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Investigating Metacognitive Fluency as a Judgment Cue in Choice Overload

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APPROVAL OF THE DISSERTATION COMMITTEE

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Abstract

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Choice overload describes the finding that individuals report being less satisfied and defer choice more often when choosing from larger rather than smaller choice sets. Researchers have proposed various theoretical models to account for this phenomenon; however, these models have yielded conflicting results. Critically, little research has sought to identify the cognitive mechanism underlying choice overload. The present study reviews models of choice overload and offers a more parsimonious account of choice overload. More specifically, metacognitive fluency, or the subjective interpretation of choice difficulty, plays a critical role during choice and may account for conflicting results in current choice overload research. The metacognitive fluency literature has suggested that choice difficulty may impede or facilitate choice depending on choice context and that choice difficulty is no longer used as a judgment cue when choice difficulty is attributed to an outside source.

Experiment 1 tested and confirmed the hypothesis that the value framing of fluency differentially impacts choice satisfaction depending on whether choice fluency signals positive or negative value. Using an attribution paradigm, Experiment 2 tested, but did not confirm the hypothesis that attributions of fluency differentially impact choice satisfaction depending on whether an external source is thought to impede or facilitate choice. Critically, both experiments failed to replicate the choice overload effect. These results provide initial evidence that metacognitive fluency is used as a judgment cue during consumer decision making, however,

further research in needed to clarify the relationship between choice set size and metacognitive fluency. This cognitive approach to choice overload offers a promising foundation for future research.

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Chapter 1: Introduction

Individuals often make choices that yield long-lasting consequences with serious implications, choices such as buying a home, selecting a retirement plan, or voting for a presidential candidate. Research has reported that larger choice sets (i.e., assortments with a larger number of choice options) facilitate choice making more than smaller choice sets. Specifically, increasing the number of options in a choice set has been shown to increase the probability of a choice being made (Baumol & Ide, 1956) and reduce uncertainty about missing choice options (Greenleaf & Lehman, 1995). Despite these benefits associated with increased choice set size, competing research has also reported that larger choice sets impede choice making more than smaller choice sets, resulting in outcomes such as increased choice deferral and decreased choice satisfaction (Iyengar & Lepper, 2000).

The term *choice overload* has been used to describe this paradoxical phenomenon that larger choice sets impede choice. More specifically, Chernev, Böckenholt, and Goodman (2015) proposed that increasing choice set size increases decision complexity and increasing decision complexity impedes choice. These researchers further defined choice overload as a latent construct reflected by self-report (e.g., confidence, satisfaction, and regret) and behavioral (e.g., choice deferral and switching likelihood) measures. Choice overload has been documented across various choice domains including traditional in-store retail (Iyengar & Lepper, 2000), e-commerce (Lee & Lee, 2004), online dating (Deangelo & Toma, 2016), and finance (Huberman, Iyengar, & Jiang, 2007). Although choice overload has drawn considerable research interest over the past decades, many researchers have failed to replicate the choice overload effect (Scheibehenne, Greifeneder, & Todd, 2010) and relatively little research has investigated the cognitive processes underlying the phenomenon (Bartels & Johnson, 2015; Langben,2015).

Chapter 2: Literature Review

Choice Overload

Iyengar and Lepper (2000) first reported the choice overload phenomenon; individuals deferred choice more frequently when presented with more, rather than fewer options. In a field study, the researchers offered grocery store patrons either smaller (i.e., 6 options) or larger choice sets (i.e., 24 options) of jam at a display table. They measured the number of patrons who stopped to browse through each choice set and the number of those patrons who made subsequent purchases. Sixty percent of patrons who encountered the larger choice set stopped at the jam display while only 40% of patrons stopped after encountering the smaller choice set. However, the researchers reported the opposite pattern for purchase behavior. Of the patrons who stopped at the larger choice set, only 3% purchased jam, whereas 30% of patrons who stopped at the smaller choice set purchased jam. Although this study reported the novel finding that increasing choice set size impeded choice, Iyengar and Lepper failed to identify the psychological processes underlying the effect.

One issue in the interpretation of the choice overload data from Iyengar and Lepper (2000) is that differences in choice deferral rates may have resulted from differences in the jam flavors presented or selected in each condition rather than from the manipulation of choice set size. To address this issue, the researchers conducted two additional yoked-design experiments. These yoked-design experiments used matched control groups; the matched control groups received the same choice options (Experiment 2) and choice outcomes (Experiment 3) as the other experimental conditions (for a review on yoked-designs, see Church, 1964). Specifically, in Iyengar and Leppers' second experiment, participants were randomly assigned to view potential essay topics from larger (i.e., 30 choices) or smaller choice (i.e., 6 choices) sets. Participants could select topics and complete elective essays for extra credit in a university course. Critically, this experiment implemented a yoked design such that essay topics seen by participants viewing the larger choice set were seen equally often by participants viewing the smaller choice set. Participants deferred choice (i.e., failed to complete essays) more frequently in the larger than smaller yoked choice sets.

In Iyengar and Leppers' (2000) third experiment participants were randomly assigned to larger (i.e., 30 chocolates), smaller (i.e., 6 chocolates), or no-choice set conditions. Each participant in the no-choice condition received a chocolate that was selected in the other two choice conditions. After choosing or receiving a chocolate, participants sampled and rated the chocolates. Participants reported lower choice satisfaction (d = 1.18; Cohen, 1992) and greater choice difficulty (d = 0.70; Cohen, 1992) when choosing from the larger relative to smaller choice sets, and critically, reported the lowest levels of satisfaction in the no-choice control condition. Taken together, these two yoked-design experiments provide evidence that differences in choice satisfaction and deferral resulted from manipulating the number of options at choice rather than from the specific options available or selections made in experimental conditions.

Since Iyengar and Leppers' (2000) research, choice overload has been replicated using various behavioral and self-report outcomes. Using behavioral measures of choice overload, researchers have found that larger (rather than smaller) choice sets are associated with increased choice deferral, increased switching likelihood (Chernev, 2003), and increased selection of easily justifiable choices (Sela, Berger, & Liu, 2008). Meanwhile, using self-report measures of choice overload, researchers have found that larger (rather than smaller) choice sets are associated with increased regret (Inbar, Botti, & Hanko, 2011), decreased confidence (Haynes, 2000) and decreased satisfaction (Botti & Iyengar, 2004). Moreover, a meta-regression conducted by

Chernev, Böckenholt, & Goodman (2015) reported that regret, confidence, satisfaction, choice deferral, and switching likelihood provide equally sensitive measures of choice overload.

Meta-Analytic Model of Choice Overload

Following Iyengar and Leppers' (2000) study, researchers in social psychology, marketing, and economics generated competing theoretical models of choice overload without clarifying the psychological processes underlying the effect. After two decades of research on choice overload, Chernev, Böckenholt, and Goodman (2015) conducted a meta-regression. To conduct this analysis, the researchers first transformed differences between choice outcomes from larger and smaller choice sets into effect size measures represented by Cohen's *d* (Cohen, 1992). The researchers included four hypothesized theoretical moderators in their meta-regression model: (1) Decision task difficulty, (2) Choice set complexity, (3) Preference uncertainty, and (4) Decision goals. The model also included six different measurements of choice overload: (1) Satisfaction, (2) Regret, (3) Choice deferral, (4) Switching likelihood, (5) Assortment choice, and (6) Option Selection. This meta-analysis regressed the effect sizes (i.e., Cohen's *d* effects) of these theoretical and measurement factors on observed choice overload measures. Across, 99 studies (N = 7,202) this model accounted for 68% of residual variances in effect sizes relative to the intercept-only model. Moreover, Chernev, Böckenholt, and Goodman reported non-significant interactions between theoretical moderators and outcome measures, suggesting that different theoretical moderators yield similar effects across the different outcome measures included in their analysis. Figure 1 below provides a conceptual representation of the relationship between choice set size, theoretical moderators, and choice outcomes.

