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Choice as an Engine of Analytic Thought

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Choice is a behavioral act that has a variety of well-documented motivational consequences—it fosters independence by allowing people to simultaneously express themselves and influence the environment. Given the link between independence and analytic thinking, the current research tested whether choice also leads people to think in a more analytic rather than holistic manner. Four experiments demonstrate that making choices, recalling choices, and viewing others make choices leads people to think more analytically, as indicated by their attitudes, perceptual judgments, categorization, and patterns of attention allocation. People who made choices scored higher on a subjective self-report measure of analytic cognition compared to whose did not make a choice (pilot study). Using an objective task-based measure, people who recalled choices rather than actions were less influenced by changes in the background when making judgments about focal objects (Experiment 1). People who thought of others' behaviors as choices rather than actions were more likely to group objects based on categories rather than relationships (Experiment 2). People who recalled choices rather than actions subsequently allocated more visual attention to focal objects in a scene (Experiment 3). Together, these experiments demonstrate that choice has important yet previously unexamined consequences for basic psychological processes such as attention and cognition.

Keywords: choice, analytic, holistic, cognition, attention

In the face of economic development and globalization, people around the world make more choices about work, food, clothing, entertainment, travel, and technology than ever before. The opportunity to choose is a hallmark of modern life. Workplaces offer more than 300 retirement plans, supermarkets offer more than 285 types of cookies, and pharmacies provide over 80 different painkillers (Schwartz, 2000, 2004). Given that society regularly asks people—as consumers, employees, and citizens—to make numerous choices across diverse contexts, the question of how this increasingly common action influences psychological functioning is both theoretically and practically important.

Theories of choice in social psychology have been inspired by the concept of self-determination (Deci & Ryan, 1987), which argues that people have an inherent need for independence, defined in terms of autonomy and control over the environment. Choice is an act that simultaneously affords both autonomy and control, and thus engenders a sense of independence (Markus & Schwartz, 2010; Schwartz & Cheek, in press). As self-determination theory is essentially a motivational theory (Ryan & Deci, 2000), social psychologists studying choice have primarily focused on the consequences of choice for motivation and well-being. An extensive literature, beginning with Langer and Rodin (1976) and Schulz (1976), has found that when people have a choice among tasks, they are more intrinsically motivated, put in more effort, perform better, and perceive themselves as more competent, compared to when they do not have a choice (see Patall, Cooper, & Robinson, 2008, for a review). In the present research, we ask whether choice influences basic psychological processes beyond motivation.

Choice and Independence

We theorize that choice increases well-being and motivation because it makes people feel more independent (Markus & Kitayama, 2003; Patall et al., 2008). Supporting this idea, recent research has found a close association between choice and a focus on independent agency (Savani, Stephens, & Markus, 2011; Savani & Rattan, 2012; Stephens & Levine, 2011). For example, in a series of studies, merely thinking about choices increased people's willingness to support social policies that would expand individual freedoms (e.g., legalizing marijuana) but oppose policies that would benefit the collective good (e.g., banning the sale

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of violent video games; Savani et al., 2011). Moreover, making choice salient increases people's tendency to hold individuals accountable for negative outcomes (i.e., victim-blaming; Savani et al., 2011; Stephens & Levine, 2011) and decreases their concerns about wealth inequality in the larger society (Savani & Rattan, 2012).

Research also suggests that independence affords analytic thinking, a style of thought in which people "focus on an object independently from its context and categorize and explain things based on attributes of the object" (Miyamoto, 2013, p. 133). Supporting this suggestion, research has consistently demonstrated that people in independent cultures tend to think more analytically than people in interdependent cultures (Varnum, Grossmann, Kitayama, & Nisbett, 2010). People in communities engaging in cultural practices that promote independence also tend to think more analytically. For example, people in Turkey who spend their time herding, a practice that tends to emphasize independence and individual decision making, had more analytic patterns of reasoning, categorization, and attention than people who spend their time farming and fishing, practices which tend to emphasize interdependence and social coordination (Uskul, Kitayama, & Nisbett, 2008; see also Kitayama, Ishii, Imada, Takemura, & Ramaswamy, 2006). People in regions of China who practice wheat farming, which requires independent work, categorized objects in a more analytic manner than people in rice growing regions, which requires cooperation and coordination (Talhelm et al., 2014).

Despite large literatures on choice and motivation (Patall et al., 2008), the choice mindset (Savani et al., 2011; Savani & Rattan, 2012), and decision-making (Bettman, Luce, & Payne, 1998), little is known about whether choice influences basic cognitive processes, such as attentional focus, categorization, and contextual effects on perception. As choice affords independence and as independence affords analytic thinking, we predicted that simply making choice salient (e.g., making choices, recalling past choices, viewing others' choices, anticipating future choices) would lead people to think more analytically.

Analytic and Holistic Cognition

Analytic and holistic cognition describe different styles of cognition at two ends of a continuum that vary on a number of dimensions (Nisbett, Peng, Choi, & Norenzayan, 2001). One of the key features that distinguish analytic cognition from holistic cognition is the tendency to focus on differences versus similarities between objects, or specifically, to separate objects from one another versus to connect them with each other (Oyserman, Sorensen, Reber, & Chen, 2009). When people are in an analytic mindset, "accessible processing strategies will focus more on contrasting, pulling-apart, distinguishing-and-separating and less on assimilating, connecting-and-integrating" (Oyserman & Lee, 2008, p. 314; see also Markus & Oyserman, 1989).

Overall, this body of research indicates that Westerners tend to have a more analytic style of cognition whereas Asians tend to have a more holistic style. For example, U.S. Americans tend to group objects by their category memberships, indicating that they view objects as separate entities to be classified, whereas East Asians tend to group objects based on the relationships that they share, indicating that they view objects as connected to each other (Ji, Zhang, & Nisbett, 2004). U.S. Americans are more likely than East Asians to separate the emotions of focal individuals from the emotions of others in the background, and therefore, their judgments of focal individuals are less influenced by the emotions of others in the background (Masuda et al., 2008). These different cognitive styles are also reflected in visual attention: compared to East Asians, U.S. Americans allocate more attentional resources to focal objects in a visual field (Chua, Boland, & Nisbett, 2005; Masuda & Nisbett, 2006; Miyamoto, Nisbett, & Masuda, 2006). This finding indicates that Americans are more likely than Asians to view focal objects as separate from and more salient than the background in which they are embedded.

Although research on analytic versus holistic cognition has focused on cross-cultural differences, these cultural differences are not fixed (Miyamoto, 2013; Oyserman et al., 2009). This view has led to a body of research that has sought to uncover some of the psychological states, such as people's subjective sense of power and control, that contribute to analytic-holistic cognition (e.g., Miyamoto et al., 2006). In a series of studies, researchers found that people who were put in a high power role thought more analytically (e.g., grouping objects by categories rather than relationships) than those put in a low power role (Miyamoto & Ji, 2011; Miyamoto & Wilken, 2010). One explanation for this finding is that people experiencing a high sense of power are more agentic and independent (Galinsky, Gruenfeld, & Magee, 2003), and this heightened sense of independence can explain why power makes people think more analytically. In another set of studies, when people were deprived of control, such as by a lack of action-outcome contingency, they were more likely to think analytically, as thinking analytically helps people regain some of their lost sense of control and feel more independent (Zhou, He, Yang, Lao, & Baumeister, 2012). Together, this previous work has focused on the psychological states that afford independence and thereby contribute to analytic-holistic cognition. In the present research, we aim to expand existing theorizing in this area by arguing that important everyday behaviors, such as the act of making choices, can also serve to promote analytic thinking.

