



Inferences from decision difficulty [☆]

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Abstract

We propose that people infer the relative attractiveness of the choice alternatives from decision difficulty. A difficult decision signifies that the alternatives are close to each other in attractiveness, and an easy decision signifies that the alternatives are remote from each other in attractiveness. In Study 1, observers used reported decision difficulty to infer preferences of the decision maker. Studies 2–4 showed that inferences about the source of one's own decision difficulty may affect a decision maker's preferences. Study 4 integrates the notion of inferences from decision difficulty with dissonance theory, showing that in repeatable decisions difficulty reduces post-decisional spreading of alternatives, as predicted by our model, whereas with one-time decisions, difficulty enhances post-decisional spreading of alternatives, as predicted by dissonance theory.

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A colleague of ours was once a finalist in the Society of Experimental Social Psychology dissertation award competition but did not win the award. In a subsequent meeting of the society, the head of the prize committee told the finalist that the decision about who would win was rather difficult. We think that it was meant to be a compliment; the present article examines the process that led to this conclusion and some of its implications.

The fact that decisions convey information is hardly a controversial idea in social psychology. An obvious inference is that the decision maker, either oneself or another person, liked the chosen alternative better than the rejected alternative (Bem, 1972). We would like to suggest, however, that information is conveyed not only

by the outcome of the decision process but also by the process itself. Specifically, we would like to propose that the difficulty of making a decision may be used as information about the magnitude of the decision maker's preference. A difficult decision process may be interpreted as indicating that the choice alternatives came close to each other in attractiveness, whereas an easy decision process may be interpreted as indicating that the chosen alternative was much more attractive than the rejected alternatives.

We further propose that once a decision maker draws inferences from decision difficulty, these inferences influence his or her subsequent preferences and choices. For example, imagine an executive who hesitates between two excellent job candidates and believes that her decision is difficult. She may infer that although one candidate was eventually chosen, the other one came really close and is therefore highly qualified. If another position would open up, the formerly rejected candidate would have a better chance to get an offer compared to a situation in which the initial decision process had been perceived as easy. If the executive feels that one candidate wins easily, then she may conclude that the

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candidates were very remote in attractiveness. This, in turn, implies that the chosen candidate is very good or that the rejected candidate is not that great, or both.

How do people come to perceive their decisions as either easy or difficult? Obviously, they may directly experience the decision as being either easy or difficult. In addition, observers may learn that a decision maker experienced difficulty from her verbal reports. People may also be convinced by somebody else that the decision-maker experienced difficulty during the decision process. We would like to suggest that regardless of the source of the perception of difficulty, it may be interpreted as conveying information about the relative attractiveness of the choice alternatives.

Inferences from decision difficulty (IFDD) are consistent with our model of post-suppressional rebound, according to which attributions about the source of suppression difficulty produce post-suppressional rebound (Förster & Liberman, 2001; Liberman & Förster, 2000). According to this model, people who experience suppression to be difficult (e.g., they find it difficult to write a story about a day in the life of an African American person while suppressing the stereotype of African Americans) may infer from this experience that they are particularly motivated to use the suppressed construct (e.g., they may think that if it is so difficult to suppress the stereotype of African Americans, it must be because they actually want to use it). As a consequence, people end up using the suppressed construct more after suppression than they would with no prior suppression. It has been shown, indeed, that discounting the perceived difficulty of suppressing a stereotype (e.g., by telling the person that suppressing stereotypes is difficult for everybody) reduces subsequent stereotyping (i.e., reduced post-suppressional rebound) relative to a control condition (Förster & Liberman, 2001, Study 3). Other models of post-suppressional rebound suggest that suppression enhances the accessibility of the suppressed construct via processes that do not involve attributions, such as ironic monitoring (Wenzlaff & Wegner, 2000) or rehearsal (Macrae, Bodenhausen, Milne, & Jetten, 1994), and thus, these models do not predict an effect of misattribution on post-suppressional rebound.

The notion that people draw inferences from decision difficulty is also in line with Schwarz's approach, according to which meta-cognitive processes take experiences as informational input. Most relevant to our framework are the findings on difficulty of retrieval by Schwarz et al. (1991) who demonstrated that retrieval difficulty may serve as an informational input in self-perception of traits, in judging the quality of one's memory (Belli, Winkielman, Read, Schwarz, & Lynn, 1998; Winkielman & Schwarz, 2001; Winkielman, Schwarz, & Belli, 1998), in judging one's health (Rothman & Schwarz, 1998), in estimating frequency (Wänke, Schwarz, & Bless, 1995), and in judging the strength of one's attitudes (Haddock,

Rothman, Reber, & Schwarz, 1999; Wänke, Bless, & Biller, 1996; for a review, see Schwarz, 1998). In a typical study (e.g., Schwarz et al., 1991), participants are asked to recall either a small number or a large number of incidents of a given behavior (e.g., either 6 or 12 incidents in which they behaved assertively) and then rate themselves on a relevant dimension (e.g., "How assertive are you?"). It is typically found that listing a large number of relevant incidents, which is relatively difficult, reduces ratings on the corresponding dimension (e.g., reduces one's self-ratings of assertiveness). In support of the proposed inferential mechanism, Schwarz and his co-workers (1991) have shown that when participants were led to believe that music played in the experimental room inhibited their ability to recall, the participants did not reduce their self-ratings on assertiveness after being asked to recall a larger number of assertive behaviors. Presumably, they attributed the difficulty of retrieval to the music and therefore did not use it as information to infer lack of assertiveness (see also, Haddock et al., 1999; Winkielman et al., 1998).

Cognitive dissonance theory (Brehm, 1956; Festinger, 1957) also addressed the effect of decisions on subsequent preferences. It proposed that after a decision is made, the attractiveness of the chosen alternative would increase, and the attractiveness of the rejected alternative would decrease (i.e., the desirability ratings of the chosen and the rejected alternatives would spread apart). This is because the positive aspects of the rejected alternatives and the negative aspects of the chosen alternative are dissonant (i.e., inconsistent) with the decision and are changed post-decision to reduce the unpleasant state associated with dissonance. For example, after choosing one of two job candidates, the positive characteristics of the rejected candidate and the negative characteristics of the chosen candidate are inconsistent with the decision and therefore discounted, producing a reduced liking for the rejected candidate and enhanced liking of the chosen candidate.

