


The Impact of Targeted Online Advertising's Pushing Time on Consumers' Browsing Intention: A Study Based on Regret Theory

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ABSTRACT

The development of digital technology enables advertising information to be pushed precisely to suitable consumers, thus achieving advertising targeting. Ad push timing can significantly impact ad click-through rates when advertisers push targeted ads based on consumers' online behavioral data. By conducting two studies, the authors found that pushing targeted ads before a consumer's purchase resulted in higher browsing intention than after purchase. This process is mediated in parallel by the perceived usefulness of ad information and anticipated regret after browsing the ad. When the purchase decision is irreversible (vs. reversible), or the repeatability of a purchase decision is low (vs. high), the impact of pushing time on consumers' advertising browsing intention will increase. In addition, the cost of decision reversal affects consumers' intention to browse ads. Consumers' intention to browse targeted ads is lower when the cost of decision reversal is high. Consumers' anticipated regret can effectively explain the aforementioned influence and moderating effects.

KEYWORDS

Anticipated Regret, Browsing Intention, Decision Reversibility, Perceived Usefulness, Targeted Online Advertising

INTRODUCTION

In the Internet era, big data technology has enabled personalized marketing information to be accurately pushed to specific consumers. This approach significantly improves the efficiency and effectiveness of marketing communication. The development and application of science and technology, such as artificial intelligence and machine learning, have changed information dissemination and the global business model (Liu & Li, 2022; Yang, 2022; Sultana et al., 2021). Companies can use individual-level data such as consumer online behavior, demographic information, and interest preferences to form

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targeted online ads with selective display functions (Kim et al., 2019; Schumann et al., 2014), thus effectively mining customer value (Wu et al., 2022). Targeting involves displaying customized ads to the right audiences at the right time and place (K. Li et al., 2012). A key challenge of targeted advertising is automating consumer group segmentation for ad delivery; effective consumer segmentation can significantly increase the ad click-through rate. When ad information matches consumer needs, consumers may regard the ad as an indicator that the company is positively predisposed to the consumer (Koch & Benlian, 2015). On the contrary, when the ad information does not match consumer needs, the ad information becomes junk that infringes on people's lives. Therefore, given the effectiveness and increasing frequency of targeted online advertising, it is important to understand the psychological responses of consumers to these efforts (Summers et al., 2016).

Studies have been published on targeted online advertising based on behavioral data, focusing on optimizing technology to achieve a higher degree of advertisement-consumer matching (e.g., Langheinrich et al., 1999; Chickering & Heckerman, 2003) and on the positive and negative effects of targeted advertising on consumer responses from the perspective of the personalization-privacy paradox (e.g., Aguirre et al., 2015; Brinson & Eastin, 2016). Although studies have explored the design of push timing for targeted online advertising (e.g., Kumar et al., 2007; Nair & Shetty, 2017), these studies have only explored the optimal scheduling and placement of targeted ads from the perspective of data analysis and data mining. However, existing studies have not aimed to uncover the reasons for this from the perspective of consumers' internal psychological responses. When companies infer consumers' needs from their browsing behaviors, they push relevant ads to these consumers (Boerman et al., 2017). Online search and browsing behaviors are closely followed by purchase behavior or purchase delay, which may affect the push timing of targeted ads. As a result, targeted ads can appear before or after consumers purchase a specific product.

We utilize the Regret Theory to explore the effect of targeted ad push timing on consumers' ad browsing intention on shopping websites and its underlying mechanisms. The key research questions that we sought to explore included (1) what are the psychological and cognitive responses that consumers have when targeted ads appear after, versus before, they have made a purchase, and (2) whether companies should continue pushing advertisements about products after a purchase has been finalized; in other words, under what circumstances should targeted ads continue or not continue to be pushed after a purchase.

THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

Regret Theory

Regret is a comparison-based negative emotion; its emergence depends on the process of comparing a selected alternative with a forgone alternative (Zeelenberg et al., 1996; Zeelenberg & Pieters, 2007). Regret may occur even if the consumer is satisfied with their current choice, depending on which option is viewed as preferable. Such comparisons are common in contemporary society, as consumers are exposed to myriad alternative options after making a decision (Simpson et al., 2008).

Counterfactual thinking refers to the process of comparing chosen and foregone alternatives in which people imagine what would have happened if they had chosen the other alternative (Kahneman & Miller, 1986). If an individual decides that they missed out on a better option (i.e., upward counterfactual thinking occurred), they feel regret. For example, when consumers purchased a product, the presentation of a targeted online advertisement provides information about a forgone or missed alternative. If the consumer perceives the alternative as superior, they feel that they made an incorrect purchase decision and experience regret.

Although regret is a negative emotion, it is beneficial and adaptive for people because it reminds us of our mistakes and helps future avoidance (Chun et al., 2019). Regret triggers physiological responses (Rotman et al., 2017) and behavioral changes that lead people to use coping strategies

to alleviate regret. For example, regret can encourage people to take remedial measures to achieve desired results in the future (Zeelenberg & Pieters, 2007).

Regret can be divided into experienced regret and anticipated regret based on whether it has or has not yet occurred (Chun et al., 2019). Research shows that anticipated regret can systematically influence choices. Individuals anticipate the extent to which a choice will cause them to feel regret before they make the choice; this anticipated regret has a stronger effect on shaping people's behavior than experienced regret (Chun et al., 2019). Bjälkebring et al. (2015) stated that both experienced and anticipated regret influence people's everyday decisions, with 30% of decisions causing people to experience regret and 70% of future decisions causing them to develop anticipated regret. Anticipated regret occurs more frequently in daily life and profoundly impacts individual's decision-making.

