provides a controlled environment to examine how framing the decision (as either an action or inaction) influences commitment to a failing course of action. The results could offer insights into decision-making processes in business, helping leaders understand how framing and presentation of choices can impact managerial decisions and organizational outcomes.

2.1.2 Experiment 3

In the third experiment, a new dimension labeled "ambiguous" was introduced into the data analysis. This experiment engaged 299 American participants from MTurk, who were recruited through TurkPrime.com. These participants were evenly distributed into three distinct groups to test the effects of different escalation framings: escalation-as-action, de-escalation-as-action, and ambiguous. While retaining similarities to the setup in Experiment 1, this iteration featured a novel approach to budget distribution. Specifically, in the escalation-as-action scenario, funding was released in two separate instances: an initial disbursement at the commencement of the project, followed by a subsequent allocation three years later to advance to the next phase. Conversely, in the de-escalation-as-action scenario, the entire project budget was pre-approved and allocated from the company's multi-year budget.

At the three-year mark, having expended half of the budgeted 10 million dollars, participants learned of a competing firm that had launched a similar yet superior product. As the decision-makers, they faced the crucial choice of whether to continue funding the remainder of the project. The ambiguous condition introduced a new dynamic, requiring participants to make a decision between continuing with the project or halting it, without explicit guidance towards action or inaction, echoing the uncertainty faced in the original study by [@arkes1985psychology]. This addition aimed to explore how ambiguity in decision-making contexts affects the propensity for escalation of commitment.

2.2 Attributes

3 Results

3.1 Experiment 1: Contrasting Escalation-action with Deescalation-action

Figure 1 with categories replicates the figure 4 in the original paper experiment 1, and it provides a quick visual indication of the data's distribution, highlighting any potential skewness by showing the medians' positions relative to the interquartile ranges (IQR). It compares participants' willingness to continue with a project across two scenarios — "Escalation-action" and "Deescalation-action" — on a commitment scale from 0 (not at all willing) to 100 (completely willing). The plot reveals a wider IQR for "Deescalation-action," suggesting a greater diversity in the participants' responses. In contrast, the median — represented by the line within each box — is higher for "Escalation-action," indicating a general tendency for participants in this scenario to be more willing to escalate their commitment. Furthermore, "Escalation-action" extends to have a higher maximum value, signifying that some participants are particularly inclined to increase their commitment level when compared to those in the "Deescalation-action" group.