Thus, it may seem that the predictions of dissonance theory are opposite to those of IFDD. However, we do not think that IFDD contradicts the logic of dissonance theory but rather is entirely consistent with it. Specifically, we suggest that if the rejected alternative remains relevant after the decision is made (e.g., because it may be pursued on another occasion), derogation of that alternative is not the only way to reduce dissonance—dissonance may also be reduced by resolving to pursue the rejected alternative on another occasion. For example, if a student chose to take a course in knitting rather than a course in finance, she can decide to take the latter course the next semester or try satisfy her curiosity about finance in another way (e.g., reading a book about the topic). In that case, promising oneself to return to the rejected alternative is in fact dissonance reducing and is therefore consistent with the logic of cognitive dissonance.

Researchers in dissonance theory have suggested that irrevocability of decisions is an important precursor of post-decisional dissonance: if one can revoke or undo the impact of a decision, no post-decision change in attitudes occurs (Davis & Jones, 1960). Note, however, that repeating a decision is not identical to revoking it, because repeating refers to the relevance of the alternatives for future decisions rather than to changing the existing decision. Moreover, unlike previous theorizing on dissonance, the IFDD model does not propose a moderator of spreading of alternatives but instead a moderator of the effect of difficulty on spreading. Namely, post-decisional dissonance predicts that the spreading apart of alternatives would be enhanced by decision difficulty because difficult decisions produce more post-decisional dissonance (Brehm, 1956; Converse & Cooper, 1979; Shultz, Leveille, & Lepper, 1999). IFDD, on the other hand, predicts that if the alternatives remain relevant post-decision, difficulty would diminish the spreading apart of alternatives. Study 4 of this paper directly addresses post-decisional dissonance and examines the prediction that repeatability of one's decision would moderate the effect of decision difficulty on spreading of alternatives. Specifically, we examine the prediction that difficulty would enhance spreading (as predicted by dissonance theory) after a one-time decision but produce the opposite effect (as predicted by IFDD) after a repeatable decision.

The current research program attempts to provide an initial demonstration of IFDD. Study 1 examines inferences that observers draw from an actor's report of decision difficulty. When first introduced, self-perception theory presented results showing that observers can correctly infer the attitudes of a participant in a dissonance experiment (Bem, 1972). This was taken to show the viability of the inference process—that is, the possibility of inferring such attitudes solely from observed behavior. Study 1 is conceptually similar to Bem's (1972) original studies in providing a pure demonstration of the inference processes. We believe that examining observers' inferences is useful because these inferences are not contaminated with concerns about consistency and desirability of self-presentation that often characterize inferences about the self. Studies 2, 3, and 4 address the effect of decision difficulty on one's own subsequent liking of and motivation to pursue the chosen and the rejected alternatives. Studies 2 and 3 apply a misattribution paradigm to either augment or discount low spreading of alternatives as a reason for decision difficulty. Study 4 manipulates experienced decision difficulty in a traditional way employed by dissonance studies, namely, by presenting alternatives that are either close or remote in their initial attractiveness. In addition, Study 4 manipulates repeatability of choice and examines the prediction that difficulty would produce spreading of alternatives (characteristic of dissonance) with one-time decisions, whereas with repeatable decisions

it would produce the opposite effect (characteristic of IFDD). In all the studies, we compute an index of spreading apart of alternatives as the difference between the evaluations of the chosen and rejected alternatives. We predict that difficult repeatable decisions would lead to less post-decisional spreading of alternatives than easy repeatable decisions.

Study 1: Inferring an actor's preferences for job candidates

The first study examines the inferences that observers draw from the decision difficulty reported by a decision-maker. Would observers infer the actor's extent of liking of the chosen and rejected alternatives from the actor's stated difficulty to decide? Evidence for such inferences would pave the way to our next question (examined in Studies 2–4), which is whether IFDD would affect the decision-maker's own preferences and motivations.

Method

Participants

Ninety-five undergraduate Tel Aviv University students (27 men, 68 women) participated in the study for course credit.

Procedure

A one-page questionnaire entitled “choosing a dessert” was included in a 30-min battery study among other unrelated tasks. The questionnaire included a description of a person deciding between two desserts in a restaurant. The description stated that the person either found the decision difficult or easy, or it did not make any reference to decision difficulty. In addition, the decision-maker in the story described the two alternatives as either good or bad. Both decision difficulty and the quality of the alternatives were manipulated between participants in a 3×2 design. The scenario, translated from Hebrew, was as follows, with the manipulation of dessert quality in parentheses and the manipulation of decision difficulty in brackets: “After having a nice meal at a restaurant, Eli and Dan got the dessert menu. Eli is allergic to dairy products and could consider only two desserts. He told Dan “I can have only the apple pie or the fruit sorbet. Both look very good (do not look that good) [the choice is rather difficult/very easy]. I will take the apple pie.” Two questions followed: “to what extent did Eli's statement imply that (a) he wanted to take the apple pie and (b) he wanted to take the fruit sorbet?” Both statements were followed by a 7-point scale, ranging from 1 (“not at all”) to 7 (“very much”). The order of the questions was counterbalanced across participants and had no significant effect on any of the results reported below.

Results and discussion

We computed a spreading score for each participant as a difference between the ratings of the chosen alternative and the rejected alternative and analyzed the data in a 3 (decision difficulty: easy, control, difficult) \times 2 (dessert quality: good vs. bad) two-way between-participants ANOVA. The means and the standard deviations of the spreading index and the evaluations of the alternatives are displayed in Table 1.