Perceived Usefulness of Information

In the network era, information overload increases the cost and difficulty of a consumer's ability to select requisite information from the massive pool of available data. According to the Theory of Information Overload, greater ad crowding results in more inefficient advertising because consumers have only a limited capacity to process information (Ha & McCann, 2008). Targeted advertising reduces the number of online advertisements that consumers see per unit of time, increasing the value of advertising communication by reducing the information load. Research into targeted advertising has confirmed the positive impact of the personal relevance of ads on information usefulness, which directly affects consumer responses to targeted ads, such as ad clicks, ad views, and purchase intentions (Bleier & Eisenbeiss, 2015; Zhang et al., 2010).

The perceived usefulness of information is an important mechanism underlying the ability of targeted advertising to influence consumer responses (Bleier & Eisenbeiss, 2015; Boerman et al., 2017). Previous research has found that targeted advertising can facilitate the identification of new products that match consumers' needs, desires, and interests (Tam & Ho, 2006). Whether dependent on consumers' purchase behaviors, location, online activity, or browsing mode, targeted ads are preferred over non-targeted ads because the former provides consumers with more useful information (Zhang et al., 2010). Targeted advertising increases consumer satisfaction with ad content through information personalization, which improves customer relationships and increases consumers' intention to purchase the advertised product (Wedel et al., 2017).

Highly personalized targeted ads can more effectively cater to personal interests and preferences, resulting in more useful advertising information. This research suggests that although ad targeting helps increase the perceived usefulness of ad information, the pushing time of targeted ads also affects how consumers perceive ad usefulness.

Pushing Time of Targeted Online Advertising: Pre- and Post-Purchase

The stage at which shopping websites push targeted advertisements to consumers can be divided into pre- and post-purchase phases that are defined relative to the purchase time. In this study, we infer that pre-purchase targeted ads will be perceived as more useful by consumers than post-purchase targeted ads, and consumers will be more willing to click and view the ads. This is because the appearance of targeted ads before purchase adds valuable alternatives for consumers and increases their opportunity to make qualitatively better decisions.

According to previous research, perceived accessibility affects perceived usefulness by influencing perceived ease of use (Karahanna & Straub, 1999). The possibility that an advertised product becomes an alternative decreases significantly after a purchase is finalized, i.e., the perceived accessibility decreases. This is because consumers have to reverse their purchase decision (e.g., request a refund or product return) before the advertised product can be used as an alternative; this leads to a decrease in perceived accessibility and perceived usefulness. Perceived usefulness affects an individual's willingness to accept things. Thus, the perceived usefulness of ad information can partly explain the effect of pushing time on a consumer's intention to browse targeted ads.

The pushing time of a targeted ad affects a consumer's intention to browse the ad because it affects the perceived usefulness of ad information and because it triggers the emergency of anticipated regret. Regret arises after a decision is made, once additional information is provided that suggests a superior alternative (van de Calseyde et al., 2018). It has been shown that the ease of imagining a better alternative determines whether people will compare the outcome of the current situation with that of the foregone alternative, thus influencing the extent to which regret occurs (Kahneman & Miller, 1986). Targeted advertising that appears after a purchase will provide consumers with foregone or missed alternatives, making it easier for consumers to engage in counterfactual thinking and increasing the likelihood of regret.

After a consumer purchases a product, targeted advertising increases the degree to which the consumer anticipates regret. Consumers will realize that if they view the ad, there is a possibility that it will generate regret. People have a natural avoidance tendency towards regret stemming from an aversion towards its experience (D. Li et al., 2012). Syam et al. (2008) found that regret aversion caused individuals to choose standardized products rather than customized products. To avoid regret, individuals show a preference for a regret-minimizing choice over a risk-minimizing choice (Zeelenberg et al., 1996). According to the Theory of Regret Regulation, since consumers are averse to the emergence of regret, they make decisions based on minimizing future regret (Zeelenberg & Pieters, 2007). Therefore, to avoid regret, or because of the existence of anticipated regret, many consumers avoid or refuse to browse targeted advertisements that are highly relevant to their purchased product after they have made the purchase.

Therefore, we proposed the following research hypotheses in this study:

H1: Consumers' intention to browse targeted ads that appear before a purchase is higher than targeted ads that appear after a purchase.

H2: The influence of the pushing time of a targeted ad (pre- vs. post-purchase) on consumers' advertising browsing intention is mediated in parallel by (a) the perceived usefulness of ad information, and (b) the anticipated regret after browsing the ad.

Decision Reversibility

Since regret is an unpleasant feeling, individuals want to protect themselves by reducing it (Zeelenberg & Pieters, 2007). Consumers select different strategies to manage regret depending on the context. Previous research has indicated that regret may drive either a behavior or a change in cognition when consumers experience regret about a purchase decision (D. Li et al., 2012).

Coping Theory points out that differences in the appraisal of stressful situations lead to distinct emotional reactions and corresponding coping strategies. Patrick et al. (2009) proposed two evaluation stages before regret generation based on Coping Theory; the first is the relevance between the product and the goal and the second is decision reversibility. The evaluation results of these two stages affect the degree of regret generation. Specifically, regret is more likely to be generated when the decision is irreversible and the goal is more relevant.