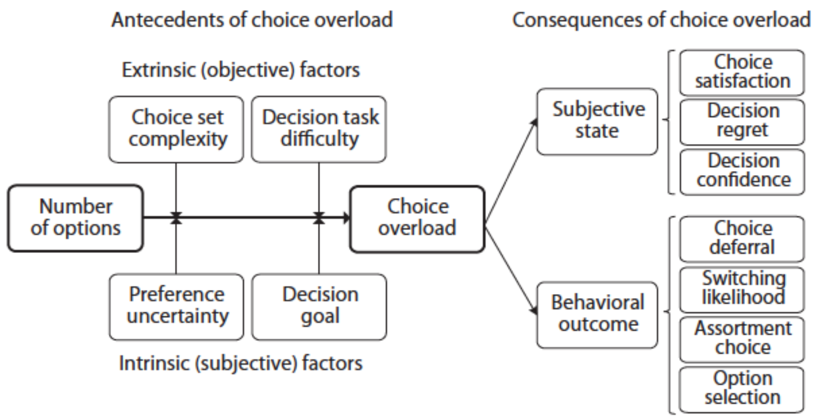

Figure 1. Conceptual model of moderators impacting the relationship between choice set size and choice overload. Specifically, decision task difficulty, choice set complexity, decision goals, and preference uncertainty moderate the relationship between choice set size and subjective (e.g., choice satisfaction) and behavioral (e.g., choice deferral) outcomes. Individuals are typically less satisfied and defer choice more frequently (i.e., experience choice overload) when facing high rather than low levels of decision task difficulty, choice set complexity, and preference uncertainty. These conceptual moderators may reflect a general factor of choice difficulty. Reproduced from Chernev, Böckenholt, and Goodman (2015), page 336.

Chernev, Böckenholt, and Goodmans' (2015) meta-regression comprehensively analyzed past approaches to choice overload and represents the recent state of the choice overload literature. However, Chernev et al. failed to explicate the cognitive mechanisms underlying choice overload and failed to differentiate the constructs underlying the theoretical moderators included in their meta-regression. The following sections detail the relationship between choice set size, decision task difficulty, choice set complexity, and preference uncertainty as a brief summary of the choice overload literature as defined in this meta-analysis. Although, Chernev et al. included decision goals as a theoretical moderator in their analysis, this factor refers to cognitive processes outside of choice (e.g., browsing or learning) and therefore has not been reviewed in the current study. After presenting an overview of these theoretical moderators in Chernev et al.'s meta-regression, a more parsimonious explanation of choice overload will be offered: The subjective ease or difficulty (i.e., metacognitive fluency) associated with a choice acts as a judgment cue during choice and impacts subsequent choice outcomes.

Decision Task Difficulty

According to Chernev, Böckenholt, and Goodman (2015), choice overload is more likely to occur when choosers face high (rather than low) levels of decision task difficulty. These researchers defined decision task difficulty as the structure of a choice problem, including the time constraints of the problem, the number of attributes associated with each choice, and the presentation format of choice sets.

Researchers have reported that decreasing the time participants have to make a choice results in decreased choice satisfaction and confidence (Haynes, 2009) due to choosers' use of less systematic information processing strategies as choice time decreases (Payne, Bettman, & Johnson, 1988). Specifically, Payne et al. suggested that under time constraints, individuals evaluate fewer choice attributes than when making choices without time constraints. In other words, an incomplete processing of alternative choices results in choice overload (Chernev, 2003).

Cognitively taxing presentation formats have also been found to increase choice deferral. For example, individuals deferred choice more frequently when selecting from larger, rather than smaller, choice sets presented visually rather than verbally (Townsend & Kahn, 2013). In addition, Chernev, Böckenholt, and Goodman (2015) argued that increasing the number of choice attributes for a choice set increases the difficulty of a choice problem. Specifically, weighing and comparing the values for multiple choice attributes becomes increasingly difficult as the number of choice options increases (Bettman, Luce, & Payne, 1998). For example, choosing a shirt from a set with color as the only varying attribute would be less cognitively taxing than choosing a shirt from a set varying in color, price, material, and cut. As such, decision task difficulty increases and choice satisfaction decreases when choosers select from choice sets with a many rather than few attributes (Greifeneder, Scheibehenne, & Kleber, 2010). These studies suggest that imposing time constraints and cognitively taxing presentation formats during choice increase the difficulty of a choice problem, resulting in choice overload.

Choice Set Complexity

Choice overload is also more likely to occur when choosers face high rather than low levels of choice set complexity. Chernev, Böckenholt, and Goodman (2015) defined choice set complexity as the alignability of option attributes and features. Choice alignability refers to the overlap of attributes in a choice set. Nonalignable choice sets contain non-orthogonal attributes, meaning that any single attribute is found in only one option. Conversely, alignable choice sets contain different levels of the same attribute across multiple options. For example, a nonalignable choice set may contain Mobile Phone A that offers Bluetooth but not Wi-Fi capabilities and Mobile Phone B that offers Wi-Fi but not Bluetooth capabilities. An alignable choice set might contain Mobile Phone A that offers low-speed Bluetooth and high-speed Wi-Fi whereas Mobile Phone B offers high-speed Bluetooth and low-speed Wi-Fi. After manipulating choice sets to contain either alignable or nonalignable attributes, Gourville and Soman (2005) reported that increasing the number of choice options increased purchase probability for alignable but not nonalignable choice sets. Bettman, Luce, and Payne (1998) proposed that individuals often compare attribute values when choosing. As such, missing attribute information (e.g., in nonalignable choice sets) makes choice problems more difficult, particularly when attribute information is missing from large choice sets. Taken together, these studies suggest choice overload occurs when choice sets contain similarly attractive options with nonalignable attributes.

Preference Uncertainty

Choice overload is also more likely to occur when choosers face high rather than low levels of preference uncertainty. Preference uncertainty refers to how clearly choosers have defined an ideal choice within a given domain and has been operationalized by researchers as individuals' prior choice preferences and choice domain expertise. Individuals may range from having no preferences to strong choice preferences in various choice domains. Similarly, individuals may have different levels of knowledge about options within a choice domain. Wansink, Kent, and Hoch (1998) reported that individuals with strong choice preferences and expertise in a choice domain prefer large choice sets. However, individuals with weak preferences and limited knowledge in a choice domain often experience choice overload and prefer smaller choice sets (Morrin, Broniarczyk, & Inman, 2012). Thus, choice overload occurs when choosers face high (rather than low) levels of preference uncertainty.

In summary, Chernev, Böckenholt, and Goodman (2015) found that decision task difficulty, choice set complexity, and preference uncertainty moderate the relationship between choice set size and choice outcomes (e.g., choice satisfaction and deferral). Specifically, individuals are less satisfied and defer choice more frequently (i.e., experience choice overload) when facing high rather than low levels of decision task difficulty, choice set complexity, and preference uncertainty.

Rational Emotional Model of Choice

Although Chernev, Böckenholt, and Goodman's (2015) meta-analysis identified four moderators of choice overload, previous models of choice have suggested that these moderators actually reflect a single factor, that is, selection difficulty. Specifically, Anderson's (2003) Rational Emotional Model of decision avoidance proposed that choice set complexity, task difficulty, preference uncertainty, and critically, choice set size contribute to selection difficulty. In an effort to use language found in the choice overload and metacognitive fluency literatures, the term "selection difficulty" has been used synonymously with the terms "choice difficulty" and "choice disfluency" through the remainder of the paper. Figure 2 below depicts the Rational Emotional Model of decision avoidance and outlines that choice set size is one of many factors that impacts choice selection by making a choice problem more or less difficult.

According to this model, choice set size, choice difficulty, and choice regret hold a positive relationship; as choice set size increases, choice difficulty also increases and results in increased choice regret. If choice set size is one factor that contributes to selection difficulty, as proposed by the Rational Emotional Model, then manipulating other factors (e.g., time limitations, option attractiveness, or domain expertise) that also impact selection difficulty does little to clarify the cognitive mechanisms underlying choice overload.