3.2 Experiment 3: Contrasting Escalation-action with De-escalation-action

Figure 4, replicated in Figure 2, provides a comparative visual analysis of decision-making behavior in two distinct scenarios: "Escalation-action" and "De-escalation-action," as per Experiment 3 of the original study. The box plot illustrates the distribution of participants' commitment levels on a scale from 0 to 100, where 0 indicates no willingness to continue with a project, and 100 reflects complete willingness. The plot highlights the position of the median within the interquartile range (IQR) to signal central tendencies and variability in commitment. The "Escalation-action" group exhibits a higher median with an average of 49.54, suggesting a stronger inclination towards project continuation. In addition, the "de-escalation – action group has a lower median with an average of 38.94. The range also stretches higher for"Escalation-action," pointing to a subset of participants with an exceptionally strong commitment to escalation. Participants in the condition framing action as escalation were more prone to increase their commitment compared to those in the condition framing action as de-escalation.
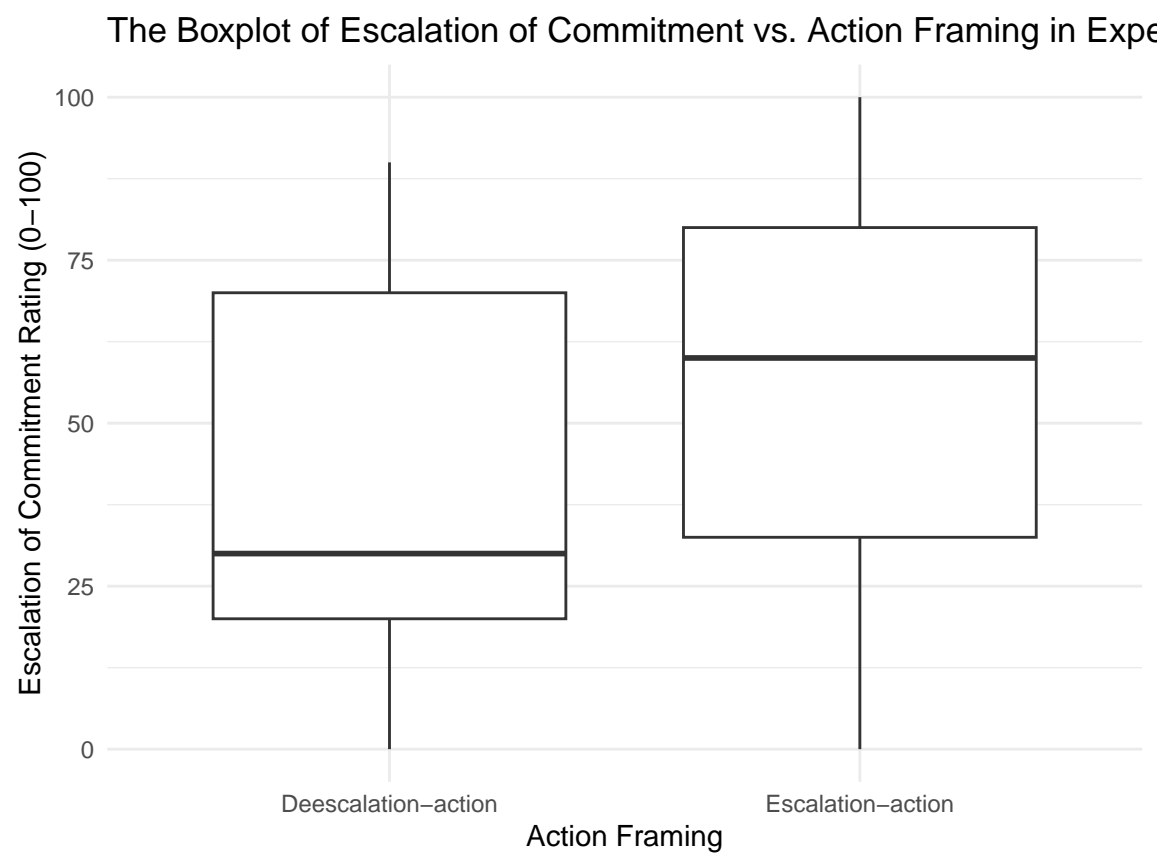
The Boxplot of Escalation of Commitment vs. Action Framing in Expe

Figure 1: Boxplot

The Boxplot of Escalation of Commitment vs. Action Framing in Expe

Escalation of Commitment Rating (0–100)

