

Analytical Thinking Reduces Affective Forecasting Impact Bias

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Date: 2020-05-07T00:00:00+00:00

Abstract

Individuals need to forecast the potential outcomes of decisions prior to making them. People tend to overestimate the emotional impact of future events, a phenomenon known as impact bias. Drawing on dual-system theory, this study examined whether analytical thinking can reduce impact bias in affective forecasting. Experiment 1 (using picture priming) and Experiment 2 (using a verbal fluency task) investigated the effect of analytical thinking on impact bias and analyzed the mediating role of affective forecasting intensity. Experiment 3, conducted in a field setting with a real-world decision (having a second child) as an example, examined the effect of analytical thinking priming on affective forecasting. The results revealed that analytical thinking reduces the intensity of affective forecasts, thereby decreasing impact bias in affective forecasting.

Full Text

Analytical Thinking Reduces Impact Bias in Affective Forecasting

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Abstract

People often overestimate the emotional impact of future events, a phenomenon known as impact bias. Drawing on dual-process theory, this research investigated whether analytical thinking can reduce impact bias in affective forecasting. Experiments 1 and 2 examined the effect of analytical thinking on impact bias using picture priming and a verbal fluency task, respectively, and analyzed the mediating role of affective forecasting intensity. Experiment 3 investigated the effect of analytical thinking priming on affective forecasting in a real-world decision context (having a second child). The results demonstrated that analytical

thinking reduces affective forecasting intensity, which in turn reduces impact bias.

Keywords: analytic thinking; affective forecasting; impact bias; dual-process theory

People typically predict the emotional consequences of their decisions before making them, and most decisions are based on these affective forecasts. Affective forecasting refers to individuals' predictions about their future emotional reactions to events (Wilson & Gilbert, 2003). If people anticipate that an option will yield more positive emotions, they are more likely to accept it; conversely, they will reject it. Research has shown that people frequently overestimate the impact of future events on their emotions, a phenomenon termed impact bias (Morewedge & Buechel, 2013; Wilson & Gilbert, 2003).

1.1 Interventions for Impact Bias in Affective Forecasting

Since Gilbert and colleagues first proposed the concept of impact bias (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998), numerous studies have investigated its sources, leading to various intervention methods based on different theoretical accounts.

Early research identified focalism and immune neglect as primary sources of impact bias. Focalism refers to the tendency to focus exclusively on the central event's impact while ignoring the influence of concurrent incidental events. Immune neglect involves failing to consider people's capacity to adapt to future events (Gilbert et al., 1998; Wilson, Wheatley, Meyers, Gilbert, & Axson, 2000; Geng & Jiang, 2017; Liang, Li, Li, & Liu, 2007). Based on these mechanisms, researchers developed defocusing exercises (Ubel et al., 2001; Wilson et al., 2000) and adaptation exercises (Ubel, Loewenstein, & Jepson, 2005). In defocusing exercises, participants detail their life experiences after a predicted event, identifying what would change and what would remain constant to counteract focalism. For example, Wilson et al. (2000) asked sports fans to predict their emotions after their team won or lost. One group completed a defocusing exercise by writing diary entries about specific activities they would engage in during the two days following the game (e.g., eating, socializing with friends, attending classes) and how much time each activity would occupy, while a control group did not write diaries. The results showed that the diary-writing group made more moderate and accurate affective forecasts compared to the control group. Adaptation exercises primarily involve recalling how feelings from similar past experiences changed over time, thereby reminding people of their adaptability to life events (Geng & Zhang, 2015).