Overview of Studies

Using multiple manipulations of choice and diverse measures of analytic-holistic cognition, we report four experiments testing whether the salience of choice—that is, making, recalling, or viewing choices—leads people to think in a more analytic rather than holistic manner. A pilot study examined whether making choices among everyday consumer products (e.g., pens, chocolates) influences a subjective self-report measure of analytic cognition. Using another manipulation of choice and an objective task-based measure of analytic-holistic cognition, Experiment 1 investigated whether recalling one's past choices (e.g., choosing to have cereal rather than eggs for breakfast) rather than one's past actions (e.g., having cereal for breakfast) leads them to separate focal objects from background objects in an emotion judgment task. Using yet another manipulation of choice and another objective measure of analytic-holistic cognition, Experiment 2 tested whether identifying all the choices that another person makes (e.g., reading one of many magazines) rather than all the actions that the person engages in leads people to group objects more analytically rather than relationally. Finally, Experiment 3 examined whether the salience of choice (i.e., recalling choices rather than actions)

leads people to allocate visual attention in a more analytic manner. All participants, experimental manipulations, and measures of analytic-holistic cognition are reported across all experiments.

Pilot Study

We conducted a pilot study to get an indication of whether choosing among multiple alternatives leads people to think analytically rather than holistically using a subjective self-report measure of cognitive styles (Choi, Koo, & Choi, 2007). This measure provides an initial test of our hypotheses because it predicts the extent to which people display analytic or holistic thinking on two different tasks. Specifically, Choi et al. (2007) found that people who scored as being more analytic on the analytic-holistic thinking scale were more likely to group objects based on rules rather than overall similarity (Norenzayan, Smith, Kim, & Nisbett, 2002), and found fewer factors to be relevant in a causal reasoning task (Choi, Dalal, Kim-Prieto, & Park, 2003). We hypothesized that compared to participants in the control condition, those in the choice condition would score higher on this subjective measure of analytic cognition.

Method

Participants. We posted a lab study seeking 100 participants at Northwestern University. Ninety-six participants (70 women, 26 men; M_{age} = 19.99 years; 95 European Americans, one multiracial) showed up for the study and were alternated between the choice condition and the control condition in a yoked design. As per predetermined criteria, given that the research team had previously conducted studies using a similar manipulation with the same subject pool, three participants were excluded because they selected "strongly agree" when asked whether they had participated in similar studies in the past.

Manipulation. We used the manipulation from Savani et al. (2011, Study 5). Ostensibly for a marketing study, participants were taken to a cubicle in which five decorative pens, five chocolate bars, five keychains, and five birthday cards were displayed on a table. In the choice condition, participants were given a questionnaire that asked them to indicate and describe one of the five items that they would choose from each category. For example, in the pen category, participants were asked, "Suppose you could have one of the five pens on the table. Which of these five pens would you choose? Please describe this pen below so that another person could distinguish it from the others." Participants in the control condition were yoked to those in the choice condition. Instead of choosing an item from each category, they were asked by the experimenter to describe how one item in each category differed from the other items in that category. The focal item in each category was the item that the previous participant in the choice condition had selected. Participants were instructed, "Please look at the five pens on the table. The experimenter will ask you to describe one of the five pens. Please describe this pen below so that another person could distinguish it from the others." Thus, participants in both conditions described how the same items differed from the remaining items in each category but those in the choice condition chose their items whereas those in the control condition did not.

After the experimental manipulation, participants were taken to a different room, seated at a computer terminal, and asked to take a short survey using the Qualtrics survey platform. The goal of this survey was to strengthen the experimental manipulation by getting participants to describe and reflect on the items that they chose and/or described earlier. Participants were informed, "Now please answer some additional questions about the products you described/chose" (depending on their experimental condition). They were asked four questions: "How much did you like the pen/keychain/chocolate/birthday card you described/chose?" (one question for each item), and asked to respond on a 7-point scale ranging from *not at all* to *very much*. To ensure that participants were assigned to a survey condition that was consistent with the experimental condition that they were assigned to previously, the computer screen prompted the experimenter to type in participants' condition before participants were seated on the computer. Due to a research assistant error, 19 participants in the choice condition were mistakenly assigned to the control condition.[1] We excluded these participants from the analyses because they completed parts of both experimental conditions.

Dependent measure. After they completed the filler survey, participants were asked to respond to the commonly used 24-item analytic-holistic cognition scale (e.g., "The whole, rather than its parts, should be considered in order to understand a phenomenon"; Choi et al., 2007) on a 7-point scale ranging from *strongly disagree* to *strongly agree*. The overall scale had high reliability, α = .77, as did the individual subscales, $\alpha_{Attention}$ = .73, α_{Cause} = .80, $\alpha_{Contradiction}$ = .79, $\alpha_{Perception}$ = .67.[2]

Results

To create a measure of analytic cognition, we averaged all items in the analytic-holistic cognition scale. We reverse scored the items such that higher scores indicated more analytic cognition. A *t* test found that participants in the choice condition were more likely to endorse attitudes consistent with analytic attention compared to those in the control condition, $t(72) = 2.13$, $p = .036$, $d = .51$, $M_{control} = 3.07$, 95% confidence interval (CI) [2.91, 3.23], $SD = .54$, $M_{choice} = 3.33$, 95% CI [3.15, 3.50], $SD = .46$.[3]

Table 1 presents the means and standard deviations of the subscales across the two conditions. The effect of choice appears to be strongest for the *attention* subscale, with choice leading participants to focus on parts rather than on the whole. Locus of attention has often been noted as the key factor distinguishing analytic thinking from holistic thinking, with a recent review claiming, "One of the core features of analytic and holistic cognition is attention to focal versus contextual information in a visual field" (Miyamoto, 2013, p. 134).

[1] Assigning participants to take the right survey for their correct condition required the experimenter to type in the word "choice" or "control" into Qualtrics. However, given that the assignment process was sensitive to capitalization, 19 participants were accidentally sent to the control condition because the experimenter typed "Choice" instead of "choice."

[2] Thereafter, participants completed an unrelated survey about gender-appropriate toys that was used as a pilot for an unrelated research project.

[3] This difference became marginally significant once we included the 19 participants who were initially assigned to the choice condition but later asked questions that were designed for the control condition, $t(91) = 1.74$, $p = .086$, $d = .36$, $M_{control} = 3.07$, 95% CI [2.91, 3.23], $SD = .54$, $M_{choice} = 3.25$, 95% CI [3.12, 3.38], $SD = .45$.