As predicted, a significant main effect of decision difficulty $F(2,89)=8.65, p<.0005$, indicated that alternatives came closest to each other (i.e., spreading was the lowest) in the difficult decision condition ($M=1.31$), followed by the control condition ($M=2.29$), and the easy decision condition ($M=3.12$). Thus, observers inferred from the actor's stated difficulty in making the decision that the two choice alternatives came close to each other in attractiveness and from a stated ease of decision that the chosen alternative was much more attractive than the rejected alternative. The "decision difficulty" \times "alternative quality" interaction was not significant, $F(2,89)=1.97, p=.14$.

In sum, Study 1 shows that when a decision-maker communicates decision difficulty, observers may use it to infer the decision maker's liking of the chosen and rejected alternatives. These results do not show, however, that decision makers engage in such inferences about themselves, a question that will be addressed in Studies 2–4. Thus, the rest of the studies in this article examine the implications of inferences from decision difficulty for the self. Would beliefs about the meaning of one's own difficulty of making a decision affect liking for the alternatives? Would these inferences affect one's motivation to choose those alternatives on a subsequent occasion?

Study 2: Misattribution of difficulty to choose between colors

To examine the effects of IFDD on subsequent preferences, we asked participants to decide between two

alternatives after attributing the difficulty of decision to an external source or not. For that purpose, we use the well-established misattribution procedure (e.g., Olson & Ross, 1988; Ross & Olson, 1981), whereby participants are told that an external source (e.g., music) has either an enhancing or a reducing effect on experienced difficulty of decision. The logic behind this manipulation is that people who are told the external source is expected to enhance difficulty of decision attribute subsequent experiences of difficulty to that source and discount other potential causes of difficulty, such as low spreading of alternatives. By the same logic, people who are led to believe that an external source reduces experienced decision difficulty but nevertheless continue to experience such difficulty, augment other sources of experienced difficulty, such as low spreading of alternatives.

Thus, in the first stage of Studies 2 and 3, participants are told that a context stimulus (e.g., music) would make a decision between two alternatives difficult or easy. By the logic of misattribution, the attribution of difficulty to low spreading of alternatives would be discounted in the first group (i.e., the "difficult" group) and augmented in the second group (i.e., the "easy" group). Those groups are then compared with a control group of participants who do not receive information connecting the context stimulus to either ease or difficulty. In the second stage of our studies, the chosen and rejected alternatives are rated again or presented a second time for a repeated decision; those ratings or choices comprise the dependent measures in these two studies. We predict that compared to the control condition, there will be more spreading of alternatives when the context stimulus is said to make the decision difficult and less spreading of alternatives when the context stimulus is said to make the decision easy.

Study 2 examines choice between two colors following a choice situation in which only one of the colors could be used. Study 3 examines the rated importance of intelligence and creativity following a choice between a self-test on one of these ability dimensions.

Method

Participants

Forty-five University of Würzburg students (20 men, 25 women) participated in a battery study on different psychological tasks. They received DM 18 (about \$8.50 at the time of the study) for a 90 min session. Three participants were excluded from the study because they failed to follow the experimental instructions.

Materials

In the first phase of the study, we used Else Lasker-Schüler's drawing "Jussuf modeling his mother" of which copies were made in both monochrome and original color. The picture is described by the artist as a

Table 1
Inferred liking for desserts by dessert quality and decision difficulty

	Easy decision	Difficult decision	Control
<i>Both desserts good</i>			
Chosen dessert	6.31a (.87)	5.81a (.83)	5.73a (1.39)
Rejected dessert	1.94a (.85)	4.00b (1.71)	2.93c (1.58)
Spreading	4.38a (1.36)	1.81b (1.83)	2.80c (2.60)
<i>Both desserts bad</i>			
Chosen dessert	3.62a (1.86)	2.62a (1.59)	3.12a (1.31)
Rejected dessert	1.75a (1.12)	1.81a (1.38)	1.31a (.60)
Spreading	1.88a (1.78)	0.81b (.98)	1.81a (1.56)

Note. In each line, means that do not share a common subscript differ at $p < .05$. Spreading is the difference between the ratings of the chosen and the rejected candidates.

Standard deviations are in parentheses (Study 1).

prince modeling a woman with colorful village scenery in the background. In the second phase of the study, we used a monochrome copy of a drawing by M.C. Escher (Symmetriezeichnung Nr. 25), which depicted seven identical lizards arranged in a symmetrical circle.

Procedure

Participants first performed unrelated tasks for about 60 min. The present experiment was carried out in a separate room and was introduced at the end of the session as a study by a colleague from Trier University on the psychology of art. Participants were tested in groups of up to four and could not see each other during the experiment.

Participants were told that the study examines color aesthetics and color preferences. They were given both the color and the monochrome copies of the Lasker-Schüler drawing and asked to color the monochrome copy using ten color markers. We told participants not to spend too much time on coloring because all we needed was a picture that would give the general idea of the colors in the original for a person who had not seen the original. We also told participants that they could choose either the red or the blue marker, but not both. No derivatives of blue or red (e.g., pink, purple, and orange) were present. To make the decision more relevant we explained that new research on the psychology of art has demonstrated that color choices reflect personality. Thus, we said, color preferences could predict criminal inclinations, pro-social and anti-social behavior, and intelligence. Through the experimental session, aromatic orange oil was applied in the room, creating a pleasant and fairly intense scent.

At this point, we introduced the experimental manipulation of misattribution. Specifically, in the aroma-facilitates-decision group, participants were told that according to research on aroma therapy, the orange aroma in the room would make the decision between the two colors easy. In the aroma-complicates-decision group, participants were told that according to research, the orange aroma in the room would make the decision between the two colors difficult. In the control group participants were told that according to research, the orange scent could make the decision easy or difficult, depending on the situation. After this part of the instructions participants began coloring the picture. Three minutes later the experimenter told participants that they should finish coloring soon and a minute after that they were asked to stop (only two participants did not finish coloring by that time).