Subsequently, Gilbert and Wilson (2007; 2009) explained impact bias from a mental simulation perspective. This view posits that when making affective forecasts, people first mentally simulate future events (previews), which generates an emotional response (premotions), and then use this as a basis for predicting future emotional reactions (predictions). Only when the simulation

content and context match those of the actual event will the simulated emotion accurately predict the real emotion; otherwise, affective forecasting errors occur. Accordingly, bias can be reduced by decreasing reliance on mental simulation. For instance, researchers have proposed a surrogation strategy, where people base their affective forecasts on reports from others who have experienced similar events rather than on their own mental simulations. Studies have found that surrogation effectively improves affective forecasting accuracy (Eggleston, Wilson, Lee, & Gilbert, 2015). Additionally, researchers have examined whether mindfulness training can improve affective forecasting accuracy by enhancing emotional understanding and awareness and improving mental simulation precision. Studies have shown that individuals high in trait mindfulness more accurately predict their emotional responses to future events, exhibiting less impact bias and less extreme affective forecasting intensity (Emanuel, Updegraff, Kalmbach, & Ciesla, 2010; Kong, 2015). Hong, Lishner, Vogels, and Ebert (2016) further investigated the effect of mindfulness training on affective forecasting bias through a field experiment, finding that participants in the mindfulness intervention condition more accurately predicted their negative emotions upon learning their exam scores compared to the control group, indicating that mindfulness intervention can improve affective forecasting accuracy.

The accessibility model of emotional self-report (Robinson & Clore, 2002) analyzes the information underlying different types of emotional reports from an accessibility perspective. It posits that when predicting emotions from future events, people lack access to specific episodic memory information and therefore intuitively base their forecasts on existing beliefs. Consumer decision research also indicates that consumers typically predict product-related emotions based on common knowledge and beliefs (Xu & Jiang, 2009; Schwarz & Xu, 2011). Affective forecasts rely on beliefs, whereas actual emotional experiences are based on immediate emotions. Because beliefs are often abstract while actual emotional experiences are influenced by events unrelated to the predicted event, affective forecasting errors frequently occur. This raises the question: can intervening on beliefs reduce affective forecasting bias?

Previous research has rarely examined affective forecasting impact bias from the perspective of intervening on intuitive beliefs. Dual-process theory posits that human decision-making involves two systems: an intuitive heuristic system (System 1) and a reasoning-based analytical system (System 2) (Kahneman, 2003; Sun, Li, & Yin, 2007). The intuitive system relies on fast, automatic, parallel processing that is rapid and consumes minimal psychological resources. In contrast, the analytical system relies more on rational, serial processing that is slower, consumes more psychological resources, and is non-modular. Compared to the intuitive system, the analytical system is less susceptible to interference from background similarity and stereotypes, operates primarily based on rules, and its processing and outcomes are consciously accessible (Evans, 2008; Kahneman, 2003). In competition between the two systems, the heuristic system often prevails, which is the root of irrational biases in decision-making (Evans, 2003). However, when analytical thinking is primed, System 2 can override System 1

(Evans, 2008; Kahneman, 2003). Therefore, the present research addresses the question: can the analytical system intervene in intuitive beliefs and thereby reduce impact bias in affective forecasting?

1.2 Analytical Thinking and Impact Bias

Previous research conceptualizes intuitive thinking as System 1 and analytical thinking as System 2 (Gervais & Norenzayan, 2012). Studies have shown that analytical thinking priming can weaken the influence of beliefs, such as reducing religious belief (Gervais & Norenzayan, 2012; Stagnaro, Ross, Pennycook, & Rand, 2019), decreasing prejudice against atheists (Yilmaz, Karadöller, & So-fuoglu, 2016; Franks & Scherr, 2017), and weakening conspiracy theory beliefs (Swami, Voracek, Stieger, Tran, & Furnham, 2014).

According to the accessibility model of emotional self-report (Robinson & Clore, 2002), people intuitively base their affective forecasts on existing common knowledge and beliefs. When analytical thinking is primed, System 2 overrides System 1 (Evans, 2008), thereby weakening belief-based intuitive processing. Therefore, when predicting emotions from future events, priming analytical thinking should reduce the influence of beliefs on affective forecasting and decrease forecasting intensity. Reduced affective forecasting intensity should further reduce impact bias and improve forecasting accuracy (Wilson et al., 2000; Eggleston et al., 2015; Hong et al., 2016; Hoerger, Quirk, Lucas, & Carr, 2010). For example, Wilson et al. (2000) found that defocusing interventions led to more moderate and accurate affective forecasts with less impact bias. Emanuel et al. (2010) found that individuals high in trait mindfulness made less extreme affective forecasts with less impact bias. Based on this evidence, we propose that priming analytical thinking weakens the influence of beliefs on affective forecasting, reduces forecasting intensity, and thereby reduces impact bias. In summary, we hypothesize that analytical thinking reduces affective forecasting intensity, which in turn reduces impact bias.

