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WHEN AND WHY IS EASE-OF-RETRIEVAL INFORMATIVE?

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ABSTRACT

We examine the differential effects of ease-of-retrieval of information from memory on behavioral frequency and attitudinal judgments, and delineate the moderators of these effects. Overall, the results of two experiments suggest that when experienced ease-of-retrieval coincides with expectations of ease-of-retrieval, the valence of the information retrieved dominates the judgment. However, when there is a discrepancy between experienced and expected ease-of-retrieval, ease-of-retrieval is particularly informative when this discrepancy cannot be attributed to task contingencies. When the discrepancy can be attributed to task contingencies, ease-of-retrieval ceases to be informative.

INTRODUCTION

Ask yourself: "Name *ten* restaurants that you go to on a regular basis." Now change the question to "Name *two*." The point is that the more difficult a listing task, the smaller one thinks is the overall population from which it was drawn. If it was difficult to name ten restaurants, you may believe that the overall population of restaurants in your memory is small, which could mean that you do not go out very often. This is because listing many instances is difficult, and the ease or difficulty with which information comes to mind is itself informative. Behavioral frequency judgments may, accordingly, reflect the experienced ease or difficulty of recalling information from memory. This is consistent with Tversky and Kahneman's *availability heuristic* (1973) that states that people estimate the frequency of an event as a function of the ease with which it comes to mind. In the domain of person perception, Schwarz, Hippler, Deutsch, and Strack (1991) found that when participants were asked to recall 12 examples of assertive behaviors, they rated themselves as less assertive than when they were asked to recall only 6 examples. Ease-of-retrieval served an informative function: when a behavior was difficult (vs. easy) to recall, participants inferred that they were lower on the trait exemplifying that behavior. Jacoby, Kelley, Brown, and Jasechko (1989) found that when names come to mind easily, people are perceived to be more famous even when the names are fictitious. Ease-of-retrieval has also been shown to affect behavioral frequency judgments (Aarts & Dijksterhuis, 1999), evaluation of one's childhood memories (Bewin & Stokou, 2002), subjective judgments of the risk of AIDS (Raghubir & Menon, 1998, 2001), product-judgments (Wänke, Bohner & Jurkowitsch, 1997), and confidence in judgments (Kelley & Lindsay, 1993).

However, these effects are not ubiquitous. When ease-of-retrieval as a cue is actively discredited as a source of information, it ceases to be informative. Earlier experiments have discredited the cue through instructions that acknowledge that the recall task is difficult (Schwarz et al., 1991; Winkielman, Schwarz & Belli, 1998), increasing personal relevance for the judgment (Rothman & Schwarz, 1998), and accuracy motivation to make a correct judgment (Aarts & Dijksterhuis, 1999; see Schwarz, 1998 for a review). Ease-of-retrieval also appears to have different effects for self- versus proxy- judgments. Raghubir and Menon (1998) showed that while ease-of-retrieval of recalling AIDS-related behaviors was informative for judgments of one's own risk of AIDS, it did not affect judgments of others' risk level.

We propose that ease-of-retrieval will be particularly informative when its actual experience

deviates from an expected baseline using the discrepancy-attribution model (Whittlesea & Williams, 1998, 2000). Recent research on people's naïve theories of memory suggest that people have expectations of what information will come easily to mind and what information will not (Skurnik, Schwarz and Winkielman, 2000). Information that is frequent, recent, typical, and well represented is expected to be easier to recall than information that is infrequent, distant, atypical, and poorly represented. However, as these naïve theories of memory are malleable and context dependent (Winkielman & Schwarz, 2001), we posit that discrepancies in actual and experienced recall difficulty (Whittlesea & Williams, 1998, 2000), affect the perceived informativeness of ease-of-retrieval. For example, Winkielman and Schwarz (2001) asked people to recall 4 or 12 memories from their childhood and then manipulated beliefs as to whether pleasant or unpleasant memories fade away. Those who recalled 12 memories (difficult task), believed that they had a happier childhood when they were informed that pleasant childhood memories fade away. Those who recalled 4 memories (an easy task) were not influenced by the manipulation of whether pleasant or unpleasant memories fade away (see also Winkielman, et al., 1998).

In this paper, we contribute to a deeper understanding of: ***(i)*** the manner in which ease-of-retrieval is informative; ***(ii)*** the consequences of ease-of-retrieval on behavioral frequency judgments, attitudes and intentions; ***(iii)*** the antecedent role of episodic recency in moderating the direction by which ease-of-retrieval is informative of behavioral frequency; and ***(iv)*** the moderating role of valence of information retrieved on attitudes and behavioral intentions. We now discuss the conceptual framework within which we make these predictions.