All the participants then proceeded to the second phase of the study in which they were given a copy of Escher's painting and asked to color it. Participants were told that they could use any marker they wanted. After completing coloring, participants received an open-ended questionnaire about their understanding of the

purpose of the study, any suspicions that they might have had in its course, and other thoughts. None of the participants expressed suspicions relevant to the study. After completing the procedure, participants were paid, thanked, and debriefed.

Results and discussion

We examined the rate of using the formerly selected and the formerly rejected colors during the second phase. For that purpose, we counted the percentage of lizards that were colored in blue and red (see Table 2) and computed a spreading score as the difference between the rate of using the formerly chosen and the formerly rejected colors. A one-way ANOVA on the spreading score with misattribution (aroma facilitates decision, aroma complicates decision, control) as a between-subjects variable revealed a significant effect, $F(2, 39) = 4.03, p < .05$. As predicted, spreading was lowest in the aroma facilitates decision condition ($M = -10$), followed by the control condition ($M = -3$), and the aroma complicates decision condition ($M = 16$). Interestingly, the former two conditions reveal negative spreading scores, indicating that participants prefer the previously rejected color to the previously chosen color. As we will see later, the same tendency emerged in Study 3 and in the repeatable condition of Study 4. Possibly, these results reflect compensation or variety seeking (i.e., a motivation to choose a different option than the one previously taken).

Our results show that a misattribution manipulation of the causes for one's experienced difficulty in deciding between two alternatives affected the post-choice motivation to pursue these alternatives. Specifically, relative to a control condition, telling participants that the context cue would facilitate decision-making (i.e., augmenting low spreading of alternatives as the cause of experienced difficulty of decision) resulted in an increased use of the rejected alternative relative to the chosen alternative. Presumably, participants inferred from the difficulty of the decision that the rejected alter-

Table 2
Likelihood of choosing the selected and the rejected colors by experimental condition

	Odor complicates decision	Odor facilitates decision	Control
<i>Chosen color</i>			
29% ^a (20)		22% ^{ac} (15)	14% ^{bc} (13)
<i>Rejected color</i>			
13% ^a (12)		32% ^b (17)	17% ^a (18)
<i>Spreading</i>			
16% ^a (27)		-10% ^b (22)	-3% ^b (24)

Note. In each line, numbers that do not share a common subscript differ at $p < .05$. Spreading is the difference between the ratings of the chosen and the rejected colors.

Standard deviations are in parentheses (Study 2).

native was relatively desirable and their motivation to pursue it on a latter occasion increased. Also as predicted, participants in the aroma-complicates-decision group (i.e., discounting low spreading of alternatives as the cause of experienced difficulty of decision), relative to the control condition, had increased motivation to pursue the chosen alternative relative to the rejected alternative.

The present study examined the effect of perceived cause of decision difficulty on subsequent motivation. Although the first choice was final and irrevocable in our experimental situation, the choice alternatives did not cease to be relevant and could be reconsidered in other decisions (i.e., the color that was rejected when coloring the first picture could be re-chosen when coloring the second picture). Similar to the classic study on over-justification (Lepper, Greene, & Nisbett, 1973), we examined the motivation to use color pens. Would similar results obtain with more self-relevant and involving domains? To address this question, the next study examines the effect of attribution of decision difficulty on post-decisional ratings of self-relevant ability domains.

Study 3: Misattribution of difficulty to decide between ability domains

Method

Participants

Forty-seven University of Würzburg students (20 men, 27 women) received DM 18 (about \$8.50 at the time of the study) for their participation in a battery study lasting 90 min. Two participants failed to follow the experimental instructions and were excluded from the study.

Procedure

Participants performed unrelated tasks for the first 20 min of the study. The present task was introduced as research on clinical psychology conducted by a colleague from the University of Trier. Participants were presented with a creativity test and an intelligence test and were told that they could pick which test they wanted to complete, as they only had enough time in the study to finish one. They were informed that their decision in itself would reflect something about their personality. Music was played during the entire experimental session (Anne Sophie Mutter performing the Violin Concerto in A minor by J.S. Bach). In the music-facilitates-decision group, participants were told that new research on psychology of music has shown that some types of music make decision processes easier; participants in the music-complicates-group were told that music would make decision processes more difficult. In the control condition, no specific instructions about the music were given.

Two sealed envelopes, labeled “intelligence test” and “creativity test” were placed in front of each participant. Both envelopes contained the same test, which included ten problems from the Gestalt Completion Test (Ekstrom, French, Harman, & Dermen, 1976). After the participant chose one of the envelopes, the experimenter removed the other envelope and instructed the participant to open the envelope, read the instructions, and begin the test. Two minutes later participants were stopped and received a short questionnaire with the main dependent variables of the study. Most of the participants completed the Gestalt Completion task within that time. The questions were: “How important are creativity tests?”, “How important are intelligence tests?”, “How important is research on creativity?”, and “How important is research on intelligence?” All the questions were followed by 9-point scales ranging from 1 (“not at all”) to 9 (“very”). Participants then continued working on unrelated tasks for 30 min. Then, they were thanked, paid, and debriefed.

Results and discussion

The two questions about each ability domain were indexed together (for creativity, $r(43) = .70, p < .0001$; for intelligence, $r(43) = .81, p < .0001$). A spreading score was computed in the same way as in Studies 1 and 2, and the data were analyzed using a one-way ANOVA with misattribution (music-facilitates-decision, music-complicates-decision, control) as a between-participants factor. The means are displayed in Table 3. The analysis revealed the predicted effect of misattribution, $F(2, 42) = 4.15, p < .05$, in that spreading was lowest in the music-complicates-decision condition ($M = -.77$), followed by the control condition ($M = -.09$) and the music-facilitates-decision condition ($M = .64$).