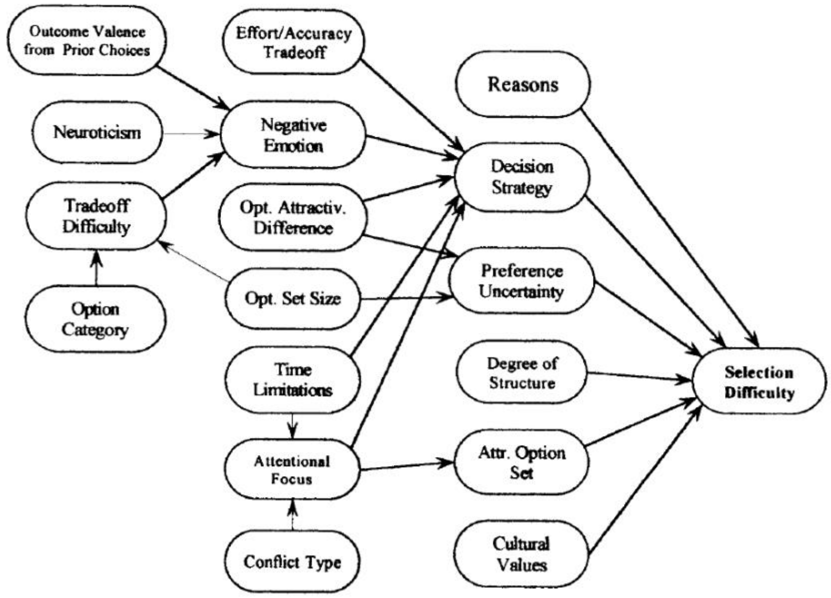

Figure 2. Factors contributing to selection difficulty in the Rational Emotional Model of decision avoidance. Many of these factors have been studied individually in the context of choice overload. However, this conceptual model suggests that selection difficulty, or choice difficulty is a single factor that contributes to choice avoidance. Moreover, increased choice difficulty increases decision avoidance (i.e., increased choice deferral and choice regret). Critically, option set size is included as one factor that impacts choice difficulty. This model reframes the choice overload literature by presenting choice set size as one of many factors that impacts selection difficulty. Replicated from Anderson (2003), page 157.

Cognitive Approach to Choice Overload

Researchers have also proposed a cognitive explanation for the choice overload paradox; individuals' cognitive limitations impede choice as set sizes increase (e.g., Chernev, Böckenholt, & Goodman, 2015; Iyengar & Lepper, 2000; Molinger, Rudnick, & Iyengar, 2008). Reutskaja and Hogarth (2009) found choice satisfaction to be an inverted U-shape function of choice set size and reasoned that at a critical point (i.e., the peak of an inverted-U), the costs associated with evaluating additional choices increases more rapidly than the benefits associated with the additional choices. Specifically, participants were more satisfied when choosing from intermediate size choice sets (i.e., 10 or 15 options) than smaller (i.e., 5 options) or larger (i.e., 30 options) choice sets. In addition, when participants were asked to make their choices based on a cognitively taxing attribute (i.e., shape when choosing boxes), participants reported lower average satisfaction when choosing from larger compared to intermediate or smaller choice sets. However, when participants were asked to make their choices based on a less cognitively taxing attribute (i.e., color when choosing boxes), participants reported similar levels of satisfaction for intermediate and larger choice sets. Together, these findings further support the notion that choice satisfaction decreases once cognitive limitations are taxed beyond a critical point.

This relationship between choice set size and choice satisfaction was further investigated by Fujiwara et al. (2018) using behavioral and neuroimaging methodologies. Again, these researchers reported a similar inverted U-shape relationship between assortment size and choice satisfaction: Choice satisfaction increased as choice set size increased only up to a critical point, followed by a decrease in choice satisfaction. Importantly, as choice set size increased, participants' reaction times increased linearly and brain regions associated with choice difficulty (i.e., the ventrolateral prefrontal cortex and insula) were more active. These behavioral and neuroimaging data empirically support the previous assumption that choice problems increase in difficulty as choice sets increase in size. Coupled with Reutskaja and Hogarth (2009), Fujiwara et al.'s research further demonstrates an inverted U-shape relationship between assortment size and choice satisfaction; increasing choice set size facilitates choice until the number of options makes a choice problem too difficult, exceeding an individual's cognitive capacities.

These findings support and extend Anderson's (2003) Rational Emotional Model that as choice set size increases choice selection difficulty also increases. Taken together, Chernev, Böckenholt, & Goodmans' (2015) meta-analysis, Anderson's (2003) Rational Emotional Model, and recent cognitive research on choice overload (e.g., Fujiwara et al., 2018) provide evidence that choice difficulty is a critical factor involved in choice overload. Related metacognitive fluency research suggests that increasing choice difficulty may have the opposite effect of that observed in choice overload - increasing choice set size may facilitate choice in certain contexts.

Metacognitive Fluency

Metacognitive fluency refers to the subjective ease associated with a cognitive process (Alter & Oppenheimer, 2009). In early research on metacognitive fluency, Schwarz et al. (1991) reported that the subjective ease of recall affected judgments of recalled content. Specifically, participants were asked to recall either six (i.e., relatively fluent recall) or twelve (i.e., relatively disfluent recall) memories of personally assertive or unassertive behaviors, and then provided self-assessments of assertiveness. On average, participants rated themselves as more assertive when generating six (rather than twelve) examples of *assertiveness* and twelve (rather than six) examples of *unassertiveness*. The researchers concluded that fluency experienced during memory recall acted as a more salient cue to judge self-assessments of assertiveness than the overall amount of content recalled.

Since Schwarz et al.'s (1991) study, metacognitive fluency effects have been replicated across various cognitive processes including linguistics (Whittlesea & Williams, 1998), embodied cognition (e.g., Strepper & Strack, 2003), perception (e.g., Pocheptsova, Labroo, & Dhar, 2010), memory (e.g., Tversky & Kahneman, 1973), *and critically*, decision-conflicts (e.g., Novemsky, Dhar, Schwarz & Simonson, 2007). Across these cognitive domains, metacognitive fluency has also been reported to affect various dependent measures including frequency and truth judgments (Reber & Schwarz, 1999), preference judgments (Bornstein & D'Agostino, 1994), confidence judgments (Kelley & Lindsay, 1993), and affective response (Winkielman & Cacioppo, 2001). Specifically, more fluently processed information has been associated with increased judgments of truth, preference, and confidence.

According to Alter and Oppenheimer (2009), metacognitive fluency acts as a critical informational cue during reasoning and judgment (e.g., evaluating choice options). Oppenheimer (2008) proposed that three factors account for how fluency operates as a judgment cue: (1) Cognitive Operations, (2) Attribution, and (3) Mental Representations. Figure 3 presents a graphical representation of these factors impacting the relationship between metacognitive fluency and judgment. According to Oppenheimer, individuals carry out cognitive operations, like choice processes, ranging on a continuum from fluent (e.g., choosing from smaller choice sets) to disfluent (e.g., choosing from larger choice sets). Individuals are typically aware of the relative fluency of these cognitive operations; however, metacognitive fluency may be attributed to an external source rather than a cognitive operation. For example, an individual may experience choice disfluency when choosing from a relatively large choice set, but attribute this disfluency to divided attention (e.g., receiving a phone call) during choice selection. As a result, metacognitive fluency no longer acts as a judgment cue when it is attributed to an external source.

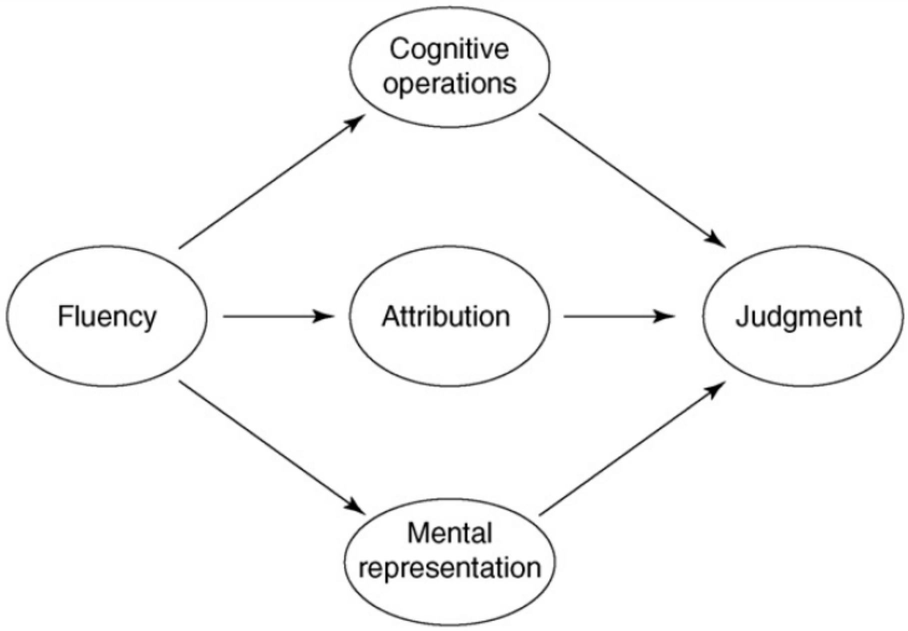

Figure 3. Oppenheimer (2008) conceptual model of factors mediating the relationship between metacognitive fluency and judgment. Extending this model to choice overload research, the use of choice fluency as a judgment cue is mediated by the attribution of experienced choice fluency. The use of choice fluency as a judgment cue is also partially mediated by mental representations (i.e., choice fluency signaling positive or negative value) and cognitive operations (i.e., decision making processes). Replicated from Oppenheimer (2008) page 240.