Action Framing

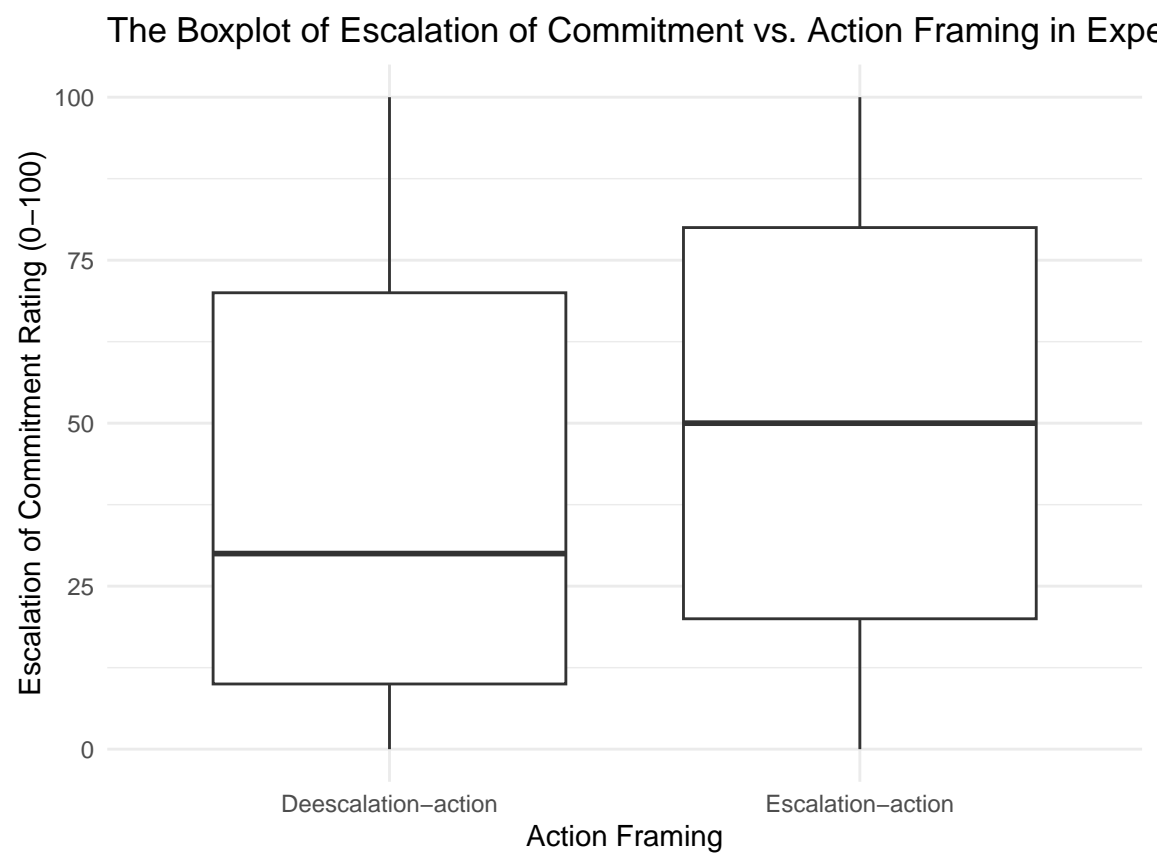Deescalation–action   Escalation–action

Figure 2: Boxplot

3.3 Experiment 3: Contrasting Escalation-action with Ambiguous

In Figure 3, we replicated the same experiment as Experiment 3 from the original study, comparing "escalation-action" with "ambiguous" scenarios. Under the ambiguous condition, participants were presented with a different scenario than in previous experiments, facing a decision to continue or terminate the experiment without any clear action or inaction. The boxplot reveals that the IQR for "Escalation-action" is wider than for "ambiguous," indicating a greater variance in participants' scores for "escalation-action." Participants rated their willingness to continue the experiment on a commitment scale from 0 to 100, where 100 signifies a strong desire to continue. The results showed that the mean score for "escalation-action" (49.54) was higher than for "ambiguous" (41.81), although the difference was not significant. This suggests that participants were more inclined to escalate their commitment in such scenarios. The figure also showed participants willing to choose "escalation-action" scored higher than those in the "ambiguous" group, above 75, indicating a preference to increase their commitment level compared to the "ambiguous" group.
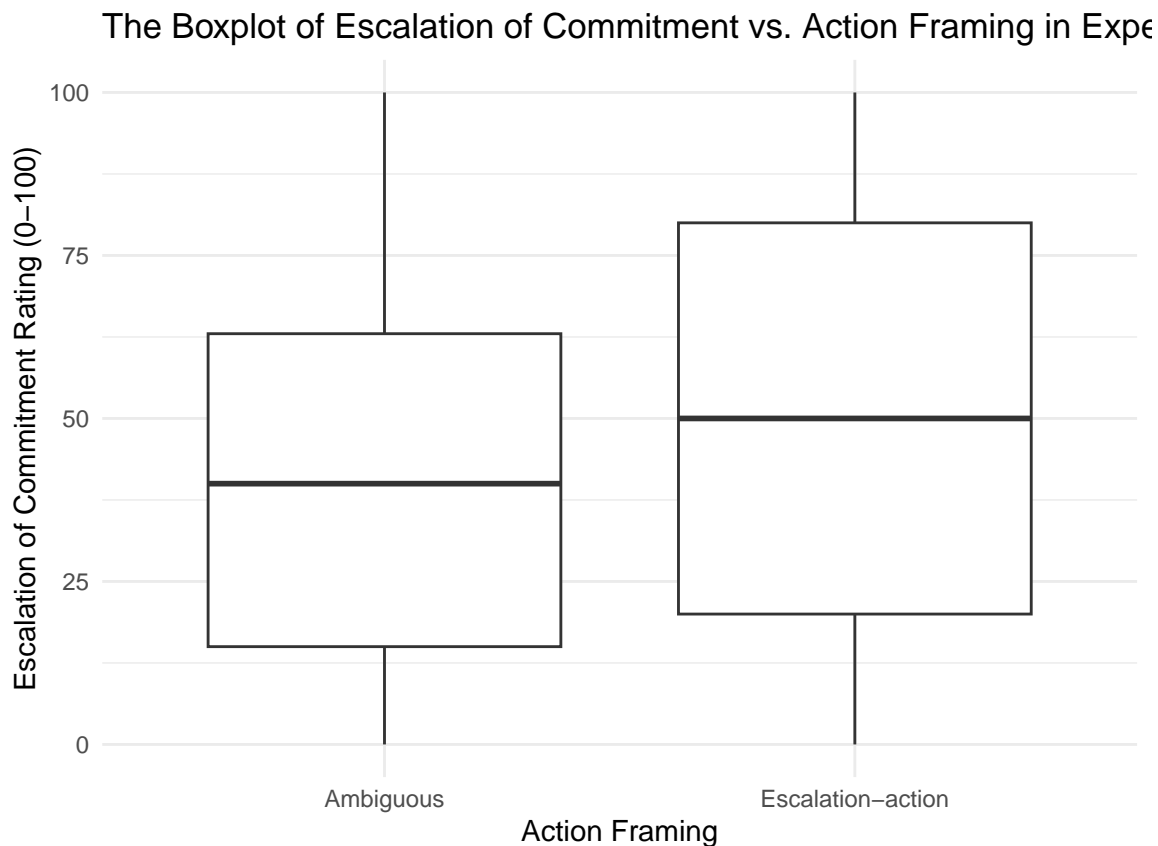