CONCEPTUAL FRAMEWORK

Figure 1 presents our process-based formulation that delineates when and why ease-of-retrieval is informative. There are four ways to arrive at judgments that involve the use of memory-based information (Box 1), context-based information (Box 2), accessibility as information for either frequency or recency judgments (Boxes 3 and 4).

Insert Figure 1 around here.

Determinants of Information Inputs for Judgments

We postulate that experienced ease-of-retrieval, expectations of ease-of-retrieval, reasons for this

expectation, and the ambiguity of frequency and recency affect the use of the four alternate sources of information for a judgment depicted in Figure 1. The antecedents to the choice of each of these sources of information depicted in the four numbered boxes are now briefly described.

Box 1: Memory-Based Information Used In Judgments

When information is easy to retrieve, people should use the information retrieved to construct their judgment. The presence of a rate-of-occurrence in memory is one instance of information that is easy to retrieve in the context of computing behavioral frequency judgments, and provides fairly accurate judgments (Menon, 1993, 1997).

Box 2: Context-Based Information Used In Judgments

On the other hand, when behaviors are too numerous to be recalled and counted, and respondents do not have access to a rate of occurrence, information is not easy to retrieve. When the accuracy desired does not warrant the effort required to recall information, people are likely to resort to contextual cues to substitute for memory-based information in making a judgment (Sudman & Bradburn, 1974). This route leads to Box 2 in Figure 1.

Boxes 1 and 2 have been explored in the survey methods domain to show that context-based information is used instead of memory-based information, when it is easily accessible and perceived to be diagnostic of a judgment (e.g., Menon, Raghubir & Schwarz, 1995, 1997).

Box 3: Ease-Of-Retrieval Is Informative Of Frequency Judgments

This particular source of information is the focus of the current paper. We propose that when information is not easy to retrieve, respondents question why. If reasons are available, the difficulty in recall is easily explained. Two example of available reasons that have been studied are: information regarding task difficulty, and target of judgment. Schwarz et al. (1991, Study 2) found that when they informed participants that a difficult task (listing behaviors where one was assertive) was indeed difficult, ease-of-retrieval did not affect their judgments of their own assertiveness: they rated themselves as more assertive when they recalled 12 assertive behaviors rather than 6 assertive behaviors. Similarly, Raghubir and Menon (2001) showed that when people were told that recalling 5 AIDS-related behaviors was a difficult task, those who were asked to recall behaviors that *caused* AIDS perceived higher risk of AIDS than those who were asked to retrieve behaviors that *prevented* AIDS. The reverse pattern held when

people were not told that recalling 5 AIDS-related behaviors was a difficult task (see also Menon & Raghubir, 2003 for a demonstration in the domain of personal computers).

A similar argument applies for target of judgment. People have no reason to expect that they will have memory-based information about an "average" person. In fact, prior research has shown that they use context-based information to make judgments about "the average undergraduate" (Menon et al. 1995; Menon, Block, and Ramanathan, 2002; Raghubir & Menon 1998; Schwarz et al. 1985). Therefore, ease-of-retrieval should be more informative about oneself than about another person. Thus, having explained away the difficulty in recall, people can estimate behavioral frequency using context-based information if desired accuracy is low (reverting to Box 2), or take the effort to recall information if desired accuracy is high (reverting to Box 1).

However, if recall is expected to be easy and it is not, the discrepancy between the experience and the expectation needs to be resolved. The discrepancy can be resolved by revising the expectation of how easy the recall task should be as it is difficult to revise one's felt experience. People expect frequent and recent behaviors to be easier to recall than infrequent and distant ones (Higgins 1989). Therefore, when a behavior is difficult to recall, people can change their expectancy about how easy it should be to recall, by either amending their beliefs about the frequency of the behavior, or by amending their beliefs about the recency of the behavior. If frequency is ambiguous, then it can be re-interpreted, and accessibility will be informative of frequency. If it were difficult to recall a behavior, people would believe it is based on a smaller population. This is Box 3 of Figure 1. For frequently performed behaviors, frequency may be more ambiguous than recency, as the last occasion a frequent behavior was performed, was possibly quite recent. Therefore, we predict ease-of-retrieval is informative of frequency.

Box 4: Ease-Of-Retrieval Is Informative Of Recency Judgments

Recency (vs. frequency) of an event is the other antecedent of accessibility of an event (Higgins 1989). If frequency is not ambiguous, but the recency of performing a behavior is ambiguous, then people can reinterpret the time at which the behavior was performed in order to calibrate the discrepancy between expected and experienced ease-of-retrieval (Skurnik et al., 2000). If it is difficult to recall a behavior, people may believe that this is so because the behavior did not happen recently (Hintzman, 2003). In this case, difficulty-of-retrieval may be informative of recency (Brown & Schopflocher, 1998).

This route is depicted as Box 4 of Figure 1.