When individuals attribute metacognitive fluency to cognitive operations, processing fluency (i.e., relative ease), rather than disfluency (i.e., relative difficulty), typically results in favorable evaluative judgments. According to Oppenheimer (2008), this occurs because individuals often hold mental representations that associate processing fluency with positive value (Briñol, Petty, & Tormala, 2006; Jacoby, 1983; Novemsky, Dhar, Schwarz & Simonson, 2007; Schwarz, 2004). Mental representations, as conceptualized by Oppenheimer (2008), will be referred to as value framing in remainder of the present study. Although the metacognitive fluency literature has suggested that choice fluency, rather than disfluency, typically results in favorable evaluative choice judgments, related research has also suggested the opposite; fluency may signal negative value depending on choice domain (Pocheptsova, Labroo, & Dhar, 2010) or framing manipulations at choice (Briñol, Petty, & Tormala, 2006). For example, individuals may view complex (disfluently processed) artwork as more interesting and valuable than simple (fluently processed) artwork. This may result from previously held associations between complexity (i.e., processing disfluency) and what makes art interesting (i.e., positive value), or from a friend suggesting that the complexity in certain styles of art is interesting (i.e., value framing) (Alter & Oppenheimer, 2009).

In the context of choice overload, increasing choice set size increases the relative difficulty, or disfluency, associated with a choice task (Anderson, 2003, Fujiwara et al., 2018). If choice fluency functions as a judgment cue when individuals evaluate choices (Novemsky, Dhar, Schwarz & Simonson, 2007), then manipulating whether fluency signals negative or positive value should differentially impact how individuals evaluate choices from relatively larger (i.e., processed less fluently) or smaller (i.e., processed more fluently) choice sets. Similarly, manipulating attributions of fluency should differentially impact choices from smaller and larger choice sets. Specifically, if disfluency is attributed to an external source, then the magnitude of the choice overload effect should decrease relative to a control group. Conversely, if an external source is thought to facilitate choice fluency, then the magnitude of the choice overload should increase, such that participants are less satisfied with selections from larger choice sets. Two experiments in the current study tested these hypotheses. More specifically, Experiment 1 tested whether manipulating the value associated with choice fluency differentially impacted choice satisfaction using a value frame paradigm. Then, Experiment 2 tested whether attributing choice disfluency to an external versus internal (i.e., inherent to the choice task) source changed its impact on choice satisfaction.

Chapter 3: Experiment 1

Introduction

Researchers have reported that metacognitive fluency may signal positive or negative value and that this association between metacognitive fluency and value may be learned (Unkelbach, 2006) or manipulated by contextual cues, such as explicit instructions (Briñol, Petty, & Tormala, 2006). For example, Pocheptsova, Labroo, and Dhar (2010) found that in certain choice domains metacognitive disfluency signals positive value; participants reported being willing to pay more for special occasion products when product information was displayed in difficult-, rather than easy-to-read font. Extending this research, Briñol, Petty, and Tormala (2006) tested and confirmed the hypothesis that individuals evaluate stimuli more favorably when experienced metacognitive fluency was associated with positive value. Specifically, individuals who viewed disfluency as a positive signal (and fluency as a negative signal) evaluated stimuli move favorably when experiencing disfluency than fluency. Conversely, individuals who viewed fluency as a positive signal (and disfluency as a negative signal) evaluated stimuli more favorably when experiencing fluency than disfluency. Critically, Briñol et al. manipulated the meaning of fluency by conducting a 2 [Thought Generation: easy (2 reasons) or difficult (10 reasons)] × 2 [Value Frame: ease-is-good/difficulty-is-bad or ease-is-bad/difficulty-is-good] between-subjects factorial design experiment.

In this experiment, undergraduate participants listed 2 or 10 reasons in favor of implementing senior comprehensive exams at their university and then read one of two short paragraphs defining the meaning of fluency. Participants in the ease-is-bad/difficulty-is-good condition read that unintelligent people often experienced ease when making judgments due to a lack of complex thinking and neuronal connections. Participants in the ease-is-good/difficulty-is-bad condition read the opposite, that is, unintelligent people often experience difficulty when making judgments due to lack of complex thinking and neuronal connections. Participants in the ease-is-good/difficulty-is-bad condition displayed typical metacognitive fluency effects: They reported more favorable attitudes towards implementing senior comprehensive exams when generating 2 (i.e., easy) rather than 10 (difficult) reasons in favor of senior comprehensive exams. Interestingly, this pattern reversed for participants in the ease-is-bad/difficulty-is-good condition; participants reported more favorable attitudes towards senior exams when generating 10 (i.e., difficult) rather than 2 (i.e., easy) reasons in favor of a senior comprehensive exam. In relation to Oppenheimer's (2008) model of metacognitive fluency, Briñol, Petty, and Tormala (2006) manipulated processing fluency (i.e., easy or difficult cognitive tasks) and the subjective values associated with task fluency. In other words, participants used metacognitive fluency as a judgement cue and the value associated with fluent and disfluent cognitive processes varies based on contextual information (e.g., explicit instructions); this rationale was used in Experiment 1. Specifically, if smaller choice sets are processed more fluently than larger choice sets (Fujiwara et al., 2018), and choice fluency acts as a judgment cue, then choice outcomes like choice satisfaction should vary as a function of the value framing of choice fluency.

Experiment 1 used a value frame manipulation (Briñol, Petty, & Tormala, 2006) with a choice overload task (Iyengar & Lepper, 2000) to test the hypothesis that metacognitive fluency, conceptualized as choice fluency (Anderson, 2003), is a critical judgment cue during choice. Specifically, choice fluency may signal negative or positive value depending on choice context.

An interaction was predicted such that holding the value frame that ease is good/difficulty is bad would result in higher choice satisfaction for selections from smaller than larger choice sets (i.e., the choice overload effect); conversely holding the value frame that ease is bad/difficulty is good would result in lower choice satisfaction for selections from smaller than larger choice sets., suggesting that the value associated with metacognitive fluency differentially impacts choice satisfaction.

Method

Participants and Design

A priori power analyses were conducted to determine the sample size in both experiments following the methods proposed by Faul, Erdfelder, Lang, and Buchner (2007). Research investigating the relationship between metacognitive fluency and value framing has reported a small to moderate effect size (Briñol, Petty, and Tormala, 2006). A G*Power analysis was conducted to determine that a sample size of N = 432 is necessary to detect an effect size of Cohen's f = 0.15, alpha = .05, power = .80.

Participants were recruited using Amazon's Mechanical Turk. Inclusion criteria required that participants reside in the United States, hold an Amazon Mechanical Turk approval rating of over 80%, and score no more than three standard deviations from the mean (computed across all conditions) on the primary dependent variable, choice satisfaction. Following Iyengar and Leppers' (2000) inclusion criteria, only participants who responded "Yes" to the question "Do you like chocolate?" were included in the study to increase the relevance of the experimental choice task. Similarly, participants were asked "How often do you eat chocolates?" and responded 1 (*almost never*) to 7 (*very frequently*). Participants who reported eating chocolates very frequently were removed from the study as familiarity or expertise in choice domain confounds choice behavior (Wansink, Kent, & Hoch, 1998). After removing 110 individuals who did not meet these inclusion criteria, the final sample consisted of 454 participants (M_{age} = 39.78 years, *SD* = 11.73; 218 females, 232 males, 4 did not specify).

Experiment 1 was based on a 2 [Task Fluency: 6 choices (fluently processed) or 30 choices (disfluently processed)] × 3 [Value Frame: control, fluency-is-good/disfluency-is-bad, or fluency-is-bad/disfluency-is-good] between-subjects factorial design. Participants were randomly assigned to one of the six conditions.