To test this hypothesis, the present research comprises three experiments. Experiments 1 (using picture priming) and 2 (using a verbal fluency task) examined the effect of analytical thinking on impact bias and analyzed the mediating role of affective forecasting intensity. Experiment 3 investigated the effect of analytical thinking priming on affective forecasting in a real-world decision context (having a second child).

Experiment 1

Experiment 1 used pictures to prime analytical thinking. To verify the effectiveness of this priming method, we first conducted a pilot study.

2.1.1 Participants

We recruited 64 university students (10 male, 54 female) with a mean age of 18.08 years ($SD = 3.87$) and normal corrected vision. The analytical thinking priming group included 34 participants, and the control group included 30 participants. Using G*Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007), we calculated that an independent samples t-test with statistical power of $1 - \beta = 0.80$, two-tailed $\alpha = 0.05$, and effect size $d = 0.80$ required a sample size of 52.

2.1.2 Experimental Design

Following Gervais et al. (2012), we used pictures of Rodin's classic sculpture "The Thinker" to prime analytical thinking. We selected four pictures of "The Thinker" from different angles, each presented for 3000 ms. Participants were instructed to view the pictures carefully and answer two questions to ensure attentive processing: (1) Which hand is supporting the face, left or right? (2) What is the facial expression of the sculpture? The control condition viewed four geometric figures.

We measured analytical thinking using the Cognitive Reflection Test (CRT) (Frederick, 2005). The CRT assesses the ability to override intuitive but incorrect responses with analytical thinking, making it an appropriate measure of analytical thinking. We selected two items: (1) A bat and a ball cost 11 yuan total, with the bat costing 10 yuan more than the ball. How much does the ball cost? (2) If 5 machines take 5 minutes to make 5 widgets, how long would 100 machines take to make 100 widgets? Correct answers received 1 point, incorrect answers received 0 points, with total scores ranging from 0 to 2. This CRT measure has been used in previous analytical thinking priming research (Gervais & Norenzayan, 2012; Yilmaz et al., 2016; Stagnaro et al., 2019).

2.1.3 Procedure

The experiment was presented on computers using E-Prime in one-on-one sessions. Participants were randomly assigned to either the analytical thinking priming group or the control group. After viewing the pictures, they completed the Cognitive Reflection Test.

2.1.4 Results

An independent samples t-test revealed that participants in the picture priming group ($M = 1.56$, $SD = 0.50$) scored significantly higher on the CRT than those in the control group ($M = 1.00$, $SD = 0.83$), $t(62) = 3.30$, $p = 0.002$, 95% CI [0.22, 0.90], $d = 0.82$. These results demonstrate that "The Thinker" pictures effectively primed analytical thinking.

2.2.1 Participants

We recruited 240 university students (92 male, 148 female) with a mean age of 21.96 years ($SD = 1.73$). The analytical thinking priming group and control group each included 120 participants. Using G*Power 3.1 (Faul et al., 2007), we calculated that a two-way between-subjects ANOVA with statistical power of $1 - \beta = 0.80$, $\alpha = 0.05$, and medium effect size $f = 0.25$ required a sample size of 158. In this study, impact bias did not differ significantly between male ($M = 0.79$, $SD = 0.91$) and female ($M = 0.72$, $SD = 0.61$) participants, $t(238) = 0.71$, $p = 0.48$, 95% CI $[-0.12, 0.40]$.