Table 1
Participants' Mean Responses on Each Sub-Scale of the Analytic-Holistic Cognition Scale, by Condition (Pilot Study)

	All participants (N = 93)			
Subscales	*Mean* $(SD)_{Control}$	*Mean* $(SD)_{Choice}$	t	p
Attention	4.90 (0.84)	4.57 (0.79)	1.96	0.054
Cause	5.06 (1.05)	4.86 (0.88)	0.99	0.32
Contradiction	4.93 (1.11)	4.84 (0.84)	0.42	0.67
Perception	4.83 (0.72)	4.74 (0.79)	0.62	0.54
	Correctly assigned participants (N = 74)			
Subscales	*Mean* $(SD)_{Control}$	*Mean* $(SD)_{Choice}$	t	p
Attention	4.90 (0.84)	4.49 (0.76)	2.13	0.036
Cause	5.06 (1.05)	4.66 (0.94)	1.66	0.10
Contradiction	4.93 (1.11)	4.77 (0.77)	0.66	0.51
Perception	4.83 (0.72)	4.76 (0.88)	0.37	0.71

Discussion

The pilot study found that merely indicating which of several consumer items they would choose for themselves made participants score higher on a subjective measure of analytic attention. This study might be considered conservative because even participants in the control condition were asked to describe how a preselected item differed from the other items, a task that requires separating and distinguishing objects, a key element of analytic cognition (Oyserman et al., 2009). One limitation of this study is that the manipulation used—describing a chosen option versus describing a preselected option—could have involved greater cognitive load in the choice condition than in the control condition, as participants in both conditions had to describe an item, but those in the choice condition also had to choose an item to describe. Nevertheless, this study provided initial support for our hypothesis that the act of choosing among multiple alternatives leads people to think more analytically. Experiments 1 to 3 tested whether the findings from the pilot study hold up with objective task-based rather than subjective self-report measures of analytic thinking.

Experiment 1

Experiment 1 tested whether choice fosters more analytic thinking using an objective measure of analytic cognition: a perceptual judgment task. Specifically, Experiment 1 tested whether thinking of choices rather than actions increases the tendency for people to separate objects from each other. The more people treat objects as separate from each other, the less influenced they would be by nontarget objects than making judgments about a target object. We tested this idea in the context of emotional judgments, testing whether people thinking in terms of choice would be less likely to take the emotions of surrounding people into consideration when making judgments about a target person's emotions, an indicator of analytic cognition (Masuda et al., 2008). Further, we used a different manipulation of choice in the present study than in the pilot study. Specifically, we primed choice by asking participants to recall either past choices (choice condition) or past actions (control condition). This manipulation avoided the cognitive load confound present in the previous study's manipulation as participants did not have any make any actual choices, but merely had to recall past actions or past choices.

Method

Participants. A power analysis based on effect size d = .36 (from the pilot study full sample, see Footnote 2), α = .05 (two-tailed), *power* = 80%, indicated that we would need to recruit a total of 246 participants. To assess whether the findings generalize across multiple samples, we posted a survey seeking 100 participants in the same lab subject pool as in the pilot study, and a survey seeking 240 U.S. residents on Amazon Mechanical Turk (MTurk). In response, 71 lab participants (44 women, 27 men, 7 unreported; M_{age} = 20.27 years; 65 European Americans, six multiracial) and 245 MTurk participants (127 women, 117 men, one unreported; M_{age} = 36.77 years; 201 European Americans, 18 African Americans, four Latin Americans, two Native Americans, eight Asian Americans, two Middle Eastern Americans, one other race, and nine multiracial) completed the study. Participants were randomly assigned to the choice condition or the control condition. MTurk participants' dropout rate did not differ significantly across the two conditions, $\chi^2(1, N = 369) = 0.84$, p = .36, indicating that differential dropout rates by condition do not pose a confound (Zhou & Fishbach, 2016). The study was administered using the Qualtrics survey program.

Attention check. After agreeing to the consent form, participants were presented with the following attention check:

> People eat and drink throughout the day. We want to learn about how many times a day you eat and drink. This page is to see if you are reading the instructions carefully. For the questions that follow this paragraph, please give answer none to each question. Please just ignore the text of the questions, and type the word none as your answer. Thank you for answering these questions.
>
> 1. On average, how many times a day do you *eat something*? Please give your best estimate: _____
>
> 2. On average, how many times a day do you *drink something*? Please give your best estimate: _____

Seventy-eight participants who failed this attention check were excluded from the analyses. This magnitude of exclusions is common in online studies (e.g., Hardisty & Weber, 2009; Parrigon, Woo, Tay, & Wang, 2017), which allows researchers to access bigger samples and a broader range of participants on various demographic factors than university lab samples, but suffers from the disadvantage that participants are not supervised in any manner at all while they are completing the study. Excluding data from inattentive respondents typically provides more accurate estimates of effect sizes (Maniaci, & Rogge, 2014; Oppenheimer, Meyvis, & Davidenko, 2009).

Manipulation. We used a recall task to manipulate the salience of choice (adapted from Savani & Rattan, 2012, Study 1). Participants in the control condition were asked to describe three *things that they did* yesterday morning (8 a.m. to 12 p.m.), afternoon (12 p.m. to 4 p.m.), evening (4 p.m. to 8 p.m.), and night (8 p.m. to 12 a.m.), whereas those in the choice condition were asked to list three *choices that they made* in each of the same periods.

Dependent measure. We used Masuda et al.'s (2008, Study 1) method and stimuli for assessing the extent to which people take contextual information into account when making judgments about a focal person's emotions. Participants were presented with cartoon images of a central person in the foreground with four other individuals in the background (see Masuda et al., 2008, p. 369). The focal figure in the center was shown as expressing one of three different emotions, happiness, sadness, and anger, at one of two different intensity levels, high versus low. This yielded focal figures expressing six different emotions. For each of the six emotions displayed by the focal figure, the background individuals depicted one of four emotions: neutral, happiness, sadness, and anger. After viewing each image, participants' task was to "judge the *middle person's* emotion from his facial expressions." Thus, each participant completed a total of 24 trials, 3 (Emotions of the Focal Figure) × 2 (Intensity of Focal Figure's Emotions) × 4 (Emotions of Background Individuals), all presented in a random order.

To ensure that all participants were exposed to each image for a minimum duration, each image first stayed on the screen for three seconds all by itself. After three seconds, a response scale appeared on the same screen asking participants to judge the degree to which the focal figure was exhibiting the expressed emotion on a 10-point scale ranging from *not at all* to *extremely*. For example, if the focal figure expressed happiness, participants were only asked to rate how happy the focal figure was. Participants were asked to rate only the emotion that the focal figure displayed, not the emotions displayed by the other individuals in the background.[4]

Results

The key outcome measure was the extent to which the emotions of people in the background influenced participants' judgments of the focal figure's emotions. Masuda et al. (2008) separately analyzed participants' mean ratings for each cell of the 3 (Focal Figure's Emotion) × 4 (Background Figures' Emotion) × 2 (Intensity) design. However, as we did not have specific predictions about between-condition differences in each of these 24 cells, and to reduce statistical biases introduced by multiple comparisons, we sought to create a unitary measure for each participant that would indicate the extent to which the participant's judgment of the focal figure's emotion was influenced by the background figures' emotions.