If a purchase decision is reversible, consumers will take actions (e.g., cancel the purchase or return the product) to reverse their initial decision to alleviate the negative feelings of regret. However, if the decision is irreversible, consumers may adjust their cognition and find a reasonable justification to support that the previous decision was correct, thus reducing regret (Zeelenberg & Pieters, 2007). Moreover, it has been demonstrated that if consumers find the decision to be reversible before a purchase, it will reduce their purchase delay and they will reach the purchase decision more quickly, as decision reversibility affects consumers' anticipated regret (Patrick et al., 2009).

It can be seen that decision reversibility directly affects the generation of consumers' anticipated regret. When a purchase decision is reversible (vs. irreversible), consumers will experience less anticipated regret when they encounter a targeted ad after purchase because they have a feasible

opportunity to optimize their final decision-making result by reversing their decision, thus increasing their willingness to browse the targeted ads.

Accordingly, we propose the following research hypothesis:

H3: Decision reversibility moderates the effect of the pushing time of a targeted ad (pre- vs. post-purchase) on consumers' advertising browsing intention. Compared to purchase decision reversibility, the effect of pushing time of a targeted ad on consumers' advertising browsing intention would increase when the purchase decision is irreversible.

Cost of Decision Reversal

Most modern shopping websites have implemented policies that make purchase decisions reversible, such as "return of goods without cause within 7 days of purchase". If the purchase decision is reversible, the cost of a reversible decision may further influence individuals' behavioral response to targeted advertising after a purchase.

When the targeted ad is pushed after purchase, consumers will trade off between the cost of decision reversal and the psychological discomfort stemming from regret. When the cost of decision reversal is low or even absent, consumers predict that if the missed alternative provided by targeted ads is found to be superior, they will pay a low reversal cost to reverse their initial decision. This alleviates the unpleasant regret and optimizes the current decision; that is, it extends benefits or reduces costs.

However, when the cost of a decision reversal is high, consumers may face a dilemma. One choice is to pay the high cost of decision reversal to reduce regret at that time; the other is not paying the reversal cost but suffering regret and cognitive dissonance. As a result, when the cost of decision reversal is high, consumers may deliberately avoid browsing targeted ads to prevent themselves from being caught in this dilemma.

Therefore, we proposed the following research hypotheses:

H4: When pushing the targeted ad after purchase, the cost of decision reversal will affect consumers' advertising browsing intention. Compared with the low cost of decision reversal, when the cost of decision reversal is high, consumers' browsing intention of targeted ads would be lower.

H5: When pushing the targeted ad after purchase, anticipated regret mediates the influence of decision reversal cost on consumers' advertising browsing intention. When the cost of decision reversal is high (vs. low), there would be stronger anticipated regret, which may restrain consumers' advertising browsing intention.

Decision Repeatability

Although regret is seen as a negative emotion, it is crucial for optimizing future behavioral decisions (Chun et al., 2019). Regret enhances people's cognition of their decisions, reinforces memories of mistakes they have made or opportunities they have missed, and allows them to learn from suboptimal results to improve their decision-making in similar future scenarios (Zeelenberg & Pieters, 2007).

If the generation of regret fails to optimize future decision-making, individuals will be more inclined to change their cognition to restrain regret or deliberately avoid situations that may generate regret (D. Li et al., 2012). Patrick et al. (2009) pointed out that consumers may cope with inaction regret by reducing cognitive dissonance or taking purchase actions when facing the same opportunity next time. It can be seen that whether there are similar purchase opportunities in the future will affect consumers' cognition and response.

This study suggests that when consumers are pushed targeted ads after purchase, their advertising browsing intention will also depend on whether the purchase decision is likely to be repetitive. Previous research on repetitive decision-making has examined the effect of previous results on subsequent decisions when the decision is repeated (Demaree et al., 2012). However, this study uses decision

repetition as a situational factor to investigate the differences in individuals' responses to targeted advertising at different levels of decision repeatability.

In the case of high repeatability of purchase decisions, consumers may continue to browse targeted ads to optimize their future decisions, even if they may experience immediate unpleasant regret. However, if the repeatability of the purchase decision is very low, especially if there is only one purchase opportunity, regret will no longer be able to optimize their future decisions. At this time, consumers will avoid regret from happening and give up feedback about forgone alternatives, thereby reducing their engagement with targeted ads.

Therefore, we proposed the following hypothesis:

H6: The process through which pushing time (pre- vs. post-purchase) impacts consumers' intention to browse advertising is moderated by decision repeatability. When the repeatability of purchase decisions is low (for instance, only once), as opposed to when it is high, pushing time has a greater impact on consumers' intention to browse advertising.