Materials and Procedure

Following a modification of Iyengar and Leppers' (2000) procedures, 30 different flavors of Godiva brand chocolates were selected to comprise stimuli in the choice sets. Participants in the present study completed a hypothetical choice task whereas participants in Iyengar and Lepper's (2000) were offered the chocolates they selected. The materials (i.e., chocolate flavors) used in the present study also differed from those used by Iyengar and Lepper (2000). The fluently processed choice set contained six different chocolate flavors presented in a single row. These chocolates were randomly selected from the group of 30 different chocolate flavors. The disfluently processed choice set contained 30 different chocolates flavors arranged into five rows of 6 chocolates. The chocolates in each choice set were presented in random order.

In the first phase of this experiment, participants read a value frame following procedures modified from Briñol, Petty, & Tormalas' (2006) research. Specifically, participants in the fluency-is-bad/disfluency-is-good condition read:

> Unintelligent people often experience a feeling of ease when choosing because their thoughts are not very complex and they have few neuronal connections. Alternatively,

intelligent people generally have more complex thinking and more neuronal connections, so they often experience a feeling of difficulty when choosing.

Participants in the fluency-is-good/disfluency-is-bad condition read the opposite:

> Unintelligent people often experience a feeling of difficulty of when choosing because their thoughts are not very complex and they have few neuronal connections. Alternatively, intelligent people generally have more complex thinking and more neuronal connections, so they often experience a feeling of ease when choosing.

Participants in the control value frame condition read did not read any text during this phase.

In the second phase of the experiment, participants completed a choice task following procedures modified from Iyengar & Lepper (2000). Specifically, participants read, "We're doing research examining how people select chocolates. Please look at the names of the chocolates and the chocolates themselves, and tell me which one you would buy for yourself". Participants then viewed choice sets that included either 6 or 30 chocolates and selected a desired chocolate without a time limit.

In the third phase of Experiment 1 participants rated choice satisfaction for chosen chocolates as the primary dependent measure. Choice satisfaction was measured with the single question, “How satisfied are you with the chocolate you selected?”; participants responded on a Likert scale ranging from 1 (*not at all*) to 7 (*extremely*) (Iyengar & Lepper, 2000). Additional self-report and behavioral measures including perceived choice difficulty and selected choice valuation were then collected. Specifically, perceived choice difficulty was measured with the question, “How difficult was making your decision of which chocolate to pick?”; participants responded on a Likert scale ranging from 1 (*not at all*) to 7 (*extremely*) (modified from Iyengar & Lepper, 2000). Choice valuation was measured with the question, “How much would you be willing to pay for the chocolate you selected?" and participants responded in United States Dollars (modified from Pocheptsova, Labroo, & Dhar, 2010). Finally, reaction time data was also collected to measure how long participants spent choosing chocolates (Fujiwara et al., 2018).

Results and Discussion

A 2 [Task Fluency: 6 choices (fluently processed) or 30 choices (disfluently processed)] × 3 [Value Frame: control, fluency-is-good/disfluency-is-bad, or fluency-is-bad/disfluency-is-good] analysis of variance (ANOVA) was conducted on the primary dependent variable, choice satisfaction, as well as on choice difficulty, choice time, and choice valuation. Regarding analysis of choice satisfaction, contrary to the major hypothesis in Experiment 1, neither the interaction between task fluency and value frame, nor the main effect of task fluency were significant (*ps* > .71). Critically, these results do not support the predicted interaction or replicate the choice overload effect. Only the main effect of value frame was significant, $F(2, 448) = 3.60$, $p = .03$, $\eta^2 = .04$; choice satisfaction was significantly higher in the fluency-is-good/disfluency-is-bad ($M = 6.33$, $SD = .77$) than fluency-is-bad/disfluency-is-good condition ($M = 5.95$, $SD = .82$) , $t(308) = 4.15$, $p < .001$, and significantly higher in the control ($M = 6.19$, $SD = .84$) than fluency-is-bad/disfluency-is -good condition ($M = 5.95$, $SD = .82$), $t(302) = 2.56$, $p = .01$ (see Figure 4).

Average choice satisfaction did not differ significantly between the control and fluency-is-good/disfluency-is-bad conditions. Descriptive statistics for choice satisfaction, including means, standard deviations, and sample size per condition, are presented per condition for both experiments in Table 1.

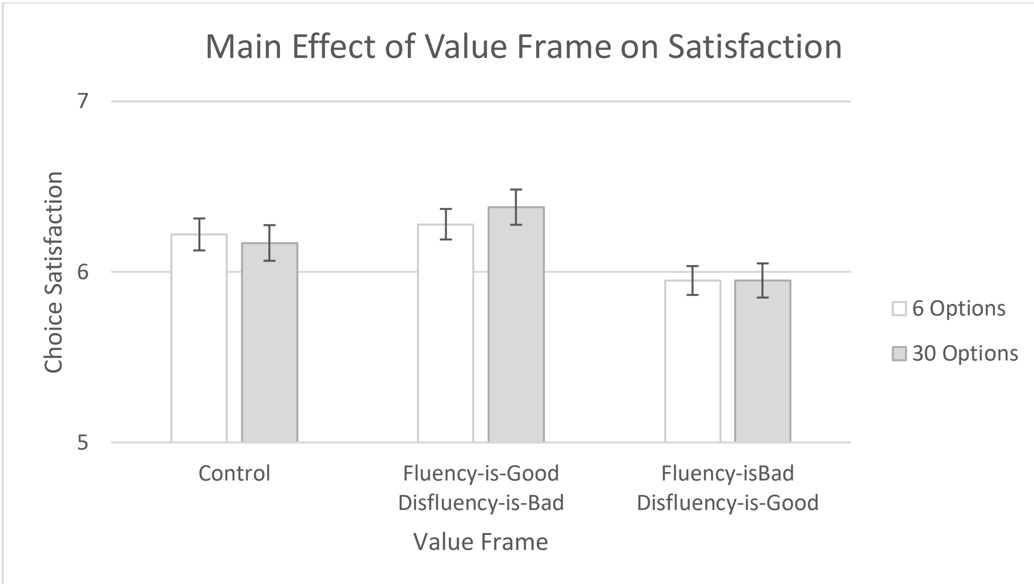

Figure 4. Experiment 1 results showing non-significant interaction of task fluency and value frame, and main effect of value frame on satisfaction. Error bars indicate standard error of the mean.

Table 1

Mean Satisfaction, Difficulty, Time Spent Choosing per Option (seconds), and Valuation Values (with Corresponding Standard Deviations), and n per Condition in Experiments 1 and 2.

	6 Choices					30 Choices				
Condition	Satisfaction	Difficulty	Time/Option(s)	Valuation	*n*	Satisfaction	Difficulty	Time/Option(s)	Valuation	*n*
Exp. 1										
FG/DB	6.28(0.78)	2.17(1.26)	4.46(6.26)	$1.67($1.70)	76	6.38(0.77)	2.53(1.53)	1.48(1.15)	$1.87($2.29)	74
FB/DG	5.95(0.76)	3.06(1.43)	4.21(4.09)	$2.89($9.35)	81	5.95(0.89)	3.66(1.65)	2.55(10.10)	$1.84($4.12)	79
Control	6.22(0.80)	2.81(1.64)	3.90(3.68)	$2.47($8.72)	73	6.17(0.88)	3.31(1.83)	1.60(0.95)	$2.55($3.28)	71
Exp. 2										
EDF	6.14(0.96)	2.97 (1.53)	3.91(2.60)	$1.80($2.05)	69	6.13(0.80)	3.62(1.86)	1.42(1.45)	$2.02($2.36)	77
EIF	6.06(0.84)	2.44(1.44)	3.88(2.90)	$1.56($1.93)	78	6.31(0.75)	3.38(1.85)	1.67(1.96)	$1.55($1.92)	72
Control	6.13(0.79)	2.86(1.60)	3.92(3.04)	$1.78($3.10)	86	6.08(0.88)	3.48(1.74)	1.26(0.85)	$3.47($10.1)	80

Note: FG/DB = fluency-is-good/disfluency-is-bad; FB/DG= fluency-is-bad/disfluency-is-good; EDF = external source decreases fluency; EIF = external source increases fluency.