We computed the dependent variable based on research on ensemble coding, in which participants estimate the mean of an array of items (e.g., the mean size of circles), and the dependent variable is the variability in participants' responses surrounding the true mean (e.g., the true size of each circle; Haberman & Whitney, 2009; Sweeny, Haroz, & Whitney, 2013). Although the mean emotion in our case is subjective rather than objective, we computed the variance in participants' ratings of each focal figure's emotions while the emotions of the background figures varied. The more the context influenced participants' judgments, the greater the variance in their ratings of the focal figure's emotions. We computed a separate variance measure for each of the six trials, which varied in the type of emotion (anger, sadness, joy) and the intensity level (high vs. low), and averaged them to form the dependent measure, $\alpha = .61$. This relatively lower reliability is probably due to the small number of items—keeping the average variances of and covariances between the items constant, if the number of items were doubled from 6 to 12, then the alpha would increase to .74. Table 2 presents the mean emotion rating for each type of trial.

Given that the mean of six variance measures was not normally distributed, *skewness* = 2.29, *kurtosis* = 10.67, Kolmogorov–Smirnov $D = .165$, $p < .001$, we analyzed the dependent measure using a nonparametric Wilcoxon's Mann–Whitney test, which does not make any assumptions about the distribution of the dependent variable. As predicted, we found that the variance in emotion ratings was lower for participants in the choice condition than for those in the control condition, $z = 2.14$, $p = .0324$, Cohen's $d = .26$, $M_{control} = 1.05$, 95% CI [.90, 1.20], $SD = .82$, $M_{choice} = .88$, 95% CI [.73, 1.03], $SD = .83$.

To test whether this effect was similar across the two subject pools, we submitted the dependent measure to a 2 (Condition) × 2 (Participant Pool) analysis of variance (ANOVA), as we could not run a 2 × 2 analysis with the Wilcoxon's Mann–Whitney test. We found a nonsignificant interaction, $F(1, 234) = 0.16$, $p = .69$, indicating that the effect of choice on analytic cognition was similar across the two populations (lab participants and MTurk participants).

Discussion

Experiment 1 found that activating the concept of choice led participants to perceive others' emotions more analytically. After recalling choices rather than actions from the previous day, participants were less influenced by the emotions displayed by individuals in

[4] To assess the relationship between the emotion judgment task and another indicator of analytic cognition, we administered the six-item Locus of Attention subscale of the Holism Scale (Choi et al., 2007) after the dependent measure (sample item: "The whole, rather than its parts, should be considered in order to understand a phenomenon"). Participants rated the items on a 7-point scale ranging from *strongly disagree* to *strongly agree*. We selected this subscale given that the dependent measure, a perceptual judgment task, mapped more closely onto the locus of attention subscale than to the other subscales (causality, attitude toward contradiction, and perception of change). Additional analysis indicated that the raw dependent measure correlated with the locus of attention subscale of the Holism Scale, $r = .16$, $p = .012$, as did the log transformed dependent measure, $r = .15$, $p = .018$, indicating that the average variance in participants' emotion ratings relates to participants' self-reported analytic thinking style. A t test found that participants' responses to the Holism Scale did not differ by condition, $t(236) = 1.21$, $p = .23$. However, this is not surprising given that an extended emotion judgment task intervened between the brief experimental manipulation and the six-item Holism Scale.

Table 2
Participants' Mean Rating for Each Type of Trial, by Condition (Experiment 1)

Trial			Control condition (N = 116–117)		Choice condition (N = 119–121)	
Focal emotion	Focal emotion's intensity	Background emotions	Mean	*SD*	Mean	*SD*
Anger	Low	Anger	7.13	1.73	7.17	1.52
Anger	Low	Joy	7.08	1.53	7.05	1.54
Anger	Low	Neutral	6.97	1.53	7.07	1.50
Anger	Low	Sadness	7.10	1.54	6.92	1.53
Anger	High	Anger	8.46	1.47	8.36	1.32
Anger	High	Joy	8.32	1.52	8.21	1.44
Anger	High	Neutral	8.10	1.72	8.27	1.47
Anger	High	Sadness	8.39	1.59	8.35	1.46
Joy	Low	Anger	7.18	1.36	7.31	1.43
Joy	Low	Joy	7.57	1.26	7.48	1.51
Joy	Low	Neutral	7.50	1.38	7.45	1.41
Joy	Low	Sadness	7.32	1.39	7.32	1.43
Joy	High	Anger	7.78	1.47	7.80	1.27
Joy	High	Joy	7.95	1.46	8.04	1.16
Joy	High	Neutral	8.01	1.26	7.79	1.22
Joy	High	Sadness	7.78	1.41	7.67	1.33
Sadness	Low	Anger	6.82	1.79	6.79	1.43
Sadness	Low	Joy	6.76	1.71	6.90	1.76
Sadness	Low	Neutral	6.68	1.54	6.88	1.66
Sadness	Low	Sadness	6.79	1.91	6.93	1.66
Sadness	High	Anger	7.46	1.70	7.42	1.57
Sadness	High	Joy	7.41	1.55	7.52	1.49
Sadness	High	Neutral	7.51	1.55	7.26	1.63
Sadness	High	Sadness	7.68	1.65	7.62	1.47

the background when making judgments about a focal individual's emotions. The result suggests that choice led participants to separate the focal object from the background rather than connecting the two.

Experiment 2

Experiment 2 sought to extend the findings in three key ways. First, we sought to conceptually replicate the findings of Experiment 1 using another manipulation of choice and another measure of analytic cognition. Second, we included a truly neutral no-judgment condition to ensure that the effect identified in Experiment 1 was driven by the choice condition and not by the control condition (in which participants focus on *actions* rather than *choices*). Third, given past research showing that power (Miyamoto & Ji, 2011) and control (Zhou et al., 2012) influence analytic-holistic cognition, it is possible that the effects of choice observed on analytic cognition are produced by a heightened sense of power or control instead of by choice per se. Therefore, we measured participants' perceptions of power and control in this study.

Instead of measuring analytic-holistic cognition through a perceptual judgment task, we did so using a grouping task. Past research has found that when presented with objects and asked to pick two that go together, analytic thinkers tend to pick objects belonging to the same category, indicating that they view objects as separate entities and focus on each object's classification. In contrast, holistic thinkers tend to pick objects based on their relationship, indicating that they view the objects as connected (Ji et al., 2004). If choice leads people to think more analytically, participants in the choice condition should be more likely to group objects based on shared category memberships compared to those in the control condition.

Method

Participants. The data in this study would be analyzed using Poisson regressions. Power analyses for Poisson regressions are not based on Cohen's *d*, which was computed in the previous studies, but on other parameters, such as the base rate exposure and the mean exposure (Faul, Erdfelder, Buchner, & Lang, 2009), estimates of which are not available. Therefore, we decided on a sample size of 100 per cell. Surveys seeking 300 U.S. residents were posted on MTurk. In response, 303 participants (168 women, 134 men, one unreported; M_{age} = 35.83 years; 236 European Americans, 24 African Americans, 11 Latin Americans, is Native American, 16 Asian Americans, five other races, 10 multiracial) completed the study. Participants were randomly assigned to the choice condition, the control condition, or the no-judgment condition. Participants' dropout rate did not differ significantly across the three conditions, $\chi^2(2, N = 428) = 3.69$, $p = .16$, indicating that differential dropout rates by condition do not pose a confound (Zhou & Fishbach, 2016). Forty-five participants who failed the attention check used in Experiment 1 were excluded from the analyses. The study was administered using the Qualtrics survey program.