2.2.2 Experimental Design

The independent variables were analytical thinking priming and acceptance/rejection condition. (1) For the priming manipulation, the experimental group viewed four pictures of “The Thinker,” while the control group viewed geometric figures, using the same materials and presentation method as the pilot study. (2) For the acceptance/rejection condition, participants played an ultimatum game in which they proposed a division of 100 yuan between themselves and another participant. The proposer made a single offer, and if the responder accepted, the money was divided accordingly; if rejected, both parties received nothing (Zhang, 2005). In reality, participants received randomly determined acceptance or rejection feedback from the experimenter.

The dependent variables were affective forecasting and affective experience. Following Gilbert et al. (1998), we used a self-developed affective rating questionnaire. Participants first predicted how they would feel (happy, joyful, pleased) if their proposal was accepted or rejected, using a 5-point scale (1 = very unhappy/unjoyful/unpleased; 5 = very happy/joyful/pleased). Higher scores indicated more intense positive emotions, while lower scores indicated more intense negative emotions. After learning whether their proposal was accepted or rejected, participants rated their actual emotional experience using the same questionnaire. In this study, the internal consistency was $\alpha = 0.91$ for the affective forecasting questionnaire and $\alpha = 0.96$ for the affective experience questionnaire.

2.2.3 Procedure

Participants were first introduced to the ultimatum game rules and asked to predict their emotions following acceptance or rejection. Before making these predictions, the experimental group viewed “The Thinker” pictures, while the control group viewed geometric figures. Finally, participants received random feedback of acceptance or rejection and rated their actual emotional experience. Impact bias was calculated as the difference between predicted and experienced emotions within each condition: for acceptance trials, acceptance prediction minus acceptance experience; for rejection trials, rejection prediction minus rejection experience.

2.2.4 Results

2.2.4.1 Effect of Analytical Thinking on Affective Forecasting in Acceptance and Rejection Conditions

A 2 (priming: analytical thinking vs. control) \times 2 (outcome: acceptance vs. rejection) between-subjects ANOVA revealed a significant main effect of analytical thinking priming, $F(1, 239) = 10.18$, $p = 0.002$, partial $\eta^2 = 0.04$; a significant main effect of acceptance/rejection, $F(1, 239) = 554.34$, $p < 0.001$, partial $\eta^2 = 0.70$; and a significant interaction, $F(1, 239) = 43.58$, $p < 0.001$, partial $\eta^2 = 0.16$. Affective forecasts were significantly higher in the acceptance condition ($M = 4.33$, $SD = 0.71$) than in the rejection condition ($M = 2.15$, $SD = 0.85$), $t(238) = 21.71$, $p < 0.001$, 95% CI [1.99, 2.39].

Simple effects analysis revealed that in the acceptance condition, participants primed with analytical thinking ($M = 4.19$, $SD = 0.81$) predicted less positive emotion than control participants ($M = 4.50$, $SD = 0.55$), $t(126) = 2.54$, $p = 0.012$, $d = 0.45$, 95% CI [0.07, 0.56]. In the rejection condition, participants primed with analytical thinking ($M = 2.63$, $SD = 0.70$) predicted less negative emotion than control participants ($M = 1.73$, $SD = 0.74$), $t(110) = -6.57$, $p < 0.001$, $d = -1.25$, 95% CI [-1.17, -0.63].

2.2.4.2 Effect of Analytical Thinking on Impact Bias in Acceptance and Rejection Conditions

To examine the effect of analytical thinking on impact bias, we calculated impact bias as the absolute difference between predicted and experienced emotions. A 2 (priming) \times 2 (outcome) between-subjects ANOVA showed a significant main effect of analytical thinking priming, $F(1, 236) = 111.11$, $p < 0.001$, with the analytical thinking group ($M = 0.34$, $SD = 0.44$) showing significantly reduced impact bias compared to the control group ($M = 1.15$, $SD = 0.75$). The main effect of acceptance/rejection was also significant, $F(1, 236) = 34.49$, $p < 0.001$, with greater impact bias in the rejection condition ($M = 1.01$, $SD = 0.83$) than in the acceptance condition ($M = 0.51$, $SD = 0.55$). The interaction was not significant, $F(1, 236) = 0.91$, $p = 0.34$. As shown in Figure 1 [Figure 1: see original paper], analytical thinking priming reduced affective forecasting intensity and impact bias regardless of whether proposals were accepted or rejected.