Figure 3: Boxplot

3.4 Experiment 3: Contrasting Ambiguous with Deescalation-action

In Figure 4, we repeated the same experiment as Experiment 3 from the original paper, comparing the willingness of two groups of participants to continue with a project: "de-escalation-action" and "ambiguous" group. The boxplot shows that the "de-escalation" group has a wider IQR, suggesting larger maximum value, smaller minimum value, and more variability compared to the "ambiguous" data. However, the mean score for "de-escalation-action" (38.94) is lower than for "ambiguous" (41.81), despite the small difference and the means being close. The larger the means are, the more willingly the participants are going to escalate their commitment. This indicates that participants were more inclined to escalate their commitment in ambiguous situations than in the "de-escalation-action" group.
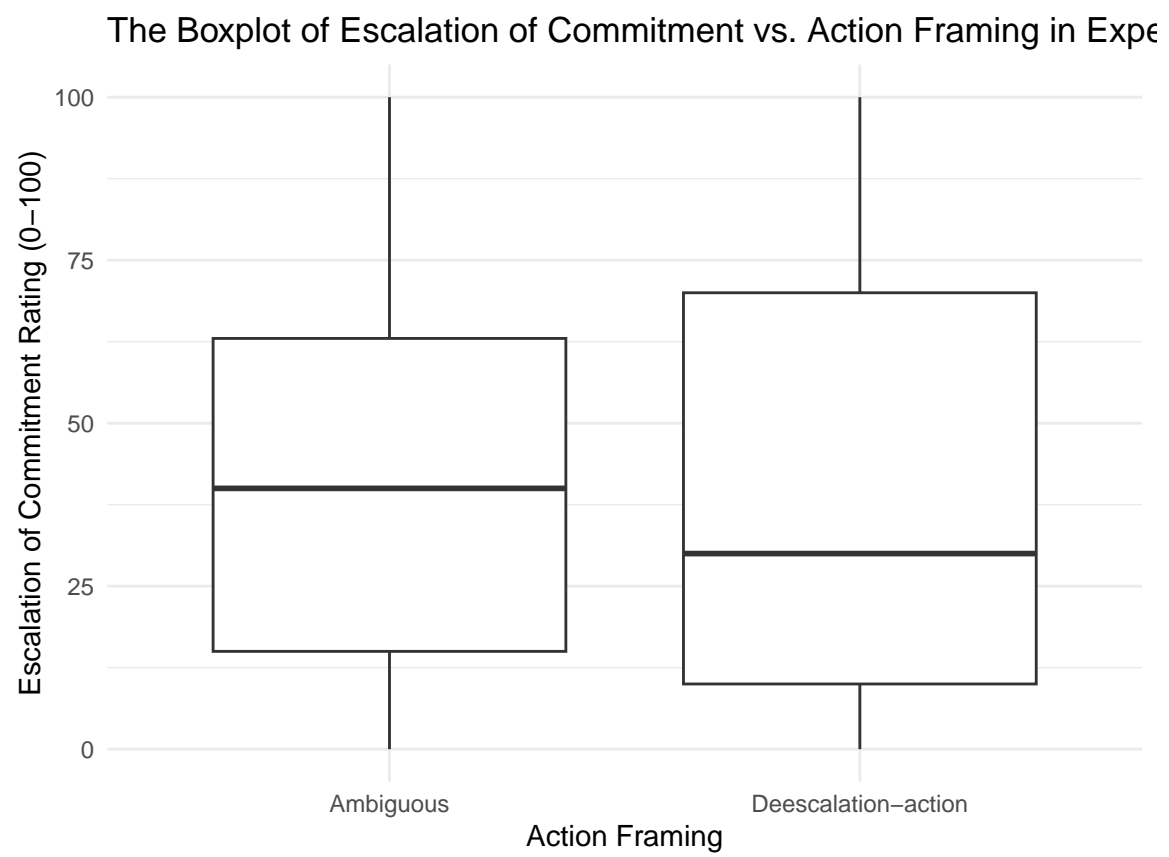
The Boxplot of Escalation of Commitment vs. Action Framing in Expe

