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Designing Interfaces to Induce Choice Closure: Why and How

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Short Paper

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Abstract

Choice closure refers to the psychological process by which decision makers come to perceive a decision to be complete and settled and has been found to significantly influence consumers' satisfaction in physical retail environments. We propose a closure interface as an effective/efficient mechanism for inducing customers' choice closure in online environments. We build a research model based on theory of closure, theory of cognitive dissonance, social influence theory, and interruption. We first investigate the effects of various designs of closure interfaces on perceived decision completeness, reduced choice comparison, and perceived interruption. We then examine the nomological networks between these constructs, perceived choice closure, and satisfaction. We will conduct two controlled experiments (n=240) in a simulated online electronics site by manipulating the presence of direct and social reinforcer, the relevance-level of a reinforcer, and the actor of closure action in a closure interface and present the MANOVA and SEM analysis result.

Keywords: Choice Closure, Cognitive Dissonance, Interruption, Social Influence

Introduction

The explosive expansion in e-business arena renders consumers an unparalleled breadth and depth of choice opportunities in a wide range of products or services. According to a recent survey, Amazon.com offers 485 million products on sales in 2015 and an average of 75,000 products added every day. Although the growth of choice sets and associated information is generally considered desirable for consumers by providing more choices and empowerment (Markus and Schwartz 2010), studies find that it could cause negative impacts such as decision difficulty, cognitive overload, stress, discomfort, and lack of confidence in their choices (Broniarczyk and Griffin 2014), resulting in regretting and revising their choices by pondering forgone alternatives, deferring or even abandoning their choices at the pre-purchase stage, and triggering high return rates of purchased products or services after purchases (Ackerman et al. 2014; Gu et al. 2013; Inbar et al. 2011). Therefore, it is imperative to investigate techniques/tools for helping online customers to reduce choice comparison and perceive decision completeness in order to lead to a sense of choice closure with satisfaction; however, there is a lack of studies in this area.

Choice closure referring to "the psychological process by which decision makers come to perceive a decision to be complete and settled" (Gu et al. 2013, p. 268) has recently received an increasing attention in physical retail environments and was found to significantly influence consumers' satisfaction (Mogilner et al. 2010). For example, studies in physical environment found that physical acts of choice closure (e.g., place a lid over a choice set) performed when choosing one alternative out of a large choice set (e.g., chocolate and tea assortment) give a signal to consumers that the choice decision is over and no more comparison is needed, inducing perceived choice closure and thus leading to satisfaction (e.g., Gu et al.

2013). Nonetheless, there are still ample avenues for further exploration of why and how to design mechanisms to induce customers' choice closure.

First, to the best of our knowledge, no study examines choice closure in e-commerce environment. We propose one promising approach to implement a web screen (i.e., closure interface) with useful contents to effectively induce customers' perceived choice closure while shopping online. Second, limited studies focus on identifying moderating factors of the relationship between the physical acts of choice closure, choice closure perception, and satisfaction including the size of choice set (Iyengar et al. 2006), type of actors (Taylor et al. 2009) and timing (Hung and Labroo 2011) of performing the acts. However, there is lack of theoretical investigation on how to design/develop other effective mechanisms to induce choice closure, which is the focus of this study. Finally, while it is conjectured that introducing mechanisms of inducing choice closure might also intrude on customers' product purchase processes or distract them from thinking about alternatives, no previous studies examine the potential effects of such interruption on perceived choice closure and subsequent customer satisfaction. This study attempts to investigate this aspect to discover new insights and thus contribute to the advancement of choice closure literature.

Given this background, we first build a research model of online choice closure based on theory of closure of consumer psychology in marketing (Gu et al. 2013), theory of cognitive dissonance (Festinger 1957), social influence theory (Kelman 1958), and interruption (Fisher et al. 2010). Using these theoretical lenses, we propose that when customers see a well-designed closure interface, they can perceive higher choice closure, which in turn increases satisfaction. We develop hypotheses for investigating the effects of various designs of closure interfaces on perceived decision completeness, reduced choice comparison, and perceived interruption. We then examine the nomological networks of these constructs, perceived choice closure, and satisfaction (see Figure 1). In essence, we seek to explain why and how to design closure interfaces to induce choice closure in an online environment.