Finally, if subjective reinterpretation of frequency or recency is possible (Hintzman, 2001), inconsistency could be resolved by making judgments about the quality of one's memory (Winkielman et al., 1998; see Figure 1).

Hypotheses

In the current paper, our focus is on situations where the actual experience of recalling information is more difficult than expected.[1] Our predictions are that task and judgment domains will affect when ease-of-retrieval is informative: ***(i)*** If information comes to mind easily, and this information is expected to be accessible, no discrepancy needs to be attributed. Ease-of-retrieval will not be informative. ***(ii)*** If people experience difficulty but can attribute it to external factors (such as task difficulty) then experienced ease-of-retrieval would not be informative. This implies ease-of-retrieval will be more informative for self than for others as people do not expect memory-based information to be easily accessible for another person. ***(iii)*** If people experience difficulty when they expect information to be easily retrievable, then frequency will be subjectively reinterpreted when it is ambiguous, such as when estimates are recent. When they are distant, people can attribute the discrepancy between expected and experienced ease-of-retrieval to recency of occurrence. In experiment 1, we examine the effects of ease-of-retrieval on behavioral and attitude judgments as a function of when expected and experienced ease-of-retrieval coincide, and when these do not coincide and the cause for them not coinciding is ambiguous or cannot be attributed. In experiment 2, we examine effects when expected and experienced ease-of-retrieval do not coincide, but when the cause for this can be attributed subtly to task contingencies.[2]

EXPERIMENT 1

Previous research indicates that the estimation of frequency judgments has a subjective element affected by the context in which such information is elicited (Blair & Burton, 1987; Burton & Blair, 1991;

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[1] Note that an analogous set of predictions can be made for when the experience of recalling information is easier than expected.

[2] Three additional situations are possible, but are not tested in the paper: (i) If people experience difficulty when they expect information to be easily retrievable, then they will subjectively reinterpret recency when frequency is less ambiguous than recency. (ii) If people experience difficulty when they expect information to be easily retrievable, then they will infer they have a poor memory when frequency and recency are unambiguous. (iii) If people experience difficulty when they expect information to be easily retrievable, then they may modify the experienced ease or difficulty of recalling information. Menon and Raghubir's (2003) results suggest that once the difficulty-of-retrieval has entered as an input to their judgments, it cannot be corrected (mental contamination models, see Wilson & Brekke 1994), making it difficult to re-cast experienced difficulty.

Menon, 1993. 1997; Menon, et al., 1995, 1997; Raghubir & Menon, 1996; Schwarz, 1990, 1998; Winkielman & Schwarz, 2001; Winkielman et al., 1998). For example, Aarts & Dijksterhuis (1999) showed that the ease-of-retrieval affected estimates of past bicycle use. When people were asked to recall 8 instances of destinations they had gone to, they estimated they had used their bicycle less often than when they were asked to only recall 3 instances.

Estimates of past frequency should, in turn, affect judgments of satisfaction and intentions to engage in similar behaviors in the future. Operationally, when people are asked to recall positive experiences, they should be more satisfied and have higher intentions to engage in the behavior again when the behaviors are easier to recall. On the other hand, when asked to recall negative experiences, they should be less satisfied and have lower intentions to engage in the behavior again when such behaviors come to mind easily. We test these predictions in Experiment 1 as a function of the discrepancy between experienced and expected ease-of-retrieval.

Method

Design

We used a 2 (number of items recalled: *2* versus *8*) x 2 (valence of information: *positive* vs. *negative*) full-factorial between-subjects design. Ninety-four students enrolled in an introductory marketing course in a university in a large U.S. city took part in the experiment to complete a course requirement.

Procedure

The behavior we chose was *eating at restaurants*, a behavior frequently engaged in by the participants used in this study, and accounting for a large proportion of their total weekly expense.[3] Following Schwarz et al.'s (1991) paradigmatic procedure, we asked participants to list the last two (*high ease-of-retrieval*) or eight (*low ease-of-retrieval*) times they had eaten at a restaurant. To manipulate the valence of the information retrieved, we asked participants to recall either positive or negative experiences. The specific instructions read:

> "Please think of regular, sit-down restaurants (where there are waiters/waitresses, a menu, table service, etc.) that you have eaten in recently. Please list <TWO/ EIGHT> restaurant visits where you

[3] A pretest among 75 participants drawn from the same pool as that used in the experiment demonstrated that out of 17 frequent expense categories, expenses on eating out at restaurants was the second highest expense category in a week (the highest being expenses on clothes at $37.87). On average, participants reported spending $32.05 every week on eating out, as opposed to only $25.93 on purchase of groceries.

had a <GOOD/ BAD> time. Please note that we are interested only in <POSITIVE/ NEGATIVE> experiences that you had at restaurants."