Manipulation. Participants were presented with a 5-min video of a man engaging in mundane behaviors in an apartment (e.g., eating candy, playing a music CD; getting ready to go out). Participants in the control condition were asked to click their mouse in the space next to the video whenever the actor touched an object, whereas those in the choice condition were asked to click the mouse whenever the actor made a choice (adapted from Savani et al., 2011, Study 1). Further, we added a no-judgment condition in which participants were asked to

simply watch the video without making any judgments, which served as an additional control condition (as in Savani & King, 2015, Study 3).

Once the video was finished, to assess whether any effects of choice were confounded by a sense of power or control, we asked participants, "How powerful do you feel right now?" and "How much in control do you feel right now?" Participants responded on 7-point scales ranging from *not at all* to *extremely*.

Dependent measure. The dependent measure was a grouping task (adapted from Uskul et al., 2008). In each of 18 trials, participants were presented with pictures of two objects (e.g., a hen and grass) on the top of the screen. We presented a third object at the bottom of the screen (e.g., a cow) that was accompanied with the question, "What goes with this?" One of the two objects on the top belonged to the same basic category as the third object (e.g., *cow* and *hen* both belong to the category *animal*), whereas the other object shared a relationship with the third object (e.g., a *cow* eats *grass*). Identifying a cow and hen as part of the same category indicates analytic thinking, whereas identifying the interdependent relationship between a cow and grass indicates holistic thinking (i.e., understanding how one object interacts with the other). Participants' responses to the 18 items were highly intercorrelated, $\alpha = .89$.

Results

The dependent variable was the number of trials on which participants grouped objects based on shared category memberships. As this was a count variable, we analyzed it using a Poisson regression, which is specifically suited for analyzing count data (Gardner, Mulvey, & Shaw, 1995). We created dummy variables for the control condition and the no-judgment condition, with the choice condition as the dropped baseline. We found a significant effect of the control condition dummy, $B = -.28$, 95% CI [–.42, −.15], $SE = .068$, *incidence rate ratio* = .75, $z = 4.20$, $p < .001$, Cohen's $d = .32$. We also found a significant effect of the no-judgment condition dummy, $B = -.23$, 95% CI [–.36, −.10], $SE = .066$, *incidence rate ratio* = .79, $z = 3.50$, $p < .001$, Cohen's $d = .27$. The negative sign of both these regression coefficients indicates that participants were less likely to group objects based on their category memberships in the control and no-judgment conditions than in the choice condition (see Figure 1). Another Poisson regression using planned orthogonal contrasts revealed that the number of categorical groupings was not significantly different across the control and no-judgment conditions, $B = -.026$, 95% CI [–.094, .042], $SE = .035$, *incidence rate ratio* = .97, $z = .75$, $p = .45$, Cohen's $d = .05$, but was significantly higher in the choice condition compared to the average of the control and no-judgment conditions, $B = .086$, 95% CI [.049, .124], $SE = .019$, *incidence rate ratio* = 1.09, $z = 4.51$, $p < .001$, Cohen's $d = .30$.

Including both sense of power and sense of control as covariates in the first Poisson regression reported above did not influence the key findings: the difference between the choice and control conditions remained significant, $B = -.33$, 95% CI [–.47, −.20], $SE = .069$, *incidence rate ratio* = .72, $z = 4.85$, $p < .001$, and so did the difference between the choice and no-judgment conditions, $B = -.20$, 95% CI [–.33, −.07], $SE = .067$, *incidence rate ratio* = .82, $z = 2.95$, $p = .003$.[5] These results indicate that the effect of choice on analytic thinking are not produced because choice increased participants' sense of power and control.

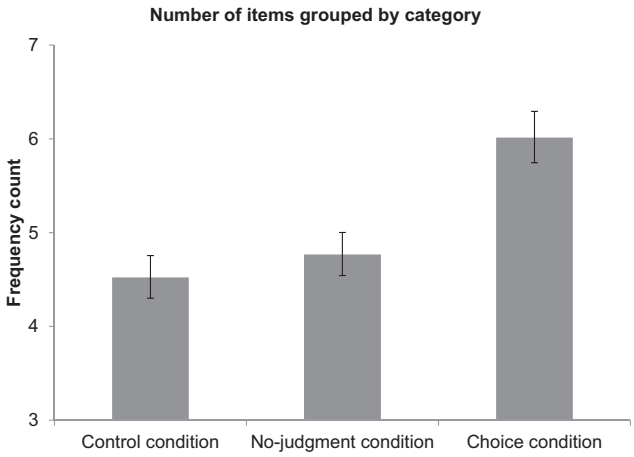

Figure 1. Mean number of items grouped by category, by condition (Experiment 2). Error bars indicate standard error of the mean (converted from log units).

Discussion

Experiment 2 built upon Experiment 1 in a number of ways. First, we conceptually replicated the finding that choice leads people to think more analytically using another manipulation of choice, in which people thought of others' behaviors as choices rather than actions. We also conceptually replicated the finding using a different objective measure of analytic thinking—the extent to which people group objects based on category memberships rather than relationships. We included a truly neutral condition in which participants watched the same video as those in the choice condition and the control condition but did not make any judgments. This no-judgment condition was not different from the control condition in terms of analytic thinking, indicating that the effects are driven by the choice condition increasing analytic cognition. Experiment 2 thus provides converging evidence that choice makes people think more analytically.

To rule out the possibility that effects of choice on analytic cognition are confounded by sense of power or control, Experiment 2 also measured these constructs. We found that choice led to more analytic thinking compared to the control and no-judgment conditions even when both power and control were included as covariates. Further, choice and power/control were related to analytic-holistic cognition in opposite directions: choice led to

[5] An ANOVA indicated that participants' sense of power marginally differed across conditions, $F(2, 253) = 2.83$, $p = .06$, $\eta^2 = .02$, $M_{choice} = 2.90$, 95% CI [2.57, 3.23], $SD = 1.51$, $M_{control} = 2.46$, 95% CI [2.16, 2.76], $SD = 1.42$, $M_{no\text{-}judgment} = 2.94$, 95% CI [2.63, 3.26], $SD = 1.52$. Another ANOVA indicated that participants' sense of control significantly differed across conditions, $F(2, 255) = 6.71$, $p = .001$, $\eta^2 = .05$, $M_{choice} = 3.60$, 95% CI [3.22, 3.98], $SD = 1.72$, $M_{control} = 3.16$, 95% CI [2.81, 3.50], $SD = 1.65$, $M_{no\text{-}judgment} = 4.06$, 95% CI [3.74, 4.37], $SD = 1.54$. Participants experiencing a higher sense of power were significantly more likely to group objects by relationship than by category, $B = -.072$, 95% CI [–.118, −.025], $SE = .024$, *incidence rate ratio* = .93, $z = 3.04$, $p = .002$. Participants experiencing a higher sense of control were marginally more likely to group objects by relationship than by category, $B = -.040$, 95% CI [–.080, .00081], $SE = .021$, *incidence rate ratio* = .96, $z = 1.92$, $p = .055$.