In the analysis of choice difficulty, neither the interaction between task fluency and value frame, nor the main effect of task fluency were significant (*p*s > .05). Only the main effect of value frame was significant ($F(2, 448) = 6.71$, $p = .001$, $\eta^2 = .07$). Participants reported greater choice difficulty in the fluency-is-bad/disfluency-is-good ($M = 3.36$, $SD = 1.56$) than fluency-is-good/disfluency-is-bad condition ($M = 2.35$, $SD = 1.40$), $t(308) = 5.97$, $p < .001$. Participants also reported greater choice difficulty when choosing in the control ($M = 3.06$, $SD = 1.75$) than fluency-is-good/disfluency-is-bad condition ($M = 2.35$, $SD = 1.40$), $t(292) = 3.84$, $p < .001$. The difference between the control and fluency-is-bad/disfluency-is-good conditions was non-significant. The main effect of task fluency was also marginally significant (based on the criteria $.10 < p < .05$); on average, participants reported greater choice difficulty when choosing from 30 ($M = 3.17$, $SD = 1.73$) than 6 ($M = 2.69$, $SD = 1.49$) choice options, $F(1, 448) = 3.72$, $p = .05$, $\eta^2 = .04$.

In the analysis of choice time per option, neither the interaction between task fluency and value frame, nor the main effect of value frame were significant (*p*s > .57). Only the main effect of task fluency was significant; participants spent more time per option when choosing from 6 ($M = 4.20$, $SD = 4.80$) than 30 choices ($M = 1.90$, $SD = 6.04$, $F(1, 448) = 6.42$, $p = .01$, $\eta^2 = .04$. These results suggest that participants may have used less systematic selection strategies (e.g., Bettman, Luce, & Payne, 1998) when choosing from 30, rather than 6 choices. In the analysis of choice valuation, neither the interaction between nor the main effects of value frame and task fluency were significant.

The primary finding in Experiment 1 was the non-significant interaction of task fluency and value frame on choice satisfaction. The secondary finding in Experiment 1 was the failure to replicate the choice overload effect; that is, choice satisfaction did not differ between participants who chose from 6 or 30 options. Prior researcher has also failed replicate the choice overload effect (e.g., Langeben, 2015) and one meta-analysis "found a mean effect size of virtually zero" (Scheibehenne, Greifeneder, & Todd, 2010, p. 409). These researches hypothesized that decision strategies (e.g., Bettman, Luce, & Payne, 1998) and dissimilarity of options may (e.g., Gourville & Soman, 2005) account for the lack of choice overload observed. These alternative explanations and other methodological considerations are further discussed in the General Discussion.

Despite these results, the main effect of value frame on choice satisfaction was significant. The value framing of choice fluency impacted choice satisfaction; participants were more satisfied with chocolate selections when choice fluency was associated with positive value and choice disfluency was associated with negative value than when choice fluency was associated with negative value and choice disfluency was associated with positive value. However, this pattern of results did not differ by choice number. These findings extend the current metacognitive fluency literature (e.g., Alter & Oppenheimer, 2009) by suggesting that choice fluency functions as a judgment cue in decision making and, critically, that the value associated with choice fluency may change based on value framing.

Furthermore, current models of choice overload (e.g., Chernev, Böckenholt, & Goodman, 2015) emphasize the negative relationship between choice selection difficulty and choice satisfaction. However, participants in Experiment 1 reported being more satisfied in the control than fluency-is-bad/disfluency-is-good value frame condition despite reporting similar average ratings of choice difficulty. Interestingly, participants also reported less difficulty choosing from the fluency-is-good/disfluency-is-bad than the fluency-is-bad/disfluency-is-good value frame condition despite choice tasks remaining constant across conditions. Taken together, these results suggest that participants may shift information processing strategies (Oppenheimer, 2008) based on value framing of choice fluency. Alternative explanations for these results and additional methodological limitations will be discussed further in the General Discussion following Experiment 2.

Chapter 4: Experiment 2

Introduction

According to Oppenheimer's (2008) model of metacognitive fluency, the attribution of fluency (e.g., choice ease or difficulty) also impacts evaluative judgments like choice satisfaction. For example, previous research has reported that individuals do not use metacognitive fluency as a judgment cue when another external source is thought to impact the relative fluency of a task (Kelley, 1973). For example, Winkielman, Schwarz, and Belli (1998) reported that participants rated their memories as more accurate when recalling three rather than twelve childhood memories and proposed that this difference in memory rating resulted from the relative disfluency experienced when recalling twelve compared to three memories. However, the magnitude of this difference decreased when the experimenters told participants that generating twelve childhood memories was a relatively difficult task. In other words, recall fluency acted as a salient judgment cue for participants to rate their memories until they attributed that fluency to another source (i.e., task difficulty). Similarly, attributing processing fluency to the presence of background music (Schwarz et al., 1991) during experimental tasks mitigated the effects of metacognitive fluency as a judgment cue.

In the domain of consumer choice, Pocheptsova, Labroo, and Dhar (2010) investigated the relationship between metacognitive fluency (i.e., presenting stimuli in easy or difficult to read font) and the attribution of fluency (i.e., internal or external to the purchase intent judgment). After viewing an advertisement, participants who attributed processing disfluency to font color reported greater purchase intent for the advertised product than those who did not attribute processing disfluency to font color. Similarly, Langben (2015) suggested that when choice disfluency is attributed to a source outside of the choice problem, choosers are similarly satisfied when choosing from both larger and smaller choice sets. Taken together, these results suggest that metacognitive fluency acts as a judgement cue unless fluency is attributed to an external source; this rationale was used in Experiment 2. Specifically, if smaller choice sets are processed more fluently than lager choice sets (Fujiwara et al., 2018), then choice fluency should act as a judgment cue and impact choice outcomes, like choice satisfaction, unless fluency is attributed to a source outside of a choice problem.

Experiment 2 used an attribution manipulation (Pocheptsova, Labroo, & Dhar, 2010) with a choice overload task (Iyengar & Lepper, 2000) to test the hypothesis that metacognitive fluency, conceptualized as choice fluency (Anderson, 2003), is a critical judgment cue during choice but its informational value decreases *or* increases when choice disfluency is attributed to an external source. Specifically, an interaction was predicted such that the attribution of disfluency to a choice problem would increase choice satisfaction for selections from smaller, rather than larger choice sets (i.e., choice overload would occur); however, the attribution of disfluency to an external source was predicted to change the magnitude of choice overload depending on framing of the external source. Specifically, holding the attribution frame that an external source decreases choice fluency was predicted to decrease the magnitude of choice overload, relative to the control condition, by increasing choice satisfaction for selections from larger choice sets. Conversely, holding the attribution frame that an external source increases choice fluency was predicted to increase the magnitude of choice overload, relative to the control condition, by decreasing choice satisfaction for selections from larger choice sets.

Method

Participants and Design

The power analysis, participant recruitment and inclusion criteria used in Experiment 2 were identical to those used in Experiment 1. After removing 94 individuals who did not meet inclusion criteria, the final sample consisted of 462 participants (M_{age} = 39.82 years, *SD* = 12.37; 227 female, 231 male, 4 did not specify).

Experiment 2 was a 2 [Task Fluency: 6 choices (fluently processed) or 30 choices (disfluently processed)] × 3 [Fluency Attribution: no external source control, external source increases fluency, or external source decreases fluency] between-subjects factorial design. Participants were randomly assigned to one of the six conditions.

Materials and Procedure

Materials used in Experiment 2 were identical to those used in Experiment 1. As in Experiment 1, the fluently processed choice set contained 6 different chocolate flavors and the disfluently processed choice set contained 30 different chocolate flavors with presentation format and randomization procedures identical in both experiments.

In the first phase of this experiment, participants read introductory text that differed for each attribution condition following methods modified from Briñol, Petty, and Tormala (2006) and Pocheptsova, Labroo, and Dhar (2010). This text manipulated the attribution of choice fluency and mental representations about that attribution without impacting the fluency of the choice task. Specifically, participants in the external source decreases fluency condition read:

> We're doing research examining how the use of technology impacts consumer choices. People shopping online often experience a feeling of difficulty when choosing because backlit screens (like computer monitors) make reading product information more difficult.

Participants in the external source increases fluency condition read the opposite:

> We're doing research examining how the use of technology impacts consumer choices. People shopping online often experience a feeling of ease when choosing because backlit screens (like computer monitors) make reading product information easier.