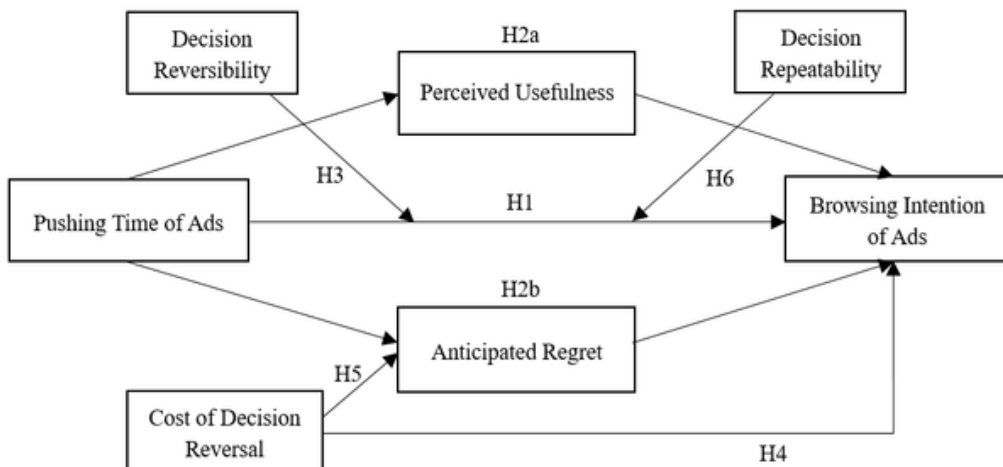
Research Model

Based on the above research hypotheses, the research model of this study can be summarized, as shown in Figure 1. The construction of the research model depends on the core points of Regret Theory. Therefore, Regret Theory is the main theoretical foundation of this study. The relationship between the research model and Regret Theory is mainly reflected in the following three aspects.

First, previous research about the pushing time of targeted ads has not investigated the underlying psychological mechanisms of consumer behavior, while this study points out that regret, as a cognitive emotion, is also an important mechanism. The usefulness of information and consumer regret affect consumers' responses to targeted ads from the cognitive and emotional paths, respectively.

Second, this paper uses the coping theory of regret to select the moderating variables in the research model. The coping theory of regret points out that individuals sometimes avoid the emergence of regret, while sometimes prefer to endure the psychological discomfort caused by regret; this mainly depends on situational factors. Therefore, in the context of consumers' responses to targeted ads, this study explores how decision reversibility and the reversible cost affect a consumer's choice of strategies to deal with regret.

Figure 1. Research model



Third, this study innovatively explores the moderating effect of decision repeatability. Whether consumers continue to browse targeted ads after purchase depends on the potential long-term benefits. High decision repeatability implies the future value of advertising browsing behavior, making decision repeatability affect consumers' tolerance to regret, thus greatly impacting on consumers' targeted advertising responses.

STUDY 1

Methods

Study 1 comprised a 2 (pushing time of targeted ad: pre- vs. post-purchase) \times 2 (decision reversibility: reversible vs. irreversible) + 1 (post-purchase, high cost of decision reversal) between-subjects design. Participants ($N=211$; recruited via a professional survey platform "Wenjuanxing"; 50.71% female) were randomly assigned to one of five conditions. The percentages of age distribution were 26.07%, 27.01%, 36.02%, and 10.90% for 18-25, 26-30, 31-40 and over 40 years old, respectively. Each participant received a fixed amount of financial compensation.

In the cover story, participants imagined that they were buying a sports jacket. In the pre-purchase [post-purchase] condition, participants read the following:

One day, you are going to buy a sports jacket online. After much deliberation, you finally choose a sports jacket from Store A which involves a special offer for this season. Just as you're about to place your order but haven't yet [just after you've placed your order], you suddenly see a targeted ad for 'Related Product Recommendations' appear at the bottom of your browser page, which includes a jacket that looks very similar to the one you've selected, but it's sold at Store B.

Then, the participants read the information about the reversibility of decision-making. Participants read in the irreversible decision condition, "You have seen a message from Store A: Since this jacket is already offered as a special discount, there is no return or exchange available. Unless the product shows serious quality problems, it will not be exchanged or returned after the order is placed."

In the pre-purchase reversible decision condition, participants read, "You have seen a message from Store A: All goods in our store are subject to a return policy that allows a 'return of goods without cause in the first 7 days.'"

In the post-purchase reversible decision condition (i.e., low-cost decision reversal condition), participants read, "You have seen a message from Store A: All goods in our store are subject to a return policy that allows for a 'return of goods without cause in the first 7 days'. You notice that the jacket you purchased has not been prepared for shipment. If you want to return it, you only need to advise customer service to refund the previous order."

In the post-purchase high-cost decision reversal condition, participants read, "You have seen a message from Store A: All goods in our store are subject to a return policy that allows for a 'return of goods without cause in the first 7 days'. You notice that the jacket you purchased has been prepared for shipment. If you want to return it, you have to wait until the jacket is delivered. In addition, you may have to pay for the return shipping."

In the pre-test ($N = 21$), the perceived reversal cost in the high-cost of decision reversal condition ($M=5.476$) was significantly higher than that in the low-cost decision reversal condition ($M=2.667$) ($t=12.494$, $df=20$, $p<0.001$).

After reading the cover story, participants were asked to indicate their advertising browsing intention on two 7-point scales ("Regarding the jacket in Store B, I would like to click-through the targeted ad to acquire further information," "Regarding the jacket in Store B, I would like to browse the information in the targeted ad"; adapted from Bleier & Eisenbeiss, 2015; 1=strongly disagree, 7=strongly agree; $\alpha=0.862$).

Then, we measured the perceived usefulness of ad information on three 7-point scales (“The targeted ad enables me to accomplish the shopping task better,” “The targeted ad improves my shopping task performance,” “The targeted ad is helpful to me in my shopping task”; adapted from Tam & Ho, 2005; 1=strongly disagree; 7=strongly agree; $\alpha=0.849$). The measurement of anticipated regret was adapted from Chun et al. (2019) (“After browsing the targeted ad, I may feel regret”, 1=strongly disagree; 7=strongly agree). Finally, participants provided demographic information.