To test the proposed hypotheses and validate our research model, we develop a simulated online electronics site with diverse closure interfaces in two controlled experiments. We examine choice closure in the context of a difficult choice with a large number of alternatives that makes choice decisions more complex. It is argued that people experience cognitive dissonance when they make complicated choice decisions and are motivated to reduce it by justifying the choice behavior through adding new cognitions about the attractiveness of their choice or seeking out the information to confirm their choice decision. Therefore, we specifically manipulate the presence of direct and social reinforcer, the relevance-level of a reinforcer, and the actor of closure action. Results from a pretest, two controlled experiments as well as the structural equation model analysis will be presented and elaborated.

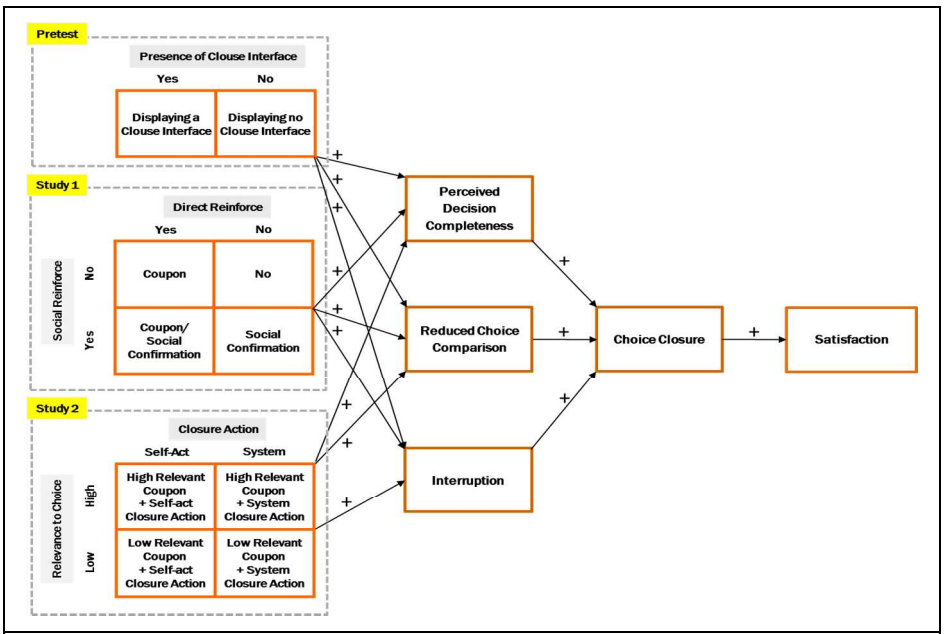

Figure 1. Research Model

Research Background and Hypotheses

Based on four theoretical references including theory of psychological closure, theory of cognitive dissonance, social influence theory and interruption, we build our research model of online choice closure, and present our hypotheses to be empirically tested. In this study, we conjecture that providing a sense of choice closure with mechanisms of interrupting or distracting people from thinking about alternatives and processing information of those alternatives can reduce people's post-decision dissonance. In turn, it will lead to satisfaction with the choice. We describe each in detail in the following subsections.

Cognitive Dissonance and Decision Reinforcer

Consumers' choice decision consists of a complex and multi-staged decision making process. While making a choice, they can experience cognitive dissonance often accompanied with anxiety, regret, and discomfort. It usually involves consideration of other alternatives (Kim 2011). In traditional businesses, companies have designed and offered intervention cues or voluntary actions to prevent continuous comparisons of choice alternatives or better rationalize their choice, resulting in alleviated dissonance. Along the same line, it is crucial for systems and web designers to incorporate effective mechanisms to reduce online users' cognitive dissonance. While there are studies related to the outcomes of psychological closure and choice closure, how closure can be induced by cues and interventions is under-investigated and should be particularly relevant to systems designers and e-commerce marketers. Cognitive dissonance theory explains that people experience an uncomfortable, negative affective state (dissonance) when they hold two or more contradictory cognitions (Festinger 1957). People are intrinsically motivated to reduce dissonance by changing the original cognitions, adding or subtracting cognitions (e.g., new attitudes, behaviors, or beliefs), or adjusting the importance of the cognitions (Hinojosa et al. 2017). When people choose among alternatives, dissonance can occur when they feel that they may not make the ideal choice and their desire to have the best choice conflicts with the realization that they may not do so.