more analytic cognition but power and control were associated with less analytic cognition. The finding that participants who experienced a higher sense of control thought more holistically is consistent with Zhou et al.'s (2012) finding that people who lack control tend to think more analytically. However, our finding that participants experiencing a higher subjective sense of power thought in a more holistic rather than analytic manner is surprising because past research has found robust associations between power and analytic cognition (Miyamoto & Ji, 2011; Miyamoto & Wilken, 2010). One possible explanation of the seeming inconsistency is that the measures and manipulations of power used in past research involved interpersonal influence versus accommodation, whereas our measure of power did not involve any interpersonal relationship. If the current finding holds up, it suggests that personal versus interpersonal nature of power might be differentially related to analytic-holistic cognition.

One potential limitation of this study is that participants in the choice condition were asked to identify all instances in which the actor's actions could be categorized as a choice. However, in the control condition, participants were asked to identify all the times the actor touched an object, a task that might rely more on perception and attention and less on categorization. This could be one reason why participants in the choice condition were subsequently more likely to group options by category than those in the control condition. However, Experiments 1 and 3 do not suffer from this limitation as they used a different manipulation of choice that did not involve any categorization.

Experiment 3

Experiments 1 and 2 showed that choice leads to more analytic rather than holistic cognition using perceptual judgment and grouping tasks. Experiment 3 tested whether choice also leads to more analytic attention as indicated by a greater allocation of attentional resources to objects that are salient in the visual field (Chua et al., 2005; Masuda & Nisbett, 2006). We used a change blindness flicker task for this purpose, which measures people's locus of visual attention (Rensink, O'Regan, & Clark, 1997). In this task, participants are shown two images that differ from each other in one key respect. The images alternate rapidly in quick succession, and participants are asked to identify the change as quickly as possible. Past research has found that analytic thinkers are more likely to mentally separate focal objects from background objects, and thus are faster in detecting changes to focal objects (i.e., objects in the foreground) in the visual scene compared to objects in the background. In contrast, holistic thinkers are less likely to separate focal objects from background objects and thus allocate similar amounts of attentional resources to objects in both the foreground and the background (Masuda & Nisbett, 2006, Experiment 1; see also Miyamoto et al., 2006; Chua et al., 2005). If choice activates a general analytic mindset, we predicted that choice would lead to analytic attention on the change blindness task, as indicated by faster detection of changes to focal objects.

Method

Participants. The data in this study would be analyzed using a hierarchical linear model (Raudenbush & Bryk, 2002). Power analyses for hierarchical linear modeling are not based on Cohen's *d* but on other parameters, such as within- and between-individual variances and covariances (Raudenbush, Bloom, Spybrook, & Martinez, 2011), estimates of which are not available. Therefore, we decided on a sample size of 100 per cell. Surveys seeking 202 U.S. residents were posted on MTurk. One of these participants who took the study twice (as indicated by a repeated MTurk ID number) was dropped. Thus, 201 participants (92 women, 108 men, one unreported; M_{age} = 37.93 years; 144 European Americans, 26 African Americans, nine Latin Americans, one Native American, 17 Asian Americans, one other race, 22 multiracials, one unreported) who submitted the study on MTurk were retained. Participants were randomly assigned to the choice condition or the control condition. Participants' dropout rate did not differ significantly across the two conditions, $\chi^2(1, N = 224) = 1.05$, $p = .31$, indicating that differential dropout rates by condition do not pose a confound (Zhou & Fishbach, 2016). Twenty-six participants who failed or did not respond to the attention check used in Experiments 1 and 2 were excluded from the analyses. Of the remaining participants, one person who failed to complete even a single trial of the change blindness measure was automatically dropped from the analyses. To ensure accuracy of display times and of response time measurement, the study was run using the Inquisit software, which provides accuracy at the level of milliseconds.

Manipulation. Participants were first exposed to the same manipulation as in Experiment 1: Participants in the control condition were asked to describe three *things that they did* yesterday morning, afternoon, evening, and night, whereas those in the choice condition were asked to list three *choices that they made* in each of the same periods.

Dependent measure. We used Masuda and Nisbett's (2006, Study 2) method and stimuli for assessing allocation of visual attentional resources to objects in the foreground versus the background. The stimuli include 30 pairs of images. In each pair, there was either a change in a focal object (e.g., a change in the color of a prominent airplane) or a change in an object in a background object (e.g., a change in the airport control tower; see Masuda & Nisbett, 2006, p. 387 for an example; see Masuda & Nisbett, 2006, pp. 398–399 for a description of all the changes). Each trial included two alternating images that flickered until participants pressed a button indicating that they noticed the change between the two images or until 1 min elapsed from the beginning of the trial. Specifically, one image was first displayed for 460 ms, followed by an interimage interval of 80 ms, followed by the other image displayed for 460 ms, followed by another interimage interval of 80 ms, followed by the first image again, and so on. Once participants indicated that they noticed the change, they were asked to describe the change: "Please tell us in detail what exactly changed across the two versions of the scene." If participants did not respond within one minute from the beginning of the trial, the trial was ended and participants were moved to the next trial.

Both accuracy and response time on the change blindness task are viable dependent measures. However, as noted by Oyserman et al. (2009, p. 225), "When the focus of a task is maintaining accuracy (e.g., instructions are to work as quickly as possible without making mistakes), effects should be on reaction time." As we had explicitly instructed participants to detect the change and to tell us "exactly" what had changed, we expected that the experimental manipulation would primarily influence reaction time rather than accuracy. However, our

theorizing would predict similar effects of choice on both accuracy and response time.

Response verification posttest. To confirm that participants' responses were accurate, we asked a new group of 298 individuals (also recruited from MTurk) to code participants' responses. Each posttest coder was randomly assigned 10 of the 30 trials included in the main study. There were on average 213.73 responses per trial, $SD = 17.01$. This number was higher than the 201 unique participants who completed the study because the research assistant who programmed the posttest survey mistakenly failed to only include responses from valid participants in the posttest survey. Each trial was coded by a mean of 9.84 coders (range = 5 to 14). For each assigned trial, coders were provided with the two images included in the trial, a description of the change between the two images, and all the main study participants' open-ended responses about what change they noticed between the two images in the change blindness task. The posttest coders were asked to indicate (yes or no) whether each open-ended response accurately described the change that occurred in each trial. Interrater reliability, across all participant responses for all trials, was high, $\alpha = .87$.

Results

Accuracy. On average, participants pressed the button indicating that they detected the change between the two images in 29.08 of the 30 trials. On each trial in which participants indicated that they detected the change, we coded participants' response as accurate if a majority of the posttest coders indicated that their open-ended response accurately described the change depicted in the experimenter-provided instructions. On average, for responses coded as accurate, 85% of the posttest coders agreed that the response was accurate (range 55% to 100%, $SD = 13\%$). On average, participants were coded as correct on 24.7 out of the 30 trials (range = 5 to 30, $SD = 3.4$).