2.2.4.3 Mediation Analysis of Affective Forecasting in Reducing Impact Bias

To test whether affective forecasting mediated the effect of analytical thinking priming on impact bias, we used Hayes' (2013) bootstrap method with Model 4. Results showed that: (1) In the acceptance condition, the indirect effect of affective forecasting was significant, with an effect size of -0.09, 95% CI [-0.19, -0.03], indicating that affective forecasting mediated the effect of analytical thinking priming on impact bias; (2) In the rejection condition, the indirect effect was also significant, with an effect size of 0.77, 95% CI [0.46, 1.21], indicating that affective forecasting mediated the effect of analytical thinking priming on

impact bias in the rejection condition.

We also tested whether affective experience mediated the effect. Using Hayes' (2013) bootstrap method with Model 4, results showed that: (1) In the acceptance condition, the indirect effect of affective experience was not significant, effect size = -0.09, 95% CI [-0.20, 0.03]; (2) In the rejection condition, the indirect effect of affective experience was also not significant, effect size = 0.26, 95% CI [-0.03, 0.60]. These findings indicate that affective experience does not mediate the effect of analytical thinking priming on impact bias.

Experiment 1 demonstrated that analytical thinking priming reduced affective forecasting intensity and impact bias regardless of whether proposals were accepted or rejected, supporting our hypothesis. Mediation analyses revealed that affective forecasting, but not affective experience, mediated the effect of analytical thinking priming on impact bias, suggesting that analytical thinking reduces impact bias by decreasing affective forecasting intensity. Experiment 2 used a different priming method to further test the effect of analytical thinking priming on impact bias.

Experiment 2

Experiment 2 used a verbal fluency task to prime analytical thinking. We first conducted a pilot study to verify the effectiveness of this priming method.

3.1.1 Participants

We recruited 55 university students (5 male, 50 female) with a mean age of 20.05 years ($SD = 1.01$) and normal corrected vision. The analytical thinking priming group included 28 participants, and the control group included 27 participants. Using G*Power 3.1 (Faul et al., 2007), we calculated that an independent samples t-test with statistical power of $1 - \beta = 0.80$, two-tailed $\alpha = 0.05$, and effect size $d = 0.80$ required a sample size of 52.

3.1.2 Experimental Design

Following Gervais et al. (2012), we used a verbal fluency task to prime analytical thinking. Participants were asked to rearrange scrambled words into sentences. Each set contained five words, and participants had to eliminate one word and form a sentence from the remaining four. For example, "this, word, is, running, yellow-dog" could be rearranged as "this yellow-dog is running." The analytical thinking priming condition included ten sentences, five of which contained words like "analyze" and "reasoning," while the other five were unrelated to analytical thinking. The control group's ten sentences were all unrelated to analytical thinking. After completing the verbal fluency task, participants took the same CRT used in Experiment 1's pilot study. To control for task difficulty, participants rated the difficulty of the verbal fluency task on a 5-point scale (1 = very easy; 5 = very difficult).

3.1.3 Procedure

The experiment was presented on computers using E-Prime in one-on-one sessions. Participants were randomly assigned to either the analytical thinking priming group or the control group. After completing the verbal fluency task, they took the CRT and rated task difficulty.

3.1.4 Results

An independent samples t-test showed that participants in the analytical thinking priming group ($M = 1.50$, $SD = 0.69$) scored significantly higher on the CRT than those in the control group ($M = 1.00$, $SD = 0.83$), $t(53) = 2.42$, $p = 0.02$, 95% CI [0.09, 0.91], $d = 0.66$. Additionally, there was no significant difference in perceived task difficulty between the analytical thinking priming group ($M = 1.93$, $SD = 1.05$) and the control group ($M = 1.96$, $SD = 1.13$), $t(53) = -0.12$, $p = 0.91$, 95% CI [-0.62, 0.55]. These results demonstrate that the verbal fluency task effectively primed analytical thinking.