In the context of shopping, merchants can consider strategies to lower cognitive dissonance such as increasing the perceived attractiveness of their choice, supplying additional information of their choice, and complimenting the consumers' wisdom and offering strong guarantees or warranties (Yap and Gaur 2014). Montgomery and Barnes (1993) argue that "dissonant consumers need reassurance (e.g., support) that a wise purchase decision has been made" (p. 206–207). Therefore, giving a direct and positive message to affirm and support a person's decision can be an effective way to alleviate her dissonance or doubt about the decision. In an online environment, rewarding coupons, positive feedbacks, and congratulatory pop-up messages are examples of a direct reinforcement of a customer's decision. In addition, humans are social in nature and their feeling, attitude, and behavior can affect or be affected by others. This phenomenon is generally referred to as social influence, and in the context of commerce, Kuan et al. (2014) investigate "informational social influence" (e.g., "buy" information – the number of people who have bought a deal) and "normative social influence" (e.g., "like" information – Facebook friends who like a deal). Theories in technology acceptance such as TAM, TRA, and UTAUT, and social influence theory all emphasize the others' influences on individuals' behaviors with respect to adopting or using information technologies. Another example is e-WoM (electronic word-of-mouth), which is referred to as "any positive and negative statement made by potential, actual or former customers about a product or company, which is made available to a multitude of people and institutions via the internet" (Hennig-Thurau et al. 2004, p. 39). All these aforementioned manipulations could induce positive outcomes (e.g., satisfaction, loyalty) and reduce negative outcomes (e.g., product return, unfavorable word-of-mouth).

In short, not only can detailed product information or a reinforcing coupon help consumers build choice confidence, but also the information produced by other users including online reviews, expert opinions, social network, and blogs (Broniarczyk and Griffin 2014). As e-commerce and Internet activities have become prevalent, both direct and social reinforcements can be easily and effectively designed and be powerful forces to reinforce people's purchasing decisions. Given these, we conjecture that providing forms of direct and social reinforcer to a person's choice can help reduce her perceived uncertainty and ambiguity of her choice, resulting in increased perceived decision completeness. We also propose that direct and social reinforcer to a person's choice can diminish his/her thoughts on those forgone alternatives (i.e., reduce a person's choice comparison). Thus, we hypothesize that:

H1: Displaying an interface with direct reinforcer(s) after a customer's product decision will lead to higher perceived decision completeness (H1a) and greater reduced choice comparison (H1b) than that without it.

H2: Displaying an interface with social reinforcer(s) after a customer's product decision will lead to higher perceived decision completeness (H2a) and greater reduced choice comparison (H2b) than that without it.

Act of Closure and Relevance of Choice Reinforcer

Past studies show that a sense of closure could be induced by performing physical acts associated with closure such as closing a lid or sealing objects in an envelope (Gu et al. 2013; Li et al. 2010). For example, by conducting an experiment that covers a chosen chocolate or tea from their assortments using a lid after selecting it from its assortments, Gu et al. (2013) demonstrate that physical acts of closure (i.e., covering a lid) can successfully signal to people that choice decision is complete, as well as prevent them from comparing between the choice and forgone alternatives, triggering choice closure that results in increased satisfaction. In particular, they confirm that the effect of physical acts of choice closure on perceived decision completeness and reduced choice comparison becomes greater when this act of closure is done by self rather than by others.

In the online environment, showing a pop-up that covers the current screen, closing a web browser, logging out from a session, disposing of a product in a particular way, and other symbolic actions could also deliver a sense of closure to consumers (Namkoong 2014). Although these actions are different from physical acts in brick-and-mortar environments in that they are sometimes not tangible and are often done by the system, they still are believed to be effective in helping people close their choice decisions in online environments. Specifically, we expect the same effect of the physical acts of choice closure on decision completeness and reduced choice comparison when a closure interface is introduced to online customers after a product choice is made. We consider the introduction of a closure interface by a system to cover up a choice set as a physical act of closure in our research context. Further, we predict that the effect of a closure interface becomes greater when an opportunity to initiate an action by self (i.e., click the button to close the pop-up and move to a checkout page after seeing a closure interface) is provided than when it is not provided (i.e., after 10 seconds, the closure interface is automatically removed by the system and moves to a checkout page).