We first assessed whether the accuracy of participants' responses varied by experimental condition and type of change (focal vs. background). A hierarchical logistic regression with the 30 trials nested within participants indicated that participants were better at detecting changes to focal objects than to background objects, $p < .001$, but there was no main effect of condition nor a Condition × Focal-Background interaction, $ps > .18$. The main effect of the focal versus background change remains significant, $ps < .001$, whereas the Condition × Focal-Background interaction remains nonsignificant, $ps > .38$, even when more stringent criteria are used to determine whether participants accurately identified the change in each trial, that is, when participants' responses are coded as accurate only if two thirds or three fourths of the posttest coders indicated that participants had accurately identified the change (instead of the majority criterion noted above).

Response time. We assessed whether the key dependent measure, the amount of time participants took to accurately detect the change on each trial, differed by experimental condition and type of change (focal vs. background). We computed the total number of milliseconds participants took to detect each change while the two images were quickly alternating (the interimage intervals were excluded from this calculation because participants could not press the spacebar during this interval). Across all participants and trials, the median response time to accurately identify the change was 6,264 ms, corresponding to between 12 and 13 flicks following the original image. We log-transformed the total detection time, which reduced skewness from 1.99 to −0.17 and kurtosis from 7.60 to 3.86, bringing the distribution of response times closer to the normal distribution (Ratcliff, 1993).

We ran a hierarchical linear regression with robust standard errors with trials nested within participants. Only trials in which participants accurately detected the change as per the posttest were included in this analysis. The dependent variable was the log transformed total detection time, and the independent variables were experimental condition (control = 0, choice = 1), type of change (0 = background, 1 = focal), and their interaction. The simple effect of condition, which indicated the difference between conditions in detection of changes in the background, was nonsignificant, $B = -.001$, 95% CI [–.11, .11], $SE = .058$, $z = .02$, $p = .98$. A simple effect of type of change indicated that changes in focal objects were detected more quickly than changes in background objects, $B = -.24$, 95% CI [–.29, −.18], $SE = .028$, $z = 8.35$, $p < .001$. Most importantly, a Condition × Type of Change interaction indicated that the difference in detection time between focal objects and background objects was greater in the choice condition than in the control condition, $B = -.10$, 95% CI [–.18, −.03], $SE = .038$, $z = 2.73$, $p = .006$ (see Figure 2). The negative coefficient of the interaction effect indicates that the difference in response time to detect changes in focal rather than background objects was significantly larger in the choice condition than in the control condition, indicating more analytic attention in the choice condition.

The Condition × Type of Change interaction remains significant, $p < .022$, even when more stringent criteria are used to determine whether participants accurately identified the change in each trial, that is, when participants' responses are coded as accurate only if two thirds or three fourths of the posttest coders indicated that participants had accurately identified the change (instead of the majority criterion used in the above analysis).

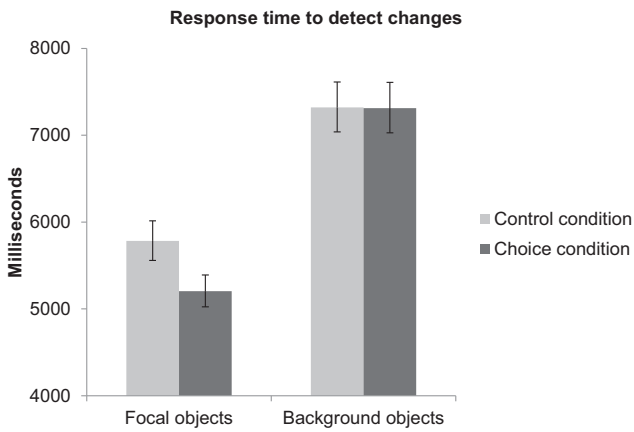

Figure 2. Mean response time to detect changes to focal objects and background objects by condition (Experiment 3). Error bars indicate standard error of the mean (converted from log units).

Discussion

Using the commonly used change blindness flicker task (Rensink et al., 1997), Experiment 3 demonstrated that choice influences visual attention. Specifically, we found no differences between the control condition and the choice condition in the time that it took participants to detect changes to objects in the background, but participants in the choice condition were faster at detecting changes to focal objects. The finding indicates that participants in the choice condition were paying more attention to information that was salient in the visual field, a hallmark of analytic attention (Buchtel & Norenzayan, 2009; Miyamoto, 2013). Experiment 3 thus provided evidence for the idea that choice not only influences attitudinal and cognitive tasks but also influences basic attentional processes.

General Discussion

Across a diverse set of studies employing a range of methods, four experiments found that the salience of choice led to more analytic rather than holistic cognition. This finding was robust both in terms of how we manipulated choice and how we measured analytic versus holistic cognition. Specifically, we found that different ways of manipulating the salience of choice—making choices, recalling one's own past choices, and thinking of others' actions as choices—led people to think more analytically. The same pattern held with different measures of analytic-holistic cognition, including attitudes, perceptual judgments, categorization, and change blindness.

Using an attitudinal measure of analytic cognition, a pilot study found that the simple act of choosing among consumer items (e.g., among keychains, pens, and chocolates) led participants to report greater focus on the parts rather than on the whole compared to participants who did not make choices. Using yet another manipulation of choice, and extending these findings from an attitudinal measure to a perceptual judgment measure of analytic-holistic cognition, Experiment 1 showed that recalling past choices rather than actions made participants' judgments about a focal figure's emotions less influenced by the emotions of other individuals in the background. To rule out alternative explanations, Experiment 2 included an additional comparison condition—a neutral no-judgment condition—while extending the findings to a new dependent measure. Compared to the control condition and the no-judgment condition, participants in the choice condition were more likely to group objects based on their category memberships rather than their relationships, an indicator of analytic cognition. Further, choice led to analytic cognition above and beyond any effects of subjective perceptions of power and sense of control. Finally, using a measure of how people distribute visual attention, Experiment 3 demonstrated that recalling choices rather than actions led participants to allocate more attention to focal and salient objects in the visual field. Thus, this study showed that choice influences basic attentional processes, while providing support for the argument that choice leads people to separate salient information from background information.

As noted above, we used three different manipulations of choice across the studies. The manipulations are comparable in that they made the concept of choice salient, but distinct in how they made the concept salient: by asking participants to either make choices, recall choices, or identify another person's choices. The converging findings indicate that the concept of choice by itself, no matter how it is activated, can trigger analytic thinking. The dependent measures were all related in that they tapped people's tendency to differentiate and separate information rather than to connect and integrate information. For example, the emotion rating task used in Experiment 1 assessed the extent to which people separated versus integrated the focal figure's emotion and the background figures' emotions. The categorization task used in Experiment 2 assessed the extent to which people focused on the connection between objects (their relationship). Finally, the change blindness task used in Experiment 3 assessed the extent to which people viewed the focal figure as integrated with the background versus separated from the background.