3.2.1 Participants

We recruited 52 university students (9 male, 43 female) with a mean age of 19.23 years ($SD = 0.99$) and normal corrected vision. The analytical thinking priming group and control group each included 26 participants. Using G*Power 3.1 (Faul et al., 2007), we calculated that an independent samples t-test with statistical power of $1 - \beta = 0.80$, two-tailed $\alpha = 0.05$, and effect size $d = 0.80$ required a sample size of 52. In this experiment, impact bias did not differ significantly between male ($M = 0.74$, $SD = 1.21$) and female ($M = 0.42$, $SD = 0.65$) participants, $t(50) = 1.14$, $p = 0.26$, 95% CI [-0.24, 0.89].

3.2.2 Experimental Design

Participants completed a memory test using nonsense syllables composed of three letters, with study and test phases. Their task was to judge whether syllables were old or new. Participants were told this was a classic memory test that accurately measured memory ability and that achieving 90% or higher accuracy would earn them a 15-yuan cash reward, while scores below 90% would yield no reward. In reality, the average accuracy was 71.56%, and no participant achieved 90% accuracy.

Before the memory test, participants predicted the positive emotions (happy, joyful, pleased) they would experience if they achieved 90% accuracy or the negative emotions (unhappy, unjoyful, displeased) they would experience if they failed to achieve 90%, using a 5-point scale (1 = not at all; 5 = very strongly). After learning their scores did not reach 90%, participants immediately rated their actual negative emotional experience. Impact bias was calculated as the difference between predicted and experienced negative emotions. The negative affective forecasting questionnaire had internal consistency $\alpha = 0.91$, and the negative affective experience questionnaire had $\alpha = 0.92$.

3.2.3 Procedure

Upon arrival at the laboratory, participants received instructions for the memory test and completed practice trials. They then performed the verbal fluency task, predicted their emotions for both success and failure outcomes, completed the memory test, received feedback, and immediately rated their emotional experience.

3.2.4 Results

3.2.4.1 Effect of Analytical Thinking Priming on Affective Forecasting and Impact Bias

We compared negative affective forecasting, affective experience, and impact bias between the analytical thinking priming and control groups, as shown in Table 1. Independent samples t-tests revealed that the analytical thinking priming group showed significantly lower affective forecasting than the control group, while there was no significant difference in affective experience between groups. The priming group also showed significantly smaller impact bias than the control group.

Table 1 Independent Samples t-Tests for Affective Forecasting, Affective Experience, and Impact Bias Across Conditions

Dependent Variable	Priming Group (M \pm SD)	Control Group (M \pm SD)	95% CI
Affective Forecasting	2.19 \pm 0.81	2.78 \pm 0.99	[-1.09, -0.87]
Affective Experience	1.94 \pm 0.54	2.09 \pm 1.09	[-0.63, 0.33]
Impact Bias	0.26 \pm 0.65	0.69 \pm 0.83	[-0.85, -0.02]

3.2.4.2 Mediation Analysis of Affective Forecasting in Reducing Impact Bias

To test whether affective forecasting mediated the effect of analytical thinking priming on impact bias, we used Hayes' (2013) bootstrap method with Model 4 and 5,000 bootstrap samples. Results showed a significant indirect effect of affective forecasting, with an effect size of -0.23, 95% CI [-0.61, -0.04], indicating that affective forecasting mediated the effect of analytical thinking priming on impact bias. As shown in Figure 4 [Figure 4: see original paper], analytical thinking priming reduced impact bias by decreasing affective forecasting intensity.

We also tested whether affective experience mediated this effect. Using Hayes' (2013) bootstrap method with Model 4, results showed a non-significant indirect

effect of affective experience, effect size = 0.05, 95% CI [-0.06, 0.27], indicating that affective experience does not mediate the effect of analytical thinking priming on impact bias.

Experiment 2 demonstrated that analytical thinking priming significantly reduced affective forecasting for memory test failure and consequently reduced impact bias. Mediation analysis confirmed that affective forecasting, but not affective experience, mediated the effect of analytical thinking priming on impact bias, replicating the findings of Experiment 1. Experiment 3 further examined whether analytical thinking priming reduces affective forecasting in a real-life context.