Lee et al. (2012) suggest that people's attention will be directed to objects that are perceived as relevant to the underlying task. In other words, people "may even ignore visually salient objects on Web sites if they perceive them to be irrelevant to their tasks" (p. 369). Therefore, it is reasonable to assume that providing forms of reinforcer highly related to the customer's choice can draw more attention and thus alleviate the dissonance concerning "wisdom of purchase" (i.e., she may not have needed the product or may not have selected the appropriate one) and the dissonance related to "concern over purchase" (i.e., she may have been influenced to make a poor choice). Thus, we conjecture that a reinforcer highly relevant to a person's choice can induce a sense of decision completeness and reduce choice comparison. Therefore, we hypothesize that:

H3: Displaying an interface that allows him/her to initiate a physical act of closure after a customer's product decision will lead to higher perceived decision completeness (H3a) and greater reduced choice comparison (H3b) than that without it.

H4: Displaying an interface with high relevant reinforcer(s) after a customer's product decision will lead to higher perceived decision completeness (H4a) and greater reduced choice comparison (H4b) than that with low relevant reinforcer(s).

Interruption

Interruption has been defined as "an externally generated randomly occurring, discrete event that breaks continuity of cognitive focus on a primary task" (Coraggio 1990, p. 12). Park et al. (2016) suggest that interrupting events tend to induce an emotional response from decision makers and cause them to appraise the cues and develop interpretations. Interruption is often used in online and mobile businesses since it is known to effectively draw users' attention and increase their awareness and recall of the information presented (You et al. 2004). Researchers and practitioners have investigated an effective way to increase the receptivity of the interruptions. For instance, Fisher et al. (2010) demonstrate that the

receptivity of an interruptive mobile ad could be significantly increased when it includes actionable, relevant, interesting, and entertaining information. In our research context, online contents displayed in a closure interface in order to provide reinforcer of their decision is a form of interruption to customers' thinking of alternatives. In addition, previous studies (e.g., Kupor and Tormala 2015) find that momentary interruptions could increase message processing and persuasion. Therefore, we expect that when rewarding offerings (i.e., direct reinforce) and social influence information (i.e., social reinforcer) are presented in a closure interface to persuade and confirm their choice, people pay more attention and therefore perceive more interruptions than when there is none. We also predict the higher perceived interruption will be perceived because highly relevant reinforcer is shown in a closure interface to further distract customers' cognitive focus on thinking of other alternatives than that with low relevant reinforcer. Thus, we hypothesize that:

H5: Displaying an interface with direct reinforcer(s) (H5a) or social reinforcer(s) (H5b) after a customer's product decision will lead to higher perceived interruption than that without it.

H6: Displaying an interface with high relevant reinforcer(s) will lead to higher perceived interruption than that with low relevant reinforcer(s).

Antecedents of Choice Closure

Closure is defined as "something settled or resolved," "the outcome of decision making," and "a comforting or satisfying sense of finality" in dictionaries. Namkoong (2014) defines psychological closure as "a mental segmentation process which isolates a given event out of the subjective portfolio of ongoing experiences" (page 3). It is generally assumed that when people experience closure, they close the doors on the conflicting thoughts of the past. Originated from psychological closure, "the sense that a life experience is complete, that is, a feeling of pastness when recollecting a life event" (Beike et al. 2007, p. 375), choice closure represents the psychological process that facilitates consumers to perceive a choice decision completed and limits the comparison between the chosen and alternative options, leading to greater satisfaction with their choice.

Counterfactual is a mental thought that is contrary to the facts. Zeelenberg and Beattie (1997) describe that people compare the actual outcome with the possible outcome of different alternatives when they engage in counterfactual thinking. Powers and Jack (2013) state that dissonance can arise immediately after a decision is made as the unknown outcomes of forgone alternatives might seem better than they had thought initially to the consumers. Past studies also find that giving more choices to consumers could have a negative effect (e.g., Ackerman et al. 2014; Inbar et al. 2011). Mogilner et al. (2013) point out that reducing a chance to think about forgone alternatives could restrict consumers' cognitive effort, resulting in reduced negative responses.

Therefore, we conjecture that right after online users make a decision, showing specific interface designs to reinforce their decision or mimic closure action can distract their attention from thinking about alternatives thus inducing their perception of decision completeness and reducing their choice comparison. Namkoong (2014) suggests that certain sensations and behaviors can bring about feelings of closure to consumers. It seems reasonable to assume that people who perceive decision is completed and do not engage in choice comparison will have a sense of closure related to their choice.