Results

First, using a one-way ANOVA we confirmed the predicted main effect, such that participants in the pre-purchase condition indicated a higher intention to browse the targeted ad than those in the post-purchase condition ($M_{pre}=5.859 > M_{post}=5.024$, $F(1, 209)=26.777$, $p<0.001$). Therefore, H1 was supported.

Second, we predicted that perceived usefulness and anticipated regret would mediate, in parallel, the relationship between pushing time of targeted ads and consumers’ intention to browse advertising. A two-mediator model was tested by bootstrapping analysis by using the PROCESS macro in SPSS. Bootstrap tests of multiple mediation were conducted to assess this prediction (with 5,000 bootstrapping resamples), examining perceived usefulness and anticipated regret as two parallel mediators of the relationship between the pushing time of ads (pre-purchase=1, post-purchase=0) and consumers’ advertising browsing intention. The corresponding path coefficients are shown in Figure 2.

Bootstrap analysis showed that the total effect of the independent variable (pushing time) on the dependent variable (browsing intention) was significant ($\beta=0.337$, $se=0.065$, $p<0.001$), the indirect effect of the independent variable on the dependent variable through the first mediator (perceived usefulness) (95%CI: $LLCI=0.181$, $ULCI=0.351$; exclude zero) or the second mediator (anticipated regret) (95%CI: $LLCI=0.026$, $ULCI=0.146$; exclude zero) was significant, but the direct effect of the independent variable on the dependent variable was not significant ($\beta=-0.005$, $se=0.055$, $p=0.923>0.1$). These results provide good evidence for the role of perceived usefulness and anticipated regret in mediating the influence of pushing time on consumers’ advertising browsing intention. Therefore, H2 was supported.

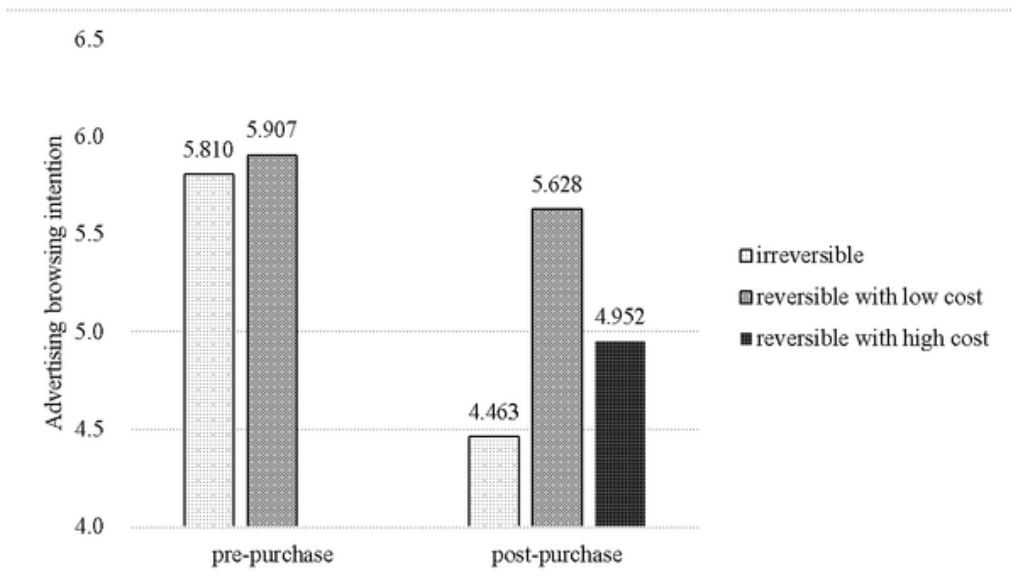
Third, we predicted that decision reversibility would moderate the relationship between the pushing time of the targeted ad and consumers’ advertising browsing intention. We combined the “post-purchase low-cost of decision reversal” condition and the “post-purchase high-cost of decision reversal” condition into one “post-purchase reversible decision” condition. In addition to the main effect of pushing time on advertising browsing intention ($F(1, 207)=37.150$, $p<0.001$), a 2x2 ANOVA also showed a significant interaction (pushing time \times decision reversibility) ($F(1, 207)=5.205$, $p=0.024<0.05$; see Figure 3).

Figure 2. The mediating roles of perceived usefulness and anticipated regret



** p<0.01, *** p<0.001

Figure 3. The influence of pushing time of ads and decision reversibility on advertising browsing intention