The present results are consistent with our predictions about the effects of augmenting and discounting low spreading as an explanation of decision difficulty. In both Studies 2 and 3, the chosen and rejected alternatives remained relevant despite the fact that the first choice

Table 3
Importance of the chosen and the rejected ability dimensions by experimental condition

	Music complicates decision	Music facilitates decision	Control
<i>Importance of chosen test</i>			
5.79a (2.15)		6.77a (1.71)	6.34a (1.12)
<i>Importance of rejected test</i>			
5.14a (2.00)		7.53b (.88)	6.44c (1.53)
<i>Spreading</i>			
0.64a (1.04)		-0.77b (1.61)	-0.09ab (1.21)

Note. In each line, numbers that do not share a common subscript differ at $p < .05$. Spreading is the difference between the ratings of the chosen and the rejected domains.

Standard deviations are in parentheses (Study 3).

was irrevocable. In Study 3, both intelligence and creativity probably continued to be important for the participants even after they rejected one of these tests in the experimental session. Therefore, we believe, difficulty of decision did not produce a post-decisional derogation of the rejected alternatives but rather produced the opposite effect. The next study more directly examines the prediction about the different domains of application of post-decisional spreading of alternatives versus IFDD.

The misattribution results of Studies 2 and 3 show that the attributions people make about their experienced decision difficulty determine subsequent evaluations of the choice alternatives. In that, they provide clear evidence for the operation of inference processes in the effects of decision difficulty on subsequent evaluation of the alternatives. A potential disadvantage of the misattribution procedure, however, is that it encourages participants to engage in interpreting decision difficulty. Would similar effects emerge without explicit mention of the source of decision difficulty or with manipulation of experienced difficulty? The next study addresses these, as well as other, questions.

Study 4: Inferences from decision difficulty and post-decisional dissonance: The role of choice repeatability

Dissonance theory predicts a post-decisional spreading apart of alternatives (i.e., more liking for the chosen alternative and less liking for the rejected alternative) that should be stronger with more difficult decisions. Contrary to this, IFDD predicts that perceiving or experiencing a decision as difficult (as compared to perceiving or experiencing it as easy), would give rise to the reverse pattern. As noted before, we believe that the contradiction between the two approaches is more superficial than real. Specifically, we believe that when there is a possibility of repeating the decision and when the choice alternatives remain relevant, enhancing the rejected alternative is in fact dissonance reducing because the knowledge that one would be able to pursue the rejected alternative at a later point alleviates the contradiction between its attractiveness and its rejection. For example in Study 1, although the decision maker made a final decision of a dessert, the more general category of desserts remained relevant and available for future choice as long as both apple pie and fruit sorbet (the alternatives in Study 1) could be ordered on other occasions. Likewise, in Study 3, after participants made their decisions we assessed the attractiveness and importance of intelligence and creativity in general, not the attractiveness and importance of the specific intelligence and creativity tests that were offered in the experimental situation. These general ability dimensions, we believe, remained relevant for participants after making the choice.

Indeed, researchers of dissonance examined a construct closely related to repeatability, namely, decision revocability, which refers to the possibility of changing or undoing a decision (Davis & Jones, 1960; see also, Gilbert & Ebert, 2002). It has been shown that post-decisional spreading of alternatives is attenuated with revocable decisions. Research on dissonance, however, never examined the effect of decision difficulty on revocable vs. irrevocable decisions. The present study examines repeatability rather than revocability, and also, more relevant to IFDD, it examines the possibility that difficulty would have different effects on repeatable vs. one-time decisions.

The present experiment was modeled after a recent study on post-decisional dissonance by Shultz et al. (1999). In the original study, participants chose between two pre-rated posters that were either both attractive (difficult decision, high attractiveness condition), both unattractive (difficult decision, low attractiveness condition), or mixed (easy decision condition). Based on their model of constraints satisfaction of dissonance (Shultz & Lepper, 1996), the authors predicted and subsequently found more spreading apart of alternatives with more difficult decisions.

We replicate Shultz et al.'s (1999) study but add a manipulation of repeatability of the decision. Specifically, some participants are told that they are making a one-time decision (a condition that is similar to the original study), whereas others are told they will be allowed to repeat the same decision at a later stage. We predict a replication of the original results (Shultz et al., 1999) in the former condition and a reversal in the latter condition. Namely, according to the principle of IFDD, the repeatable decision condition should yield less spreading apart of alternatives in the difficult decision conditions than in the easy decision condition. In other words, we predict that the contrast between the easy decision condition and the two difficult decision conditions would depend on repeatability, because with a repeatable decision, the difficult decision conditions would produce less spreading than the easy decision condition, whereas the reverse will hold with a one-time decision.

We measure perceived decision importance to make sure that making a decision repeatable did not reduce dissonance simply by making it seem less important. In addition to directly connecting our predictions with those of dissonance theory, the present study also extends Studies 2 and 3 by including a choice between unattractive alternatives and by manipulating actual difficulty rather than attributions about the source of difficulty.

Method

Participants

One-hundred and three participants from University of Bremen and neighboring high schools (47 men, 56

women) completed in a 1-h battery study for a payment of €7 (at the time, approximately US \$7). The study took place at International University of Bremen, Germany.

Materials

Portrait photos of young men were downloaded from the internet, and descriptions were matched to each portrait to convey cooperativeness and efficiency or selfishness and laziness. In a pilot study, 10 participants rated 20 descriptions on their degree of cooperativeness vs. selfishness and efficiency vs. laziness on 9-point scales anchored with each of the two traits (e.g., 1 “very cooperative” and 9 “very selfish”). We selected five descriptions that were rated as selfish ($M = 2.21$) and inefficient ($M = 1.97$) and five descriptions that were cooperative ($M = 7.23$) and efficient ($M = 7.95$).

Procedure

Participants were tested individually in a study on decision processes. They were told that at the end of the study they would work with a partner of their choice on a set of tasks that could not be solved alone. Furthermore, participants were told that we would try to match them with the partner they chose, but we could not guarantee it because it was possible that some of the candidates would not be available. Participants then indicated how much they liked each of 10 candidates (presented in random order) on a 15-point scale ranging from -7 (“not at all”) to 7 (“very much”).