Liu (2008) argues that an interruption can make people's information processing less bottom-up data driven and more top-down goal directed, resulting in preferences shifted from their primary goal dimension. The positive effects of an interruption have reported especially when users are engaged in a complex and stressful main task. Under the assumption that thinking continuously about forgone alternatives and comparing continuously them with the chosen one after a choice is an unsettled and exasperate task, a well-crafted interruption can help people disengage in these thoughts and attend to the interruption. Therefore, an interruption with appropriately designed cues can direct people's attention more toward underlying goal (of finishing purchase activities) and thus distract their attention to alternatives or data of those alternatives, leading to a sense of closure. Therefore, we hypothesize that:

H7: A customer's perceived decision completeness (H7a), reduced choice comparison (H7b), and positive interruption (H7c) will lead to a greater sense of choice closure.

Satisfaction

Namkoong (2014) demonstrates that providing consumers with a proper sense of ending or resolution can provide significant value. Gu et al. (2013) find that people with a sense of high (vs. low) closure after decision tend to focus on enjoying their chosen option and thus experience heightened choice satisfaction. Small and Venkatesh (1995) also argue that achieving closure can lead to satisfaction with the decision. They state that "satisfaction with the decision at the time the decision is made is the affective outcome of having attained the desired cognitive end state of closure" (p. 545). Thus, we hypothesize that:

H8: A customer's sense of choice closure will lead to greater satisfaction with his/her choice.

Research Methodology

A pre-test and two subsequent controlled experiments with a simulated online commercial website with 270 subjects who have online electronics purchase experience will be carried out to examine the effects of a closure interface on perceived choice closure and satisfaction. We will first conduct a pre-test (n_{pre}=30) to examine whether showing a closure interface in product purchasing processes is more effective to induce perceived decision completeness and reduce choice comparison than not showing it. After confirming its significant effects, we will conduct two main experiments. Study 1 (n_1=120) will be conducted to examine the effects of a closure interface with direct and/or social reinforcer on perceived decision completeness, reduced choice comparison, and perceived interruption. A 2 (presence vs. no presence of direct reinforcer) x 2 (presence vs. no presence of social reinforcer) between subject design will be used to examine the effects. Study 2 (n_2 = 120) with a 2 (closure act by self vs. by system) x 2 (high vs. low relevant reinforcer) treatments will be conducted to investigate the effects of a closure interface of a reinforcer with different levels of relevance and with a different actor of a closure act. We then investigate both their main and interaction effect. A total of nine different treatments are planned, including (a) eight choice closure designs and (b) one control treatment without any closure design.

***Experimental Website Design*:** We will create an experimental online electronics site by mimicking real-world major online electronics sites such as Amazon.com and Newegg.com. Except for the control condition, all experimental treatments are designed to include four web pages: a product information page with 12 alternative products (each product has its own hyperlinked page providing the detailed product description), a product-in-cart page after a product is "added to shopping cart" with the product subtotal and a list of recommended alternatives, a closure interface, and a checkout page. The product, product-in-cart, and checkout pages are identical across treatments. The only difference between treatments is the design elements included in the closure interface.

Similar to previous studies (e.g., Wang and Benbasat 2005), we choose an electronics product (i.e., digital camera) as a target product because there are equally competitive brands and each product's price and customer reviews are compatible. We carefully manipulate the information of price and customer reviews not to include any dominant product through a focus-group study with seven customers of products.

The product information screen consists of twelve different products each includes its image, hyperlinked name, price, and star rating. Subjects are asked to click the hyperlinks of interested products, navigate the pages, and select their favorite product by clicking "add to cart" button. A product-in-cart page will be displayed with the product subtotal and a list of recommended alternatives. As users initiate an action to proceed to check out, then a closure interface shows up before moving to the checkout page.

We design different closure interfaces by manipulating the presence of direct and social reinforcer, and the relevance-level of a reinforcer, and an actor of closure acts. For a direct reinforcer, we add "20% discount coupon of the product." For a social reinforcer, we include a list of short satisfaction statistics to the interface (i.e., "99.5% of customers purchased the same product showed the satisfaction with the product/sellers"). For the highly relevant reinforcer, we use the same "20% discount coupon of the product," while for the low relevant one, we add "20% discount coupon of a smart phone" to the interface. Finally, for the "closure act by self" condition, we include a "Proceed To Check Out" button at the bottom of the closure interface and customers cannot move to a checkout page until they click it, while for the "closure act by system" condition, we design the interface to automatically move to a checkout page after 10 seconds.