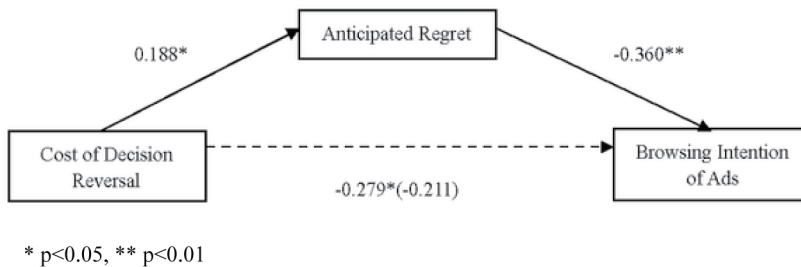
When the decision was reversible, participants' intention to browse the targeted ad was significantly higher than when the decision was irreversible ($M_{\text{reversible}} = 5.500 > M_{\text{irreversible}} = 5.145$, $F(1, 207) = 8.340$, $p = 0.004 < 0.01$). When the decision was irreversible, participants' intention to browse advertising before the purchase was significantly higher than after the purchase ($M_{\text{pre}} = 5.810 > M_{\text{post}} = 4.463$, $F(1, 81) = 34.341$, $p < 0.001$). The pushing time of the targeted ad still had a significant impact on participants' intention to browse advertising when the decision was reversible (including low and high reversible cost conditions), but the significance of the influence decreased ($M_{\text{pre}} = 5.907 > M_{\text{post}} = 5.294$, $F(1, 126) = 8.031$, $p = 0.005 < 0.01$). When the decision was reversible (including the low reversible cost condition but excluding the high reversible cost condition), there was no significant difference between the pre-purchase and the post-purchase condition on participants' browsing intention ($M_{\text{pre}} = 5.907$, $M_{\text{post}} = 5.628$, $F(1, 84) = 1.765$, $p = 0.188 > 0.1$). Therefore, H3 was supported.

Finally, a one-way ANOVA showed the predicted influence of the cost of decision reversal on consumers' advertising browsing intention ($F(1, 83) = 6.193$, $p = 0.015 < 0.05$). The browsing intention of ads in the low reversal cost condition ($M = 5.628$, $SD = 1.102$) was higher than in the high reversal cost condition ($M = 4.952$, $SD = 1.387$). Therefore, H4 was supported.

Then, a one-mediator model was tested by bootstrapping analysis. To investigate the mediation effect of anticipated regret in the relationship between the cost of decision reversal (low-cost=0, high-cost=1) and consumers' intention to browse advertising, a mediation analysis with a bootstrapping procedure (with 5,000 bootstrapping resamples) was conducted. The corresponding path coefficients are shown in Figure 4.

The results showed that the total effect of the independent variable (cost of decision reversal) on the dependent variable (consumers' advertising browsing intention) was significant ($\beta = -0.279$, $se = 0.112$, $p = 0.015 < 0.05$), the indirect effect of the independent variable on the dependent variable through the mediator (anticipated regret) was significant (95% CI: $LLCI = -0.174$, $ULCI = -0.011$; exclude zero), and the direct effect of the independent variable on the dependent variable was marginal significant ($\beta = -0.211$, $se = 0.110$, $p = 0.059$). It can be seen that anticipated regret mediates

Figure 4. The mediating role of anticipated regret



the influence that the cost of decision reversal has on consumers’ advertising browsing intention. Therefore, H5 was supported.

Study 1 provides evidence that the pushing time of targeted ads significantly influences consumers’ advertising browsing intention, which is mediated in parallel by the perceived usefulness of ad information and anticipated regret after browsing the ad. Study 1 also demonstrated the moderating effect of decision reversibility and the further influence of the cost of decision reversal. Our results show that post-purchase targeted ads can also generate high click-through rates. The effect of the pushing time of targeted ads on browsing intention is significantly reduced if the decision is reversible and the cost of decision reversal is low. This suggests that advertisers can continue to push targeted ads at the post-purchase stage. However, they need to segment the market by decision reversibility and the cost of decision reversal to ensure higher advertising effectiveness.

STUDY 2

Methods

Study 2 comprised a 2 (pushing time of targeted ad: pre- vs. post-purchase) × 2 (decision repeatability: low vs. high) between-subjects design. Participants (N=160; recruited via the same survey platform as Study 1; 54.37% female) were randomly assigned to one of four conditions. The percentages of age distribution were 22.50%, 28.75%, 37.50%, and 11.25% for 18-25, 26-30, 31-40 and over 40 years old, respectively. Each participant received a fixed amount of financial compensation.

We used situational simulation to manipulate the pushing time of targeted ads and decision repeatability. In the cover story, participants imagined they were looking for a translation service for a minor language. In the low decision repeatability [high decision repeatability] condition, participants read the following content:

Based on the needs of work or study, you want to translate some minor language documents into Chinese. However, none of your friends are familiar with this minor language. You have to look for a translation service on the Internet. Regarding the translation service in this minor language, you only need it once [you need it more than once]. It is almost impossible for you to have the same need in the future [There will be many similar translation needs in the future]. Then, you find the translation service of this minor language on Platform A by an online search. After having a general understanding of Platform A’s translation business and fees, you are satisfied with Platform A’s translation service. You notice that once you place an order on Platform A, it is very troublesome to cancel the order and obtain a refund.

In the pre-test ($N=25$), the perceived repeatability of the decision in the high decision repeatability condition ($M=5.480$) was significantly higher than in the low decision repeatability condition ($M=2.120$) ($t=-13.394$, $df=24$, $p<0.001$).

After this, participants read information about the pushing time of targeted ads. In the pre-purchase [post-purchase] condition, participants read “When you are ready to place an order but have not yet placed it [after you have placed the order and completed the payment], a targeted advertisement about the translation service of this minor language on Platform B pops up on the webpage.”

Then, participants were asked to answer a series of questions to measure the browsing intention of ads ($\alpha=0.933$), perceived usefulness of ad information ($\alpha=0.795$) and anticipated regret after browsing the ad (see the scale items in Study 1 for details). Finally, participants provided demographic information.