Experiment 3

4.1 Participants

We recruited 111 married women with one child (mean child age = 1.40 years, SD = 0.49) who had not yet had a second child from locations where mothers congregate, such as elementary school gates and bookstores. The final sample included 108 valid participants with a mean age of 34.77 years (SD = 5.02) and normal corrected vision. The control group included 51 participants, and the priming group included 57 participants. Using G*Power 3.1 (Faul et al., 2007), we calculated that a between-subjects t-test with statistical power of $1 - \beta = 0.80$, two-tailed $\alpha = 0.05$, and effect size $d = 0.80$ required a sample size of 52.

4.2 Experimental Design

4.2.1 Independent Variable: The priming group viewed four pictures of “The Thinker,” while the control group viewed geometric figures, using the same materials and presentation method as Experiment 1.

4.2.2 Dependent Variable: Affective forecasting. Following Wirtz, Kruger, Scollon, and Diener (2003), we selected emotion words relevant to having a second child. Participants predicted the positive emotions (happiness, joy, excitement) and negative emotions (depression, pain, exhaustion) they would experience after having a second child using a 7-point scale (1 = not at all; 7 = extremely strong). Higher scores indicated more intense predicted emotions. The positive affective forecasting questionnaire had internal consistency $\alpha = 0.96$, and the negative affective forecasting questionnaire had $\alpha = 0.84$.

4.3 Procedure

The experiment was conducted in a quiet room with all procedures completed on computer. Upon arrival, the priming group viewed “The Thinker” pictures, while the control group viewed geometric figures. Participants then predicted the positive and negative emotions they would experience after having a second child.

4.4 Results

Independent samples t-tests showed that when predicting positive emotions from having a second child, the priming group predicted significantly less positive emotion than the control group. However, when predicting negative emotions, there was no significant difference between the priming and control groups (see Table 2).

Table 2 Independent Samples t-Tests for Positive and Negative Affective Forecasting

Affective Forecasting	Priming Group (M \pm SD)	Control Group (M \pm SD)	95% CI
Positive Emotions	4.54 \pm 1.63	5.18 \pm 1.66	[0.01, 1.27]
Negative Emotions	2.98 \pm 1.32	2.69 \pm 1.65	[-0.86, 0.28]

Experiment 3 found that analytical thinking priming reduced positive affective forecasting for having a second child, consistent with our hypothesis. After priming analytical thinking, people no longer focused solely on the joy of a new life but considered various events more rationally, thereby reducing positive affective forecasting. However, contrary to our hypothesis, there was no significant difference in negative affective forecasting between the priming and control groups. We speculate that the effect of analytical thinking priming on affective forecasting may depend on task characteristics. Participants' negative affective forecasting for having a second child was already relatively weak, so priming analytical thinking did not significantly reduce it further. In contrast, positive affective forecasting was relatively strong, and analytical thinking priming significantly reduced it. Hong et al. (2016) reported similar findings, where mindfulness reduced the intensity of negative affective forecasting for exam scores but did not significantly reduce positive affective forecasting for exam outcomes.

General Discussion

Experiments 1 (using picture priming) and 2 (using a verbal fluency task) examined the effect of analytical thinking on affective forecasting impact bias and the mediating role of affective forecasting. Experiment 3 further investigated the effect of analytical thinking priming on affective forecasting in a real-world decision context (having a second child).

5.1 The Role of Analytical Thinking in Affective Forecasting

All three experiments demonstrated that priming analytical thinking reduces the intensity of affective forecasting for future events. According to the accessibility

model of emotional self-report (Robinson & Clore, 2002), people intuitively base their affective forecasts on beliefs about future events. In Experiment 1, people likely relied on intuitive beliefs such as “receiving more money brings happiness” or “losing money brings unhappiness” to forecast emotions following proposal acceptance or rejection. In Experiment 2, people likely used beliefs such as “poor memory test performance is embarrassing or upsetting” to forecast emotions about test failure. In Experiment 3, people likely drew on beliefs such as “more children bring more happiness” to forecast emotions about having a second child. Because beliefs about future events are abstract and often ignore the influence of events unrelated to the predicted event, people overestimate the emotional impact of future events.