Next, to measure *behavioral frequencies*, we asked respondents: ***(i)*** Objective frequencies: how many times a month they generally eat out, using an open-ended format; ***(ii)*** Subjective frequency: to estimate the same on a scale anchored at “rarely = 1” and “frequently = 7”; ***(iii)*** Expense estimates: how many dollars they had spent eating out at restaurants since January 1 of the year.

We used a set of four measures to elicit *attitudes and intentions*: ***(i)*** Satisfaction with experiences: participants rated how satisfied they were with their eating out experiences on a seven-point semantic differential scale anchored at “not at all” and “very” satisfied. ***(ii)*** Attitudes towards eating out: Participants used four seven-point semantic differential scales anchored at boring-fun, unexciting-exciting, nonsocial-social and unpleasant-pleasant (Cronbach’s α = .91) that we combined to form the *Attitude Index*. ***(iii)*** Attitude Prediction: Respondents rated their prediction of whether the next eating experience was going to be positive or negative using two seven-point scales anchored at “not at all likely” and “very likely.” ***(iv)*** Behavioral Intention: Finally, we elicited a behavioral intention of initiating the next eating out incident on a seven-point likelihood scale anchored at “not at all likely” and “very likely.”

As manipulation checks, we followed the method used by Menon et al. (1995, 1997) and elicited ratings on four seven-point scales to measure the task difficulty of recalling experiences at restaurants anchored at: ***(i)*** "not at all difficult" and "very difficult," ***(ii)*** "no effort" and "a lot of effort, ***(iii)*** "no time" and "a lot of time," and ***(iv)*** "no thought" and "a lot of thought". We computed a *Difficulty Index* based on these measures (Cronbach's a = 0.95). In addition, at the end of the study, we also asked participants how the difficulty of the actual task of listing the experiences compared to what they had thought. We measured this on two seven-point semantic differential scales anchored at “much easier/much more difficult” and “much less effortful/much more effortful” (Cronbach’s α = 0.91), which we combined to form the *Comparative Difficulty Index*. Finally, Schwarz et al.’s (1991) paradigm is frequently criticized on the grounds that longer listing tasks dilute the valence primed – i.e., when asked to recall 8 positive instances, people report not-so-positive, and maybe even negative, instances as they continue the difficult listing task, leading to lowered evaluations. Some researchers have controlled for the possibility of this effect through content-analyzing items listed (for a review see Schwarz 1998). Instead of that

approach, we directly asked participants at the end of the questionnaire to rate each incident they had listed on a scale of -3 (negative) to +3 (positive), with "0" indicating a neutral incident. We computed two means based on these ratings: an average of the first two instances recalled, and an average of all instances recalled. This measure also acts as a manipulation check for valence of retrieved information.

The elicitation of all these measures took around 20 minutes.

Results

Manipulation Checks

A 2 x 2 ANOVA on the Difficulty Index showed the predicted main effect of recall task (M_2 = 3.0 versus M_8 = 4.5; $F(1,90) = 23.23$, $MS_e = 2.21$, $p < .001$). This effect was qualified by an interaction with valence of the information retrieved ($F(1,90) = 4.90$, $p < .05$). Given the interaction, we confirmed that the effect of task was present in both the valence conditions (M_{2N} = 2.9 vs. M_{8N} = 5.1, contrast $F(1,91) = 23.67$, $p < .01$; M_{2P} = 3.1 vs. M_{8P} = 3.9, contrast $F(1,91) = 3.61$, $p < .06$; with the former difference being larger than the latter one; see table 1).

Insert Table 1 around here.

We subjected the Comparitive Difficulty Index to a 2 x 2 ANOVA which revealed two significant main effects such that the recall 2 task was perceived as comparatively less effortful than the recall 8 task (M_2 = 4.2 versus M_8 = 4.7; $F(1,90) = 5.71$, $MS_e = 1.35$, $p < .05$), and the positive experiences were perceived as easier to recall than the negative experiences (M_P = 4.1 versus M_N = 4.7; $F(1,90) = 5.71$, $p < .05$). Note that deviations from the mid-point 4 are indicative of discrepancies between expected and experienced ease-of-retrieval. Paired t-tests between each of these means and the mid-point 4 indicates that while the difference is significant in the recall 8 condition ($t(43) = 3.91$, $p < .01$), the difference is non-significant in the recall 2 condition ($t(49) = 1.07$, $p > .25$). Furthermore, the difference is significant in the negative experience condition ($t(46) = 4.74$, $p < .01$), though this was driven mostly by the recall-8 condition (M_{8N} = 5.7 vs. M_{2n} = 4.3). The difference is non-significant in the positive experience condition ($t<1$). Thus we expect that the ease-of-retrieval effects should dominate the recall-8 condition, particularly when participants are asked to recall negative experiences.[4]

Finally, a 2 x 2 ANOVA on the average valence ratings of the experiences revealed the desired main effect of valence ($F(1,90) = 571.19$, $MS_e = 