Escalation of Commitment Rating (0–100)

Action Framing

Ambiguous   Deescalation–action

Figure 4: Boxplot

3.5 Experiment 4: Contrasting Escalation-action with Deescalation-action

In Figure 5, we expanded on Experiment 3 by assessing participants' expectations of failure versus success and their willingness to continue with the project. Participants were asked four questions, considering two choices and outcomes—action or inaction, and negative or positive—then rated their feelings. The scale was 0-100, with 100 meaning absolute willingness to continue, and 0 indicating a desire to terminate the project. Figure 5 replicates Experiment 4 from the original study, comparing the scores of "escalation-action" and "de-escalation-action." The boxplot shows that "escalation-action" had a higher average (54.34) compared to "de-escalation-action" (43.96), indicating a stronger tendency to escalate, especially after considering potential decisions and anticipated emotional outcomes. The "de-escalation-action" data showed greater diversity, as indicated by the interquartile range (IQR).
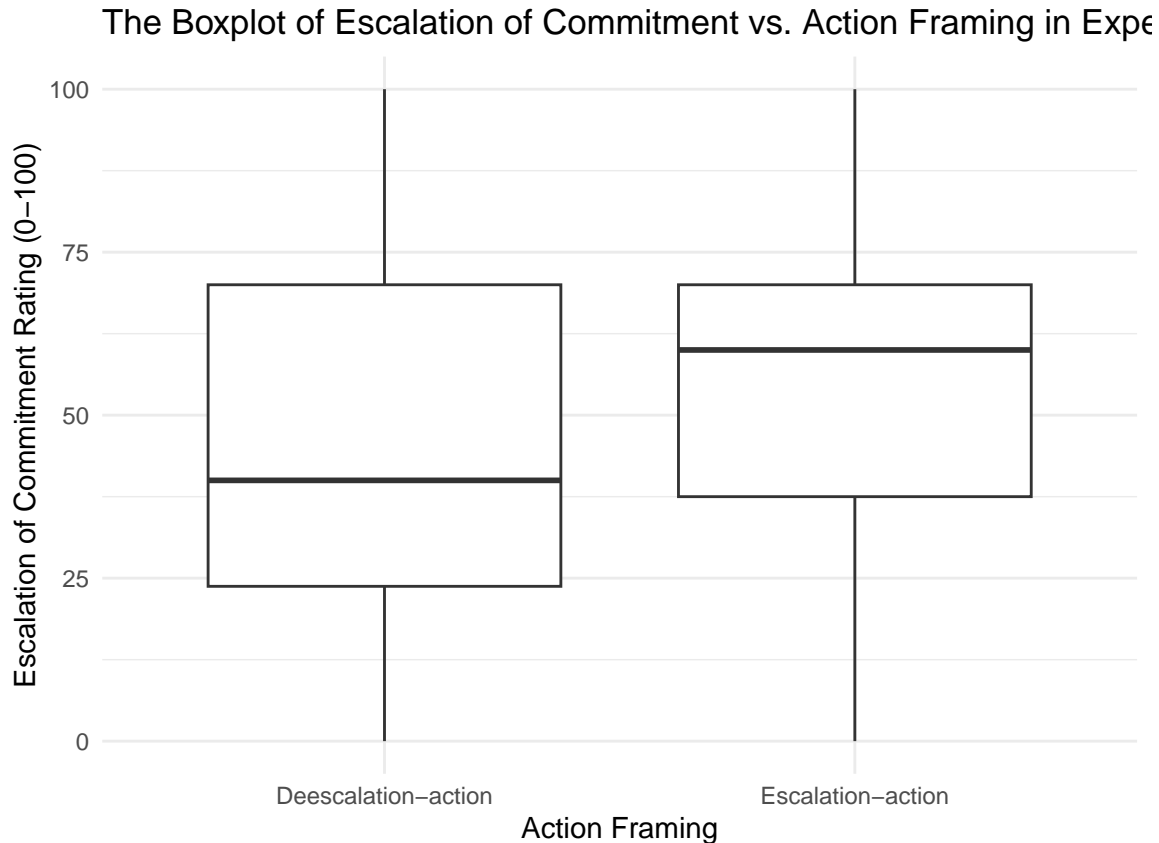