The checkout page consists of the total price and tax information, input boxes to get credit card and shipping information. Subjects are then requested to click "Purchase" button that directs them to first a thank-you page and the subsequent online questionnaire. In the no closure cue condition, a checkout page is displayed ten seconds after showing a closure interface with only a company logo and a short thank-you message. All the webpages will be installed onto the lab computers in order to precisely control the system environments of the experiments. Details on the experimental procedure and manipulation checks can be discussed in the conference.

***Subjects*:** We recruit subjects by distributing invitational fliers and making class announcements to undergraduate business students at a large U.S. university who have at least one time online purchase experience in the last year and randomly assign to one of the eight treatments. Before starting the experiment in a computer lab setting, subjects are told that it is a part of a consumer research project examining product usage, which involves comparing and choosing a product and they are asked to evaluate their product choice after they complete the purchase task. For all studies, participation is voluntary. Incentives to participate include receiving both class credit and an opportunity to win a small gift. The total amount of time taken to complete the study will be no more than 20 minutes.

***Measurement Items*:** The measurement items of the constructs are developed following a formal instrument development procedure (Straub 1989). Instrument items (Table 1) are based on an extensive literature review: four perceived decision completeness items (Gu et al. 2013), three reduced choice comparison items (Gu et al. 2013), three perceived choice closure items (Beike and Wirth-Beaumont 2005), three interruption items (Moe 2006; Xia and Sudharshan 2002), and four satisfaction items (Lou et al. 2012) are selected (see Table 1). All items are measured using a 7-point Likert-type scale. A pilot test is conducted to test the validity and reliability of instrument items and confirm their convergent and discriminant validity and reliability. Manipulation check is also conducted to confirm whether our manipulation for the closure interface is successful and thus subjects correctly identify the things they observe in closure interfaces. The MANOVA and subsequent structural equation modeling (SEM) analyses are used for data analysis.

Table 1. Instrument Items

Construct	Items	Description
Perceived Decision Completeness (Gu et al. 2013)	PDC1	To what extent do you feel you have reached closure about your choice of what product to purchase?
	PDC2	To what extent are you still thinking about your decision of what product to buy? (reverse coded)
	PDC3	After choosing your product, to what extent did you perceive that decision as settled?
	PDC4	People sometimes use expressions such as 'I have turned my back on' or 'I have closed the door on' something. To what extent do you think such expressions describe how you feel about your decision of what product to purchase?
Reduced Choice Comparison (Gu et al. 2013)	RCC1	After you selected the product and went through a checkout process, to what extent did you keep thinking about the other products available on the product page?
	RCC2	After you selected the product and went through a checkout process, to what extent did you try to compare it with other products on the product page?
Interruption (Moe 2006; Xia and Sudharshan 2002)	INT1	I feel impeded to compare alternatives and complete choice decisions while seeing a pop-up page showing a coupon and/or customer satisfaction statistics.
	INT2	I had trouble to compare alternatives and complete choice decisions while seeing a pop-up page showing a coupon and/or customer satisfaction statistics.
	INT3	I was distracted from comparing alternatives and completing choice decisions when I see a pop-up page showing a coupon and/or customer satisfaction statistics.

Perceived Choice Closure (Beike and Wirth-Beaumont 2005)	PCC1	After choosing your product, to what extent did you perceive that decision as 'unfinished business?' (reverse coded)
	PCC2	After choosing your product, to what extent did you perceive that decision as a 'closed book'?
	PCC3	After choosing your product, to what extent did you think of that decision as behind you?
Satisfaction (Luo et al. 2012)	SAT1	How satisfied are you with the product that you chose?
	SAT2	How likely is it that you would recommend the product you chose to a friend/colleague?
	SAT3	I am pleased with the product I chose.
	SAT4	I am happy with the product I chose.

Expected Contributions

Our contribution is multifold. First, extending from physical shopping environments, this study provides new insights into the effects of various designs of closure interfaces on online choice closure perception and satisfaction. Especially, we introduce new manipulations of type and relevance-level of reinforcer and an actor of closure act in an online purchasing context. Second, by proposing theory-driven closure interface alternatives and newly investigating the value of a closure interface with respect to their induced positive effects (i.e., increased perceived decision completeness, reduced choice comparison, and increased interruption), this study contributes to the advancement of the choice closure literature (i.e., answering why and how to design interfaces to induce choice closure). Finally, by proposing and validating a research model of online choice closure, the study provides a solid foundation for better understanding of the important but under-investigated nomological networks of choice closure.

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