Participants in the control attribution condition read did not read any text during this phase.

In the second phase of this experiment, participants completed a choice task following procedures modified from Iyengar & Lepper (2000). Specifically, participants read, "In the current study, we're examining how people select chocolates. Please look at the names of the chocolates and the chocolates themselves, and tell me which one you would buy for yourself." Participants then viewed choice sets that included either 6 or 30 chocolates and selected a desired chocolate without a time limit.

In the third phase of this experiment, participants rated choice satisfaction for chosen chocolates as the primary dependent measure. Additional self-report and behavioral measures including time spent on the choice task, perceived choice task difficulty, and selected choice valuation were then collected.

Results and Discussion

A 2 [Task Fluency: 6 choices (fluently processed) or 30 choices (disfluently processed)] × 3 [Fluency Attribution: no external source control, external source increases fluency, or external source decreases fluency] analysis of variance (ANOVA) was conducted on the primary dependent variable, choice satisfaction, as well as on choice time, choice difficulty, and choice valuation.

Regarding the analysis of choice satisfaction, neither the interaction between nor the main effects of task fluency and fluency attribution were significant (*p*s > .24). Critically, there results do not support the predicted interaction or replicate the choice overload effect. In the analyses of choice time and choice difficulty, only the main effect of task fluency was significant; participants spent more time per option when choosing from 6 (*M* = 3.90, *SD* = 2.86) rather than 30 options (*M* = 1.45, *SD* = 1.47), and reported greater difficulty when choosing from 30 (*M* = 3.49, *SD* = 1.81) rather than 6 chocolates (*M* = 2.75, *SD =1.54*), *F*(1, 456) = 56.07, *p* = < .001, η^2 = .23; *F*(1, 456) = 5.57, *p* = .02, η^2 = .05, respectively (see Figure 5).

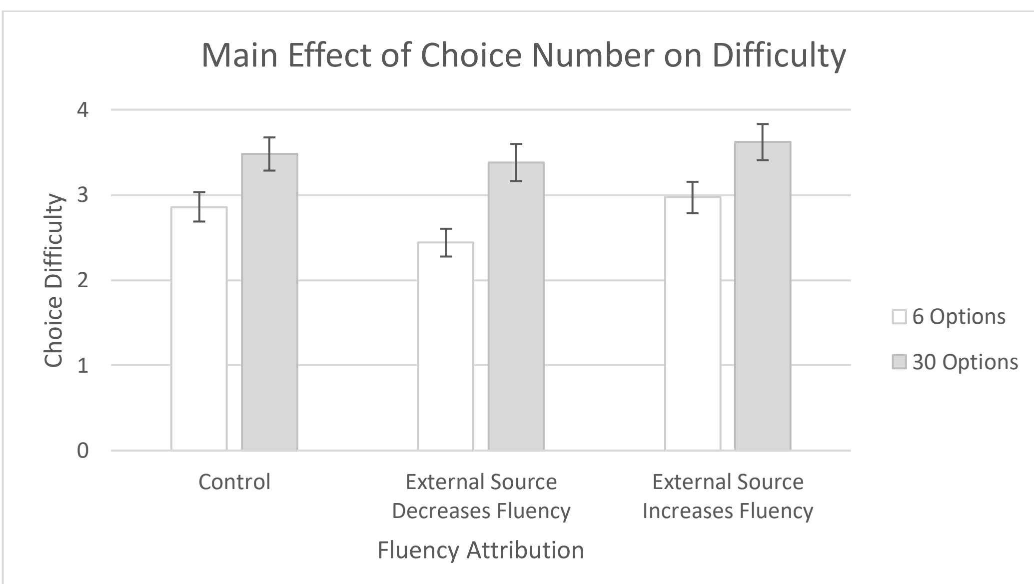

Figure 5. Experiment 2 results showing non-significant interaction of task fluency and fluency attribution, and the main effect of task fluency on difficulty. Error bars indicate standard error of the mean.

Similarly, only the main effect of task fluency was significant in the analysis of choice valuation. On average, participants valuated choices from the 30-option choice set more highly (*M*= $2.38, *SD*= $6.25) than choices from the 6-option choice set (*M* = $1.71, *SD* = $2.45), $F(1, 456) = 5.35$, $p = .02$, $\eta^2 = .05$.

The primary finding in Experiment 2 was the non-significant interaction of task fluency and fluency attribution on choice satisfaction. The secondary finding in Experiment was the failure replicate the choice overload effect, that is, choice satisfaction did not differ between participants who chose from 6 and 30 options. As in Experiment 1, participants reported greater difficulty when choosing from 30 than 6 chocolates, but no choice satisfaction differences were observed across choice conditions. Results from Experiment 2 did not support the hypothesis that attributions of fluency differentially impact choice satisfaction depending on whether an external source is thought to impede or facilitate choice. Alternative explanations, methodological limitations, and future directions for this research are discussed below.

General Discussion

Despite the extensive amount of research on the relationship between choice set size and choice outcomes, the choice overload literature has yielded inconclusive results as to when and why choice overload occurs (Scheibehenne, Greifeneder, & Todd, 2010). This ambiguity may stem in part from the competing theoretical approaches taken in studying the effect. Marketers, economists, and psychologists have proposed various moderators of choice overload but little research has investigated the cognitive mechanisms underlying the effect explicitly.

From a cognitive perspective, researches have proposed that choice overload results from choice selection difficulty (Anderson, 2003); as choice set sizes increase, choice problems become increasingly difficult and cognitively taxing (Fujiwara et al., 2018). When the costs associated with evaluating additional choice options becomes greater than the benefits associated with new options, choice overload typically occurs. Although prior research has reported a positive relationship between choice set size and choice difficulty to account for choice overload, related metacognitive fluency research has suggested that increasing choice difficulty may facilitate choice only in certain contexts, like exclusive choice domains (Pocheptsova, Labroo, & Dhar, 2010) or when individuals are provided with explicit associations between processing disfluency and positive value (Briñol, Petty, & Tormala, 2006).

The present study investigated the cognitive mechanisms underlying the choice overload effect. Specifically, two experiments tested how the subjective choice ease or difficulty impacted judgments of choice satisfaction. Critically, neither experiment replicated the choice overload effect and this may account for the lack of predicted interactions in both experiments. A number of alternative hypotheses may also account for the absence of choice overload in both experiments. First, although participants reported differences in choice difficulty across experiments and conditions, the choice tasks may have been relatively easy for all participants. Across both experiments, average difficulty ratings ranged from M = 2.17 (SD = 1.26) to M = 3.66 (SD = 1.65) in each condition (see Table 1). The choice tasks in the present study may not have been sufficiently difficult to result in choice overload. If participants experienced relative ease when choosing a chocolate regardless of experimental condition, this may explain why participants were less satisfied when choice ease was associated with positive value and choice difficulty was associated with negative value.

Second, choice overload is also more likely to occur when choosers face high rather than low levels of choice set complexity. Chernev, Böckenholt, and Goodman (2015) hypothesized that choice set complexity varies as a function of the attractiveness and values assigned to choice options. Specifically, they proposed that choice set complexity increases when options are valuated similarly but decreases when a set contains disproportionately valuated options. Sela, Beger, and Wu (2009) proposed that choice problems become more difficult as choice set sizes increase, but that the presence of an easily justifiable choice simplifies a choice problem. An exploratory analysis presented in Figure 6 revealed that across Experiment 1 and Experiment 2 participants selected certain chocolates more or less frequently than other chocolates. This behavioral evidence suggests that the stimuli used in the present study included disproportionately attractive and unattractive options, resulting in simplified choice tasks. The presence of these inferior and superior choice options may have also accounted for the lack of the choice overload effect observed across both experiments and confounded the results.