Research has shown that priming analytical thinking reduces intuitive influences (Evans, 2003; Evans, 2008; Kahneman, 2003). Therefore, priming analytical thinking should weaken the influence of beliefs on affective forecasting, leading people to rely less on intuitive belief information and instead analyze the emotional impact of future events more comprehensively, thereby reducing affective forecasting intensity. This is consistent with previous findings that analytical thinking priming can weaken belief influences (Gervais & Norenzayan, 2012; Yilmaz et al., 2016; Stagnaro et al., 2019; Franks & Scherr, 2017).

5.2 Analytical Thinking Reduces Impact Bias

Experiments 1 and 2 found that analytical thinking significantly reduced impact bias, with affective forecasting mediating this effect, consistent with our hypothesis. Previous research on impact bias interventions has shown that reduced affective forecasting intensity decreases impact bias and improves forecasting accuracy (Wilson et al., 2000; Eggleston et al., 2015; Hong et al., 2016; Hoerger et al., 2010). Thus, priming analytical thinking reduces impact bias by decreasing affective forecasting intensity.

Overall, the three experiments demonstrate that priming analytical thinking significantly reduces affective forecasting intensity for future events, thereby reducing impact bias. As proposed in dual-process theory, although Systems 1 and 2 can sometimes operate in parallel, System 2 often overrides System 1 input when analytical tendencies are activated and cognitive resources are available (Strack & Deutsch, 2004). When forecasting emotions from future events, people lack access to specific experiential and situational information, making belief information about future events more accessible. Consequently, people intuitively rely on beliefs about future events to predict emotions. When analytical thinking is primed, System 2 weakens intuitive processing (Evans, 2003; Evans, 2008; Kahneman, 2003), leading people to rely less on intuitive beliefs about future events and instead engage in more comprehensive analysis and rational prediction, thereby reducing affective forecasting intensity and consequently reducing impact bias.

5.3 Theoretical Implications

Based on the accessibility model of emotional self-report (Robinson & Clore, 2002), this research proposes that people follow accessibility principles when making affective forecasts, intuitively relying on beliefs about future events, whereas actual emotional experiences are based on immediate emotions. The different information sources lead to affective forecasting bias. To date, few studies have examined impact bias in affective forecasting from the perspective of intervening on intuitive beliefs. From a dual-process theory perspective (Evans, 2003; Evans, 2008; Kahneman, 2003), this research demonstrates that analytical thinking reduces affective forecasting intensity and consequently reduces impact bias. This provides a new direction for impact bias interventions and further confirms the influence of beliefs on affective forecasting bias. Additionally, this research shows that priming analytical thinking reduces affective forecasting intensity, demonstrating that System 2 can override or weaken intuitive System 1 processing, thereby providing further evidence for dual-process theory.

5.4 Practical Implications

People make decisions daily, and most decisions involve affective forecasting. Impact bias reduces decision quality and subsequently affects satisfaction and well-being. This research demonstrates that priming analytical thinking can significantly reduce impact bias in decision-making. Therefore, activating analytical thinking when making decisions can improve the accuracy of forecasting emotions from decision outcomes and enhance decision quality.

5.5 Limitations and Future Directions

This research examined the effects of analytical thinking priming on affective forecasting and impact bias through laboratory experiments (Experiments 1 and 2) and a field experiment (Experiment 3), but several limitations remain. Experiment 3 only examined the effect of analytical thinking priming on affective forecasting in second-child decision-making without following up to measure actual emotional experiences after having a second child. Future research should investigate the effect of analytical thinking priming on impact bias in real-life decisions. Additionally, future studies could directly examine the effect of analytical thinking on intuitive beliefs.

In conclusion, this research demonstrates through three experiments that analytical thinking priming reduces impact bias in affective forecasting, with affective forecasting serving as a mediator in this relationship.

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