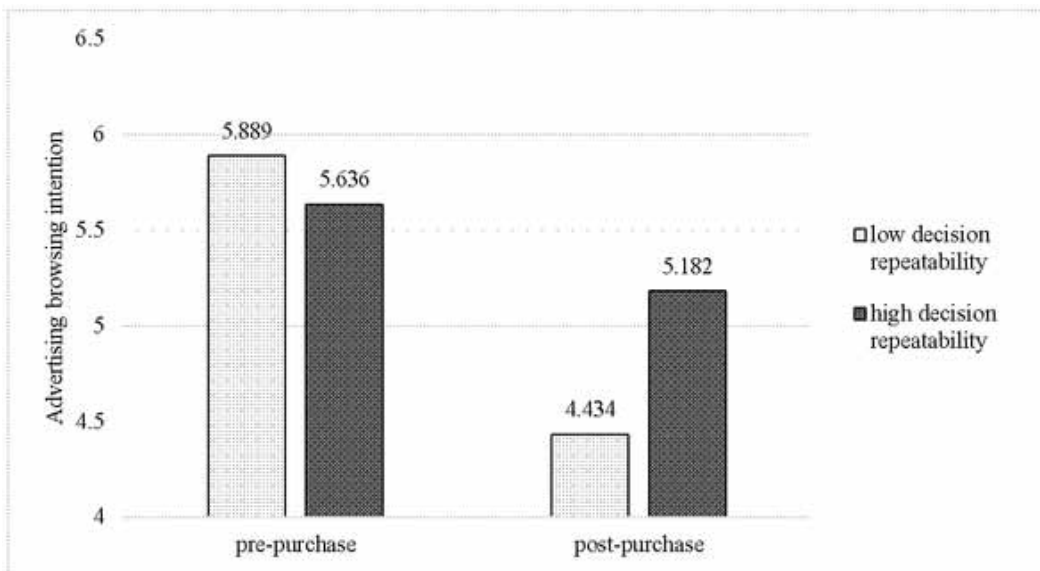
Results

First, a two-way ANOVA on advertising browsing intention revealed a significant main effect of pushing time ($F(1, 156)=18.135$, $p<0.001$), and a significant interaction (pushing time \times decision reversibility) ($F(1, 156)=4.977$, $p=0.027<0.05$), but no significant effect of decision reversibility ($F(1, 156)=1.219$, $p=0.271>0.1$) (See Figure 5).

Simple effects tests showed that when the decision repeatability was low, participants in the pre-purchase condition indicated a higher intention to browse the targeted ads than in the post-purchase condition ($M_{pre}=5.889>M_{post}=4.434$, $F(1,81)=21.142$, $p<0.001$). However, when the decision repeatability was high, there was no significant difference in the browsing intention of ads between the pre- and post-purchase conditions ($M_{pre}=5.636$, $M_{post}=5.182$, $F(1, 75)=2.062$, $p=0.155>0.1$). Therefore, H6 was supported.

Second, we again examined the mediating roles of perceived usefulness and anticipated regret. Bootstrap tests of multiple mediation, similar to Study 1, were conducted to assess this prediction.

Figure 5. The influence of pushing time of ads and decision repeatability on advertising browsing intention



Results showed that the total effect of the independent variable (pushing time) on the dependent variable (browsing intention) was significant ($\beta=0.317$, $se=0.076$, $p<0.001$), the indirect effect of the independent variable on the dependent variable through the first mediator (perceived usefulness) (95%CI: $LLCI=0.138$, $ULCI=0.351$; exclude zero) or the second mediator (anticipated regret) (95%CI: $LLCI=0.040$, $ULCI=0.225$; exclude zero) was significant, but the direct effect of the independent variable on the dependent variable was not significant ($\beta=-0.041$, $se=0.069$, $p=0.550>0.1$), lending support to H2 again.

Finally, we further investigated, in the post-purchase condition, why consumers had different degrees of advertising browsing intention when decision repeatability was different. We found that, in the case where targeted ads were pushed after purchase, participants indicated lower anticipated regret ($M_{high}=4.591 < M_{low}=5.184$, $F(1, 80)=4.211$, $p=0.043<0.05$) and higher advertising browsing intention ($M_{high}=5.182 > M_{low}=4.434$, $F(1,80)=4.104$, $p=0.046<0.05$) in the high decision repeatability condition compared to the low decision repeatability condition.

Regression analysis showed that when targeted ads were pushed after purchase, when the decision repeatability was low, anticipated regret significantly restrained consumers' advertising browsing intention ($F(1, 36)=5.422$, $p=0.026<0.05$). However, when the decision repeatability was high, anticipated regret did not significantly restrain consumers' advertising browsing intention ($F(1, 42)=0.234$, $p=0.631>0.1$). This is likely because consumers believe that browsing behavior can help improve their future decision-making and, as a result, they tend to continue to browse targeted ads even if this may cause them to regret their initial purchase.

The above results supported our assertions in hypothetical reasoning. If the decision repeatability is high, consumers will continue to browse targeted ads to improve their future behavior, even if this causes regret. However, if the decision repeatability is low, consumers will restrain their subsequent browsing behavior because of anticipated regret. Our findings suggest that advertisers should first make clear whether consumers are likely to repeat their purchases of specific products or services. When a product or service belongs to a category with high consumption frequency, advertisers may still achieve high click-through and browse rates if they continue to push targeted ads after purchase.