Each participant was randomly assigned to one of three conditions: high ratings, difficult choice; low ratings, difficult choice; and easy choice. In the high ratings, difficult choice condition, we presented each participant with the two candidates with the highest ratings after excluding those that were rated $+6$ and above by the participant. In the low ratings, difficult choice condition, we presented each participant with the two candidates with the lowest ratings after excluding those that were rated -6 and below by the participant. In the easy choice condition, we presented each participant with the candidate with the highest score and the lowest score after excluding candidates that had been rated as $+6$ and above and -6 and below (thus excluding the candidates with extreme ratings). As in the original study by Shultz and co-workers (1999), this procedure was intended to allow for sufficient room for change in the ratings. Four participants gave extreme ratings of 6 , 7 , -6 , and/or -7 to all the candidates and were thus excluded from the study.

The experimenter wrote down the names of the two candidates on a piece of paper, handed it to the participant, and asked him/her to select one of the two candidates. To manipulate choice repeatability, half of the participants in each experimental condition were led to believe that they are making a one-time choice and that they would work with the same partner for the entire set of tasks. The other half of the participants were told that

because there were several tasks in the experiment, it is possible that at a later stage they would be allowed to re-select a partner from the same set of 10 candidates (i.e., repeat the same choice procedure as before).

The time it took participants to make the choice was recorded using a stop watch. As in the original study (Shultz et al., 1999), we expected difficult choices would be slower than easy choices. Therefore, we used decision time to check the manipulation of choice difficulty.

Participants were then given a questionnaire and asked how difficult the decision was and how important it was, each on a 15-point scale ranging from -7 (“very easy”/“not at all important”) to 7 (“very difficult”/“very important”). After working on unrelated tasks for approximately 12 min participants received the portraits and descriptions of the 10 candidates (presented in random order) again and evaluated them on the same 15-point scale as before. Participants were told that we were interested in their current evaluation and that they were free to change their original evaluation if they wished. Later on, participants were informed that due to some technical difficulties with our computer equipment, they would not be able to complete the cooperative tasks but could participate in questionnaire studies instead. At the end of the experiment, participants were asked about their beliefs about the purpose of the study. No participant raised any suspicions about the cover story. Finally, participants were thanked, paid, and debriefed.

Results and discussion

Decision difficulty and decision importance

We first examined the effectiveness of the decision difficulty manipulation using both decision time and reported decision difficulty. A two-way ANOVA, with choice difficulty (easy; difficult, high ratings; difficult, and low ratings) and repeatability of decision (one-time vs. repeatable) as between-subjects factors and decision time as the dependent measure, revealed a significant main effect of choice difficulty, $F(2,97) = 4.86$, $p < .01$, indicating faster decisions in the easy decision condition ($M = 33.33$) than for the two difficult decision conditions $M = 60.30$ and ($M = 55.26$, for the high ratings and the low ratings conditions, respectively), $F(1,97) = 9.45$, $p < .005$, for the contrast between the easy decision condition (assigned the weight of -1) and the two difficult decision conditions (each assigned a weight of $.5$). The two difficult conditions did not differ from each other, $F < 1$, $p > .10$. No other effects were significant, all $F_s < 1.26$, $p > .26$.

A similar analysis was conducted using reported decision difficulty as the dependent measure and also showed a significant effect of decision difficulty, $F(2,97) = 29.22$, $p < .0001$, with more difficulty reported in the difficult decision conditions (high ratings $M = -1.09$, low ratings $M = -1.59$, $F < 1$) than in the easy condition ($M = 4.69$), $F(1,97) = 58.06$, $p < .0001$, for the contrast between the

easy decision condition (assigned the weight of -1) and the two difficult decision conditions (each assigned a weight of $.5$). There were no other significant effects, all $F_s < 1$, $p > .10$. Thus, our manipulation of decision difficulty was successful in that the difficult decisions were significantly more difficult for the decision makers than easy decisions, as indicated by both slower decision times and higher ratings of difficulty.

Importantly, the manipulation of decision repeatability did not affect decision importance. A two-way ANOVA (decision difficulty \times repeatability) on the decision importance measure revealed no effect of decision repeatability: the rated decision importance did not differ between the one-time decision condition ($M = 1.56$) and the repeatable decision condition ($M = 2.41$), $F(1,97) = 1.73$, $p = .19$. There were no other main effects or interactions, all $F_s < 1$, $p > .10$.

Spreading of alternatives

As in the original study (Shultz et al., 1999), our dependent measure was the change in ratings for the two candidates that comprised the choice alternatives. For both the chosen and rejected candidates, change scores were computed as the difference between their respective first and second ratings. As in Studies 1–3, we computed a spreading score as a difference between the chosen and the rejected alternatives. The means and the standard deviations of the change in ratings for the two candidates and the spreading score are displayed in Table 4. We predicted a contrast

Table 4
Change in the evaluation of chosen and rejected persons, decision times, decision difficulty, importance, and mood as a function of type of choice and repeatability of decision

Decision difficulty	Easy	Difficult, high	Difficult, low
<i>One-time decision</i>			
Chosen alternative	0.67a (1.08)	1.12ab (1.15)	1.75b (1.88)
Rejected alternative	-0.72a (1.36)	-2.12b (2.50)	-0.43a (1.09)
Spreading	1.39a (2.09)	3.25b (2.84)	2.19ab (2.26)
Decision time	31.33a (17.00)	72.94b (53.80)	58.75b (47.27)
Experienced difficulty	4.61a (2.83)	-0.62b (4.47)	-1.56b (4.38)
Importance of decision	1.78 (3.46)	1.06 (4.55)	1.81 (3.17)
Mood	3.67a (1.65)	3.69a (1.54)	1.50b (2.71)
<i>Repeatable decision</i>			
Chosen alternative	0.89a (1.18)	0.65a (1.45)	-1.28b (1.87)
Rejected alternative	-0.67a (2.09)	1.41b (1.94)	-1.50a (3.05)
Spreading	1.55a (3.11)	-0.76b (1.25)	0.22ab (2.26)
Decision time	35.33a (45.52)	48.41ab (36.96)	52.17b (21.69)
Decision difficulty	4.78a (2.78)	-1.53b (4.12)	-1.61b (4.15)
Importance of decision	2.72 (2.89)	2.24 (2.14)	2.28 (3.30)
Mood	4.28a (2.11)	3.35b (1.90)	1.11b (3.44)

Note. In each line, numbers that do not share a common subscript differ at $p < .05$. Higher numbers indicate an increase in value. Spreading is the difference between the ratings of the chosen and the rejected candidates.