Figure 5: Boxplot

3.6 Experiment 4: Contrasting Escalation-action with Ambiguous

In Figure 6, we replicates Experiment 4 in original study, comparing the "escalation-action" group and "ambiguous" group's willingness to continue the project, now incorporating participants' outcome expectations. The boxplot illustrates both groups' scores on their decision to proceed with the experiment, where 100 signifies a strong desire to continue, and 0 signifies a decision to stop. It highlights that the "escalation-action" group's average score is 54.34, indicating a stronger inclination to proceed compared to the "ambiguous" group's average of 46.75. However, the "ambiguous" group displays a wider IQR, suggesting greater variability in willingness to continue. Despite introducing some new conditions in the experiment, the data aligns with the results from figure 3, showing that participants continued to be willing to proceed with the project in the "escalation-action" scenario.
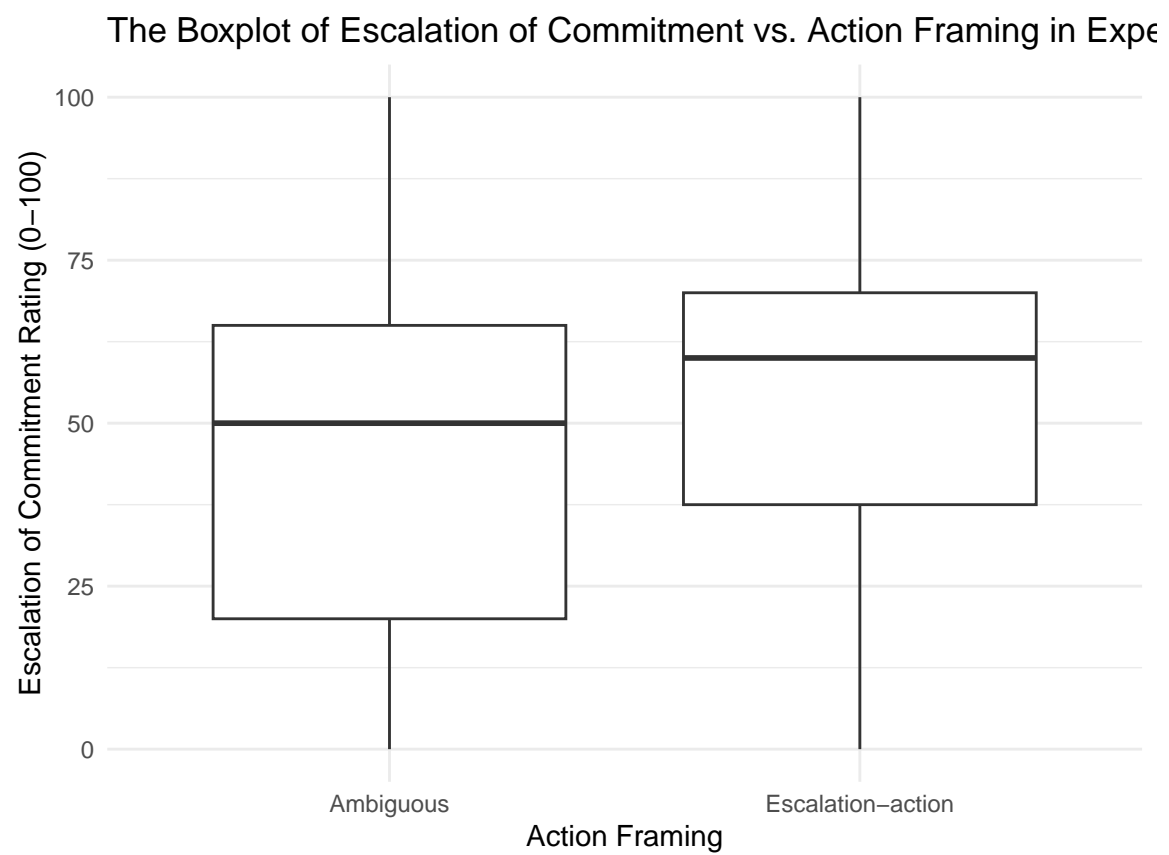
The Boxplot of Escalation of Commitment vs. Action Framing in Expe