GENERAL DISCUSSION

Our study provides a deeper understanding of the influence that the pushing time of targeted ads has on consumers' advertising browsing intention. The findings from our two experiments indicate that, compared with ads pushed after purchase, consumers have higher browsing intention of targeted ads pushed before purchase. This effect is mediated in parallel by the perceived usefulness of ad information and anticipated regret after browsing the ad. Both decision reversibility and decision repeatability moderate the relationship between the pushing time of targeted ads and consumers' advertising browsing intention. Furthermore, compared with the low cost of decision reversal, consumers' advertising browsing intention decreases when the cost of decision reversal is high.

Theoretical Implications

This study has theoretical contributions to targeted online advertising based on user behavior. Previous research about the pushing time of targeted ads did not investigate the underlying psychological mechanisms of consumer behavior and potential moderating factors. To the best of our knowledge, this is the first study to explore the influence of pushing time of targeted ads on consumer response from the perspective of consumer psychology.

This study also contributes to the literature on consumer regret, especially the research into the impact of anticipated regret on consumer behavior. By using Regret Theory, this study examined the effects of decision reversibility, decision reversal cost, and decision repetition on consumers' advertising browsing behavior. This work enables Regret Theory to be developed and applied in the context of targeted advertising browsing.

In addition, decision repeatability is a new concept proposed in this study based on the research context. Existing research into decision repeatability mainly focused on the influence of previous results on subsequent decisions. However, in this study, we applied the term “decision repeatability” as a situational variable and found that when decision-making is highly repetitive, people are willing to bear the cognitive dissonance stemming from regret to improve future behavioral efficacy.

Practical Implications

The findings of this study have several practical implications. Effective targeted advertising should recommend the most appropriate advertisements to the most appropriate consumers at the right time to meet their information needs. According to our results, the pushing time of targeted ads may impact the effectiveness of targeted advertising. Shopping websites should fully use consumers’ browsing records and purchasing behaviors to arrange the pushing time of targeted ads and, as far as possible, make targeted ads appear before purchase. Once consumers have completed the purchase, advertisers need to consider whether to continue pushing targeted ads. When advertisers push targeted ads after consumers complete the purchase, consumers will reduce the browsing intention of targeted ads because of anticipated regret, thus reducing the effectiveness of targeted advertising.

Whether advertisers continue to push the targeted ads of relevant products after purchase depends on the reversibility, repeatability, and cost of decision reversal of consumers’ purchase decisions. Specifically, when the purchase decision is irreversible, low in repeatability, or has a high immediate reversal cost (for example, the product has been shipped, or the reversal demands significant time or money from the consumer), advertisers should reduce or avoid the push of targeted ads after purchase. However, if the purchase decision is repetitive and reversible, and the reversal cost is low (for example, the product has not been shipped, and the reversal cost tends to zero), advertisers can continue to push targeted ads for relevant products. At this time, the consumers’ browsing intention of targeted ads remains high, and the likely effectiveness of targeted ads is high.

Another practical implication of this study is that enterprises should pay attention to the vital role of anticipated regret in consumer decision-making. Targeted advertising allows enterprises to improve marketing communication efficiency, create accurate information and provide convenient consumer services. However, we found that, in some cases, the appearance of targeted ads may impart certain psychological costs to consumers such as regret. The prevention of anticipation and experience of regret by consumers is an important target for enterprises. For example, before consumers complete the purchase, advertisers can push targeted ads based on consumers’ previous search and browsing behavior. After consumers complete the purchase, advertisers should push targeted ads of complementary products rather than products that may trigger consumer regret.

Limitations and Future Research

This study does not examine the impact of consumer price sensitivity, product price, consideration set, and other factors on consumers’ advertising browsing intention and product choice, which is a limitation. These potential factors may have a significant impact on the research findings under certain circumstances. For example, customers with low price sensitivity may not be willing to spend time browsing more alternatives before or after purchase. For products with high prices, the impact of anticipated regret on behavior will be relatively low. At this time, consumers are more willing to obtain price information from targeted ads. Browsing targeted ads means adding new alternatives to the consideration set, and consumers’ preference for adding new alternatives also depends on the number of existing alternatives. If consumers already have many alternatives, it will reduce their willingness to browse targeted ads. Therefore, future research can explore these potential antecedents.

According to the personalization-privacy paradox, targeted advertising brings more helpful information to consumers while it may also cause consumers to worry about disclosing personal privacy information. In the era of big data, personal data and privacy concern significantly affect global consumers’ online behavior (Xu et al., 2022; Boron et al., 2021; Mutambik et al., 2021).

Because these factors directly affect consumers' perceived risk and trust in e-commerce platforms (Sun & Li, 2022). Future research can incorporate consumer privacy variables into the research model.

In terms of research methods, this study only uses the experimental method to test hypotheses and does not conduct field experiments, which is another limitation. Although the mediating effects proposed in this study are difficult to test by field experiments, future research can use real data to verify this study's main and moderating effects. For example, advertisers can use behavioral data to infer the purchase stage of consumers. After the consumers are randomly grouped, the targeted ads can be pushed in the pre- or post-purchase stage to verify the differences between the two groups of consumers in advertising browsing behavior. In addition, products with different purchase repeatability can be divided according to product characteristics to test the moderating effect of decision repeatability.

AUTHOR DISCLOSURE STATEMENT

No competing financial interests exist.

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