Standard deviations are in parentheses (Study 4).

between the easy decision condition and the two difficult decision conditions, such that with a one-time decision, difficult decisions would produce more spreading than the easy decision, whereas with repeatable decisions the reverse will hold. An ANOVA with choice difficulty (easy; difficult, high ratings; difficult, low ratings) and repeatability of decision (one-time vs. repeatable) as between-subjects factors and spreading scores as the dependent measure showed that there was no main effect for choice difficulty, $F < 1$, $p > .10$, and a strong main effect of repeatability $F(1,97) = 17.06$, $p < .0001$, which indicated that spreading was higher for one-time decisions ($M = 2.24$) than for repeatable decisions ($M = 0.34$). This latter result is reminiscent of the finding that dissonance-related change in attitudes is reduced with revocable decisions compared to irrevocable decisions (Davis & Jones, 1960; see also, Gilbert & Ebert, 2002). As well, and more relevant to the IFDD model, there was a significant difficulty \times repeatability interaction, $F(2,97) = 6.66$, $p < .02$, indicating that the effect of difficulty on spreading depended on repeatability. To better understand this interaction, we turn now to examine the contrast between the easy decision condition and the difficult decision condition, separately for each repeatability condition (i.e., repeatable vs. one-time).

First, we examined whether or not our one-time decision condition replicated the results of dissonance theory in general and those of Shultz et al. (1999). As predicted by dissonance theory, a t test revealed a significant overall spreading of alternatives occurred ($M = 2.24$), $t(49) = 6.39$, $p < .0001$. Also predicted by dissonance theory, a planned contrast analysis comparing the two difficult decision conditions (each given the weight of $.5$) with the easy decision condition (given the weight of -1), indicated that spreading was lower in the easy decision condition ($M = 1.39$) than in both the difficult high ($M = 3.25$) and the difficult low ($M = 2.19$) conditions, $F(1,47) = 3.52$, $p = .07$. Thus, the results of the one-time decision condition replicate those of Shultz et al. (1999) and are consistent with dissonance theory.

This pattern of results was dramatically changed when participants were told that they would be able to redo their decision with the same candidates on another occasion. In the repeatable decision condition, the same planned contrast analysis comparing the two difficult decision conditions with the easy decision condition yielded the pattern predicted by IFDD. Specifically, spreading was lower in the difficult decision conditions ($M = -0.27$) than in the easy decision condition ($M = 1.55$), $F(1,50) = 7.17$, $p < .01$. Moreover, a t test showed that while significant spreading occurred in the easy decision condition, $t(17) = 2.12$, $p = .05$, it was eliminated in the difficult decision, low ratings condition ($M = 0.22$), $t(17) < 1$, and even reversed in the difficult decision, high ratings condition $M = -0.76$, $t(16) = 2.52$, $p < .05$. Thus, as predicted by IFDD, decision difficulty decreased spreading of alternatives.

In sum, the present study shows that, as predicted by dissonance theory, spreading of alternatives characterizes one-time decisions and not repeatable decisions. Most importantly from the IFDD perspective, repeatability affected not only spreading per se but also the way decision difficulty influenced spreading. Specifically, in one-time decisions, difficulty enhanced post-decisional spreading of alternatives (as is predicted and found by dissonance theory), whereas in repeatable decisions decision difficulty had an opposite effect in that it reduced spreading of alternatives, an effect predicted by the IFDD model. It is noteworthy that our manipulation of decision repeatability did not affect perceived decision importance and hence the reduced spreading of alternatives. The different effects of decision difficulty on spreading cannot be attributed to reduced importance of the decision.

General discussion

We suggested that people draw inferences from decision difficulty (IFDD) in which they use perceived, inferred, or experienced difficulty of decision-making as information about the relative attractiveness of the choice alternatives. Specifically, we predicted that people would infer that the rejected alternative and the chosen alternative are close in attractiveness from a difficult decision experience. We also predicted that people would infer from an easy decision that the chosen alternative is much more attractive than the rejected alternative. Study 1 showed that observers use the actor's reported difficulty of making a decision to infer his or her evaluations of the alternatives.

Studies 2, 3, and 4 examined the effect of inferred or experienced decision difficulty on one's own evaluations of the alternatives and motivation to pursue them in the future. Studies 2 and 3 augmented or discounted low spreading of alternatives as the cause of experienced difficulty of decision. In Study 2, participants chose between blue or red to color a painting, and in Study 3 participants chose between taking an intelligence test and a creativity test. In both studies, the post-choice attractiveness of the chosen and rejected alternatives was assessed. In Study 2, participants were presented with another opportunity to use red and blue colors; the rate of using these colors, as previously chosen and rejected, was examined. In Study 3, participants indicated the importance of intelligence and creativity tests after deciding to take one of them. Both studies demonstrated that when the causal strength of low spreading was augmented, spreading was reduced relative to a control condition. In addition, both studies demonstrated that when the causal effect of low spreading was discounted, the spreading apart of alternatives increased relative to the control condition.

Inferences from decision difficulty and post-decisional dissonance

Study 4 attempted to integrate the IFDD model and post-decisional dissonance model, according to which difficult decisions (relative to easy decisions) should enhance post-decisional spreading apart of alternatives by enhancing liking for the chosen alternative and reducing liking for the rejected alternative. Past research and theories on dissonance already suggested that revocable decisions do not produce the spreading of alternatives characteristic of dissonance (Davis & Jones, 1960; see also, Gilbert & Ebert, 2002). However, this research did not address repeatability of decisions (i.e., when the focal decision is irrevocable but the alternatives remain relevant for future decisions) and never proposed that the effect of decision difficulty on spreading of alternatives would depend on repeatability.