Figure 6: Boxplot

3.7 Experiment 4: Contrasting Deescalation-action with Ambiguous

In Figure 7, the experiment from Experiment 4 of original paper was replicated, comparing the willingness of different groups of participants to continue the project between "de-escalation-action" and "ambiguous" conditions. The boxplot shows that although the "de-escalation-action" group's maximum value is slightly higher than that of the ambiguous group, its mean score is lower than the ambiguous group's, at 43.96 versus 46.75, respectively. Higher scores indicate a greater desire to escalate commitment. This data suggests that compared to the "de-escalation-action" group, participants in the ambiguous group were more inclined to want the project to continue. This finding aligns with the results from Figure 4, indicating that under various conditions, participants in the ambiguous group are more inclined to escalate their commitment.
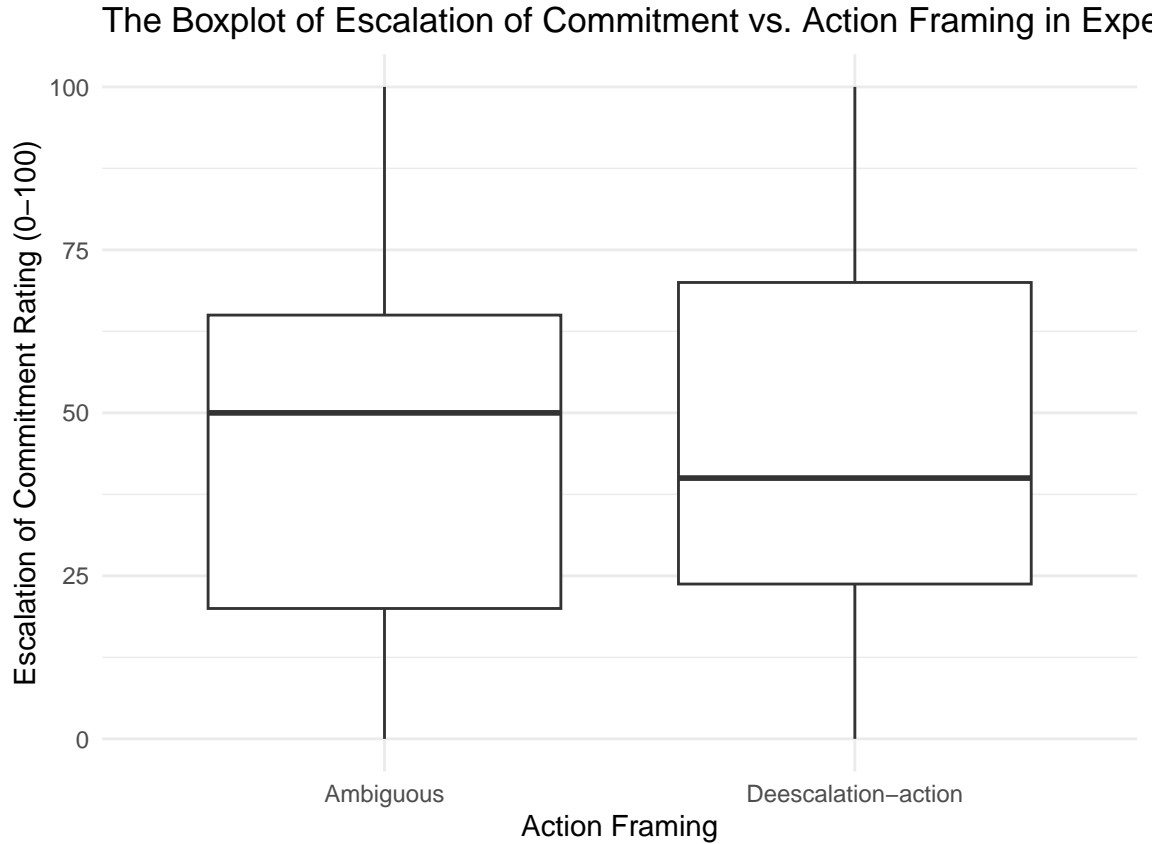