Theoretical Contributions

A broader role of choice in basic psychological functioning. Decades of research in social psychology have examined the motivational consequences of choice (Patall et al., 2008). The present research suggests that choice has a broader impact on psychological functioning beyond motivation. Whereas the current research focused on one aspect of cognition—analytic versus holistic categorization, perceptual judgments, and attention—it raises the possibility that choice might influence a range of cognitive processes, including lower order processes such as memory and higher order processes such as reasoning. Further, beyond motivation and cognition, one might ask whether the salience of choice also influences affective processes, such as emotion regulation.

Situational basis of cognition. The present findings contribute to a nascent literature in social psychology that focuses on identifying the psychological states, such as power and control, that underlie and afford cultural differences in analytic-holistic cognition. Contributing to this literature, our studies reveal that choosing among multiple alternatives or thinking about choices, which engenders a sense of independence, affords a more analytic style of cognition. Our work also extends this prior research by showing that the effects of choice on analytic-holistic cognition are separate from power and control. The psychological states and behaviors identified as antecedents of analytic cognition—power (Miyamoto & Ji, 2011), control (Zhou et al., 2012), and choice—are all part of a network of constructs related to independence (Markus & Kitayama, 2001, 2003). This convergence leads to the prediction that other psychological states and concepts associated with independence, such as uniqueness, autonomy, freedom, and self-sufficiency, would also foster analytic cognition.

Mechanism for previously identified consequences of choice. The finding that choice leads to greater attention to focal information suggests a possible mechanism for previously identified consequences of choice. For example, although researchers have largely assumed that previously established effects of making choices on performance are due to increased intrinsic motivation (Patall et al., 2008), it is possible that changes in people's cognitive style (i.e., being more analytic) could help to explain their improved performance, given that many tasks used to measure performance require analytic thinking (e.g., the remote associates test; Mednick, 1968). More analytic thinking could also explain other demonstrated effects of the salience of choice on social attitudes,

such as victim blaming (Savani et al., 2011) and the justification of wealth inequality (Savani & Rattan, 2012).

Novel hypotheses about the consequences of choice. If opportunities for choice continue to increase over time (Schwartz, 2004), then current research suggests that analytic thinking might become more prevalent in the coming years. Given that most IQ tests measure some elements of analytic thinking (Kaufman et al., 2010; Reber, Walkenfeld, & Hernstadt, 1991), this idea could help to explain why there have been consistent gains in average IQ over time and across many nations (Flynn, 1987, 1999). Future research can investigate more directly whether situations and conditions that afford and predict analytic cognition, such as choice, also increase performance on IQ tests. For instance, the Raven's Progressive Matrices (Raven, Raven, & Court, 1998) is one example of a commonly used IQ test that requires people to engage in abstraction rather than contextualization. Choice could also increase performance on other common tests of creativity that also require analytic thought, such as the Remote Associates Test (e.g., Question: "What word goes with cake, cottage, and Swiss?" Answer: "cheese"; Mednick, 1968).

Limitations and Future Directions

Generalizability of the experimental manipulations. Although the current experiments manipulated choice in a variety of ways—making choices, recalling choices, and viewing actions as choices—all manipulations focused on conscious, deliberate choices. We did so because the literatures on choice in social psychology (Patall et al., 2008), consumer behavior (Bettman et al., 1998), and judgment and decision making (Koehler & Harvey, 2008) largely focus on conscious choices (which might be influenced by nonconscious processes). Yet, people's choices are often made out of routine or habit, without much conscious thought (e.g., one of the authors always chooses to buy Peets Coffee Italian Roast whole beans, Wood & Neal, 2007), and driven by features of the environment rather than by their own volition (Nisbett & Wilson, 1977). If people make choices out of routine or if choices are driven by the environment, then the key process that we proposed—a heightened sense of independence—may not occur to the same extent. Future research can investigate whether only deliberate choices, not nonconscious choices, influence analytic-holistic cognition.

The present research examined how diverse manipulations of choice influenced people's analytic cognition in laboratory and online studies. Future research can investigate whether similar effects emerge with the types of everyday choices that people commonly make in their lives. For example, does online shopping, which allows people to make more choices among more alternatives than ever possible in the past, lead to more analytic cognition? Does the act of playing video games, in which people have to continuously make snap decisions, foster more analytic cognition? Do organizational practices offering employees greater choice and autonomy in what tasks they work on and how they spend their time (e.g., job crafting; Berg, Wrzesniewski, & Dutton, 2010) produce more analytic cognition? Future research can investigate these intriguing possibilities.

One feature of the choice manipulations used in the current studies is that they focused on attaining a high degree of experimental control. They did so by priming the concept of choice, such as by asking people to recall past choices or by asking them to identify other people's choices. These manipulations are quite different from past research on choice, in which people were often given choices in contexts (e.g., nursing homes or educational settings) that would otherwise not afford them personal control (Cordova & Lepper, 1996; Langer & Rodin, 1976). It is possible that in these types of contexts, in which people do not have a high degree of autonomy, the motivational effects of choice might be more pronounced than in contexts in which people already have a high degree of autonomy.

Generalizability across cultures. The current studies were conducted in the United States, an independent cultural context in which people tend to think analytically, and thus it is unclear whether the association between choice and analytic thinking would generalize to interdependent cultural contexts in which people tend to think in a more holistic manner. When making choices, Americans primarily focus on their preferences, which might be one of the reasons why we found the association between choice and analytic thinking in the current studies (Savani, Markus, & Conner, 2008). It is possible that when making choices, people in more interdependent cultural contexts would use more complex, association-based thinking, including making inferences about other people's expectations and preferences, and about social norms (Savani, Morris, & Naidu, 2012; Savani, Wadhwa, Uchida, Ding, & Naidu, 2015; Uchida, Savani, Hitokoto, & Kaino, 2017). Therefore, in more interdependent cultural contexts, it is possible that choice might not be as strongly associated with analytic cognition. Future research can examine this question.

Generalizability to choices for others. Most of the current studies examined the effects of making and recalling one's own choices on analytic cognition. Past research has found that making choices for oneself versus for others has different psychological consequences. For example, making a choice for oneself leads to cognitive dissonance (a stronger alignment between one's preferences and one's choices) among European Americans but making a choice for others does not; Japanese exhibit the opposite pattern (Hoshino-Browne et al., 2005; Kitayama, Snibbe, Markus, & Suzuki, 2004). We propose that the effects of choice on analytic attention occur because of the association between choice and independence. If making choices for oneself makes people feel more independent, but making choices for others makes them feel more interdependent, then making choices for others might not lead people to think analytically to the same extent as making choices for oneself. Future research can examine this prediction.

Conclusion

Choice is a behavioral act that is pervasive and powerful. Just as all acts can assume a variety of meanings depending on the context (Stephens, Markus, & Townsend, 2007), so can choice. In addition to the many known correlates and consequences of choice, such a sense of independence, freedom, and control, the present research suggests that another important consequence of choice is analytic thought, or a style or habit of thinking that fosters distinguishing and separating as opposed to connecting and integrating. Given its ubiquity and growing prevalence, the act of choosing may emerge as a key mechanism that contributes to the evolution of patterns of

analytic thought and related processes over time and across settings.

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