We replicated a study on post-decisional dissonance (Shultz et al., 1999) to which we added a manipulation of repeatability of decision by telling some participants (in the repeatable decision condition) that they would be allowed to repeat their decision with the same alternatives at a later stage. As in the original study, other participants were told that they could decide only once (i.e., the rejected alternative would no longer be available). Decision difficulty was manipulated by presenting two alternatives that were close in attractiveness (i.e., both attractive or both unattractive) or remote in attractiveness (i.e., one attractive and one unattractive alternative). We found the pattern of results predicted by dissonance theory with one-time decisions (i.e., more spreading apart of alternatives in the difficult decision condition than in the easy decision condition) and the reverse pattern, predicted by the IFDD model, with potentially repeatable decisions.

As mentioned before, we believe that the IFDD model is consistent with the logic of dissonance theory, because when the rejected alternative continues to be relevant, resolving to pursue it on a later occasion is a viable way of reducing dissonance. It is when the decision cannot be repeated that one needs to resort to derogating the rejected alternative to reduce cognitive dissonance.

Moderators of inferences from decision difficulty

Of course, decision difficulty is not the only source of information on the value of decision alternatives. Alternatives also have initial value (attractive alternatives vs. unattractive alternatives) and value that is reflected in the choice itself (the chosen alternative is more positive than the rejected alternative). The effect of decision difficulty may interplay in a complex way with these other sources of value. For example, it is possible that the high evaluation of an attractive chosen alternative (i.e., an alternative that has positive value from two sources) is not easily reduced by perceiving the decision as difficult. It is also

possible to conceptualize the rejected alternative as an unfulfilled goal and the chosen alternative as a fulfilled goal, which would suggest more rumination about and better memory for the rejected alternative than the chosen alternative (Lewin, 1951; Martin & Tesser, 1996; Zeigarnik, 1927). These may lead to more pronounced inference processes about the rejected alternative than about the chosen alternative. This tendency was obtained in Studies 1 and 3 and in the attractive alternatives condition of Study 4. Thus, only Study 2 did not find the effect with positive alternatives. Further research is needed to explain this effect and the process(es) that underlie(s) it.

It is also possible that because people expect and experience avoidance-avoidance conflicts (i.e., choosing between two negative alternatives) to be more difficult than approach-approach conflicts (i.e., choosing between two positive alternatives, Arkoff, 1957; Weiner, 1989, p. 159), difficulty in deciding between negative alternatives (unlike a difficulty to decide between positive alternatives) would be perceived as natural and would not instigate an attribution process. Further research is needed to further explore the moderating effect of the valence of alternatives on IFDDs.

We should note that inferring the relative attractiveness of the alternatives is only one possible inference from decision difficulty (for a review see, Schwarz, 2004). Depending on the activated meta-cognitive theory, decision difficulty might also be interpreted as indicating a lack of expertise (e.g., "If it is so difficult for me to decide which car to buy, it must be the case that I know very little about cars."), distraction (e.g., "If it is so difficult for me to decide between these presents, it must be the case that I am very distracted," for a review see, Schwarz, 2004), or a need to compromise or defer the choice (Novemsky, Dhar, Schwarz, & Simonson, 2005). It would be interesting to examine the idea that these attributions are mutually exclusive (Schwarz, 2004) in future research. For example, would eliciting attributions to lack of expertise eliminate the effect of decision difficulty on subsequent choice?

Further research directions

Suppressed motives in intra-personal conflicts

The current research examined only choices between alternatives that do not logically contradict each other (e.g., one could, in principle, use both red and blue colors; only the specific experimental situation of Study 2 excluded that possibility). Further research will have to address intra-personal conflicts between opposing values, such as competition vs. cooperation. Our theory suggests that to the extent the dilemma is experienced as difficult, the rejected motive would rebound in a subsequent situation. For example, imagine that a person experiences the decision between cooperation and competition in the "prisoner's dilemma" as difficult. If

allowed to repeat the game, would that person be more likely to switch strategy compared to a person who was led to experience the decision as easy? And if so, how generalizable would that tendency be? For example, would she choose a different strategy when playing with another partner, when playing a different type of cooperation-competition game, or when the "rejected" motive is allowed to rebound in a completely different behavior (e.g., recycling as an example of cooperation)?

Temptations

Our findings with repeatable vs. one-time decisions have interesting implications for situations involving temptations and self-control, which usually involve difficult decisions (e.g., between smoking and quitting or between a spouse and a lover). For example, imagine that John has a hard time deciding between two romantic partners, Adam and Steve, and chooses Adam. How attracted would John be to Steve after making the decision? We predict that if John sees no chance at all that he will ever change partners he will derogate Steve and will not be attracted to him. However, once the possibility of changing partners occurs to John, this tendency would be reversed, and difficulty of decision would translate into an enhanced attraction for Steve. More generally, in situations that involve temptations, a decision against the temptation has to be perceived as final and irreversible; otherwise the difficulty of making it would result in a rebound of the motivation to pursue the previously rejected, potentially destructive behavioral choice.

Other manipulations of decision difficulty

In our studies, intricate laboratory manipulations were used to augment and discount perceived difficulty of decision (Studies 2 and 3). In real life, similar effects could be obtained when the decision is made difficult by other means, such as introducing hard-to-evaluate dimensions (e.g., when choosing a chair, comfort could be harder to compare across alternatives than price; see, Hsee, 1996), by making people deliberate the decision more (Carmon, Wertenbroch, & Zeelenberg, 2003), or by making the decision seem costly or crucial. Our theory suggests, for example, that if a mother is trying to decide between a parrot and an iguana as presents for her son, the salesperson should attempt to make her decision as difficult as possible (e.g., by providing extensive information about the animals), to enhance the chance that she will end up taking both or to get her come the next day to buy the rejected animal for her daughter.

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