Figure 7: Boxplot

4 Discussion

4.1 Why do escalation groups favor carrying out initiatives to completion?

Figure 1 shows that when buying a ticket is viewed as an "action" (upgrade group), people are more likely to stick to the plan. This is consistent with an optimistic outlook for dealing with the problem. Individuals may act out of an innate sense of responsibility to prevent loss, even if doing so entails additional expenses. In this case, since the activity promotes good coping, it can be seen as a means of reducing psychological stress. People who choose to stop action and instead consider continuing to purchase tickets as "no action" may be less willing to take corrective action as a result of this information. Since taking further action can psychologically relieve psychological stress, people are more likely to accept the loss. Psychological stress is crucial to this process because it affects how people perceive a loss. This psychological stress may be exacerbated by the sunk cost fallacy [@tversky1996reality], which holds that because people cannot bear the loss of resources they have already used, they have to take action to "save" the situation.

4.2 Stay neutral in the choice

From Figures 2, 3 and 4, we can see that the intention to continue the project is highest in the promotion group, while the intention of the fuzzy group without an action framework ranks second, and the intention of the demoted group is relatively low. When it is not clear which option is better, people may exhibit decision inertia, that is, a tendency to maintain the status quo [], which we can understand from multiple perspectives. First, from a cognitive point of view, maintaining the status quo reduces the psychological burden. Secondly, emotional factors also play a role in the decision-making process, and anxiety caused by uncertainty may cause individuals to avoid taking action as an emotional defense mechanism [@bowins2004psychological]. At the same time, individuals' social background may also affect their decision-making tendencies, especially under the influence of Confucian thinking in Hong Kong culture. They may be more receptive to a conflict-avoidance culture, and taking a middle position may be considered a better behavior [@leung2002dualistic]. This inertia may have led participants in the fuzzy group to adopt a more conservative stance between promotion and demotion, helping individuals avoid the uncertainty that might come with change [power2018decision]. This explains why their willingness is lower than that of the promotion group and higher than that of the demotion group.

4.3 The role of enhanced emotional projection on psychological stress

After studying figures 5, 6, and 7, it can be found that the ranking of willingness to continue the project has not changed, but the gap between each willingness is increasing. This is because the experiment is more complex and closer to the real situation, increasing the tester's thinking and pressure on the experiment itself. When individuals are better able to understand other people's situations, they may also be more aware of their own emotional states and, as a result, choose more authentic coping strategies. At the same time, enhanced emotional projection in heightened stressful situations can help resolve conflict. When individuals are able to understand the complexity of a problem, they are more likely to find a satisfactory solution, which reduces stress. When faced with ambiguous situations, individuals may need to invest more cognition to interpret the information, which may increase their stress and tend to choose a willingness that is neither too optimistic nor too pessimistic than the intermediate one, which may explain why the ambiguous group ranks second in some assessments. People's psychological evaluations of action and inaction are influenced by emotional stress, and they may face immediate losses if things don't take action. This way of thinking is enabled when people reinforce the presupposition that these outcomes could have been avoided if they had acted differently [@reb2010effects].

5 Conclusion

This study complements the research results of Gilad Feldman and Huang Jianhui, demonstrating the important role of psychological load in project management decision-making. The findings suggest that decision-makers are more likely to stick to their investments even when faced with the risk of project failure under a "no action" framework, supporting the theory of active loss avoidance. Furthermore, research has shown that in situations of uncertainty, when there is no clear framework for action, decision makers behave more conservatively, which may be influenced by decision inertia. This study highlights the importance of identifying these psychological factors in the decision-making process and highlights how knowledge of these effects can help individuals make better decisions in challenging situations.

5.1 Weakness and next step

Although the study provided a wealth of information, it also had certain limitations. For example, the experimental design is too simplistic because people know that the choices made do not affect real life, and participants may know that they are being observed, which may influence their choices. In reality people may be affected by more factors such as financial stress and time emotionally invested, which may be difficult to fully replicate in a laboratory setting. In addition, the sample of participants is too simple, only the data of Hong Kong students, different ethnic groups and different age groups were not included in the experiment. To improve the generality of the findings, more ethnically diverse participants should be included in future

studies. In order to more accurately simulate the real world decision-making environment, more complex experimental situations must be created. The direction of future research is how to apply these results to the real world to make more informed decisions. With more research, we will be able to better understand the impact of complex human psychology on the decision-making process. This understanding will enable us to create more successful project outcomes.

6   References