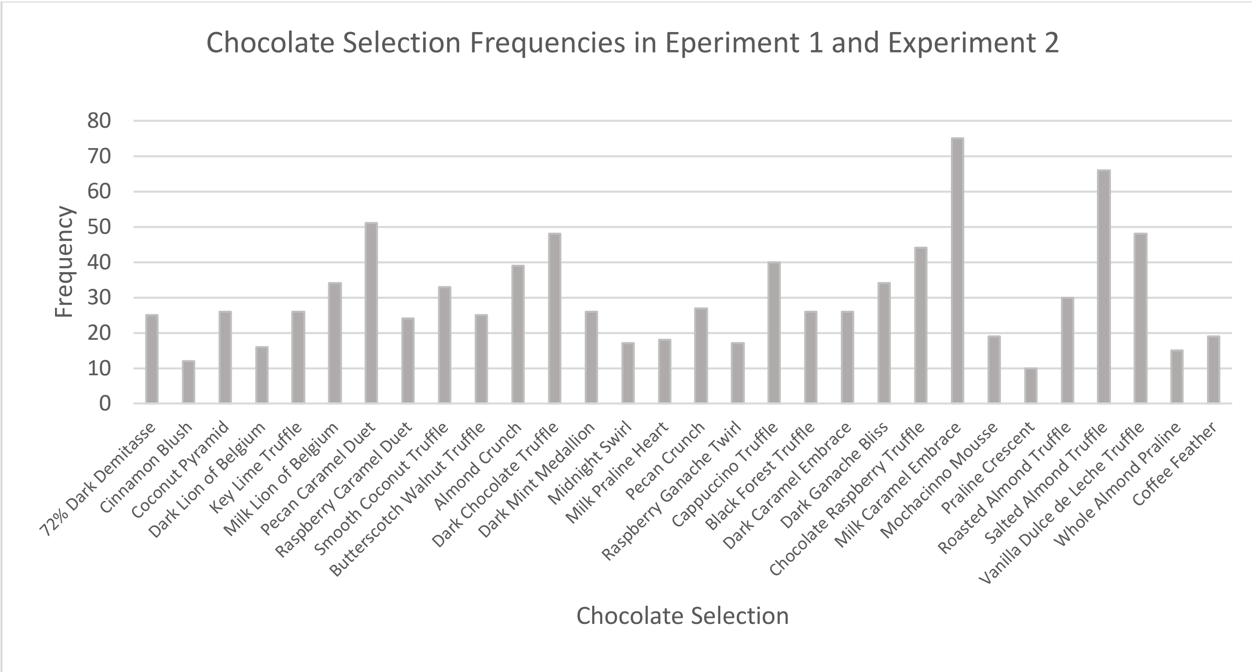

Figure 6. Frequency distribution of chocolate selections across Experiment 1 and Experiment 2

Third, participants may have used different choice strategies (Oppenheimer, 2008) when selecting depending on the value frame associated with choice fluency. Specifically, participants who associated choice difficulty with positive value and ease with negative value may have used more effortful information processing strategies when choosing than participants who associated choice ease with positive value and difficulty with negative value (Alter, Oppenheimer, Epley, & Eyre, 2007; Bettman, Luce, & Payne, 1998). For example, if participants associated choice difficulty with being intelligent, then they may have exerted more cognitive effort to make the choice task more difficult. These systematic differences in information processing may have also contributed to the pattern of results observed. Although, researchers have also reported that an incomplete processing of alternative choices results in choice overload (Chernev, 2003; Haynes, 2009), using overly effortful processing strategies on a relatively simple task may also result in decreased choice satisfaction. Additional research on choice strategies, cognitive effort, and choice overload would provide further insights into the current theoretical models of metacognitive fluency and choice overload.

Fourth, decision goals also moderate the relationship between choice set size and choice satisfaction (Chernev, Böckenholt, & Goodman, 2015). Decision goals refer to the intended outcome associated with choice evaluation, specifically, whether decision-makers intend to browse or choose. Individuals typically exert more cognitive effort when choosing rather than browsing. Kahn and Wansink (2004) proposed that individuals with the goal of browsing derive pleasure from the evaluation process and are therefore less likely to experience choice overload compared to individuals with the goal of choosing (Chernev & Hamilton, 2009). As such, choice overload is also more likely to occur when individuals intend to choose, rather than browse. Participants in the present study did not experience a tradeoff for selecting one chocolate over the other as they received the same compensation (i.e., $0.50) regardless of chocolate selection or time spent choosing and as such, may have approached the choice task with browsing rather than choosing goals.

Despite failing to replicate the choice overload effect in Experiment 1 or Experiment 2, a value frame paradigm in Experiment 1 tested and partially supported the hypothesis that choice fluency acts as a critical judgment cue during choice that signals negative or positive value depending on choice context. Results in Experiment 2 did not support the hypothesis that choice fluency is a critical judgment cue during choice but that the informational value associated with choice fluency varies when choice disfluency is attributed to an external source. Experiment 1 extends the current choice overload and metacognitive fluency literatures in theoretically meaningful ways. First, the metacognitive fluency literature has documented how metacognitive fluency functions as a judgment cue across cognitive processes including perception (e.g., Pocheptsova, Labroo, & Dhar, 2010), memory (e.g., Tversky & Kahneman, 1973), and decision-conflicts (e.g., Novemsky, Dhar, Schwarz & Simonson, 2007). However, relatively little research has investigated the relationship between the subjective values associated with choice fluency and choice outcomes, like choice satisfaction. Experiment 1 provides initial evidence that choice fluency is used as a judgement cue and may signal positive or negative value depending on framing effects. Second, the choice overload literature emphasizes the negative relationship between choice satisfaction and choice difficulty – although participants in Experiment 1 reported lower levels of choice satisfaction in the fluency-is-bad/disfluency-is-good value frame condition than in the control condition, they reported similar levels of difficulty when choosing in both conditions. This finding suggests that, in addition to the factors outlined by Anderson (2003) and Chernev, Böckenholt, and Goodman (2015), the value associated with choice fluency may also moderate the relationship between choice fluency and choice satisfaction. However, additional research is needed clarify the relationship between choice size, mental representations of choice fluency, and choice satisfaction.

In addition to the methodological considerations previously mentioned, future research investigating the choice strategies individuals use when choosing from relatively small or large choice sets would also extend current models of choice overload (e.g., Chernev, Böckenholt, & Goodman, 2015) and metacognitive fluency (e.g., Oppenheimer, 2008). Haynes (2009) hypothesized that individuals use heuristics to simplify choice problems under time constraints although little research has investigated the relationship between choice set size and information processing strategies directly. Conversely, Alter, Oppenheimer, Epley, and Eyre (2007) reported that metacognitive disfluency activates analytic reasoning; specifically, participants answered more questions correctly on the Cognitive Reflection Task (Frederick, 2005) when the test was presented in difficult, rather than easy-to-read font. If choice disfluency (e.g., choosing from a relatively large choice set) activates analytic reasoning, and this disfluency signals negative value, then individuals would report relative dissatisfaction with rational choice selections. In other words, individuals may make “better” (i.e., more rational) choices when choosing from larger than smaller choice sets, but may defer choice more frequently and be less satisfied with these choices. It is also worth noting the practical implications of investigating the relationship between choice fluency, processing strategies, and choice outcomes like deferral and satisfaction. Investigating these cognitive processes underlying the choice overload would provide further insights into the factors that impact rational information processing, the propensity to make a choice, and choice satisfaction. In turn, this research could help facilitate analytic reasoning in policy adoption, like the United States government choosing stimulus package or policy for reopening the economy.

Although researchers have also highlighted the relative flexibility of the value associated with metacognitive fluency (i.e., Briñol, Petty, & Tormala, 2006; Unkelbach, 2006), additional research has suggested that positive or negative value associated with metacognitive fluency may be domain specific and relatively stable psychological constructs (Pocheptsova, Labroo, & Dhar, 2010). Research investigating cognitive mechanisms underlying the stability of associations between choice fluency and value would also extend current theoretical models of choice overload and metacognitive fluency.

Choice overload has been studied extensively over the past decades in the consumer research, marketing, and psychology without clarifying the cognitive mechanisms underlying the effect. Theoretical models of metacognitive fluency (e.g., Oppenheimer, 2008) have proposed that the value framing and attributions of fluency associated with a cognitive task impact how that fluency is used as a judgment cue. Two experiments in the present study yielded mixed results regarding the relationship between choice fluency and choice satisfaction. Findings from Experiment 1 provide initial evidence that the value framing of metacognitive fluency are relatively flexible constructs and the value associated with choice fluency impacts choice satisfaction. Although further research is needed to clarify this relationship between choice fluency and choice satisfaction, this novel approach to investigating choice overload provides initial evidence that cognitive models of metacognitive fluency may account for the discrepant findings in the choice overload literature, and as such, warrant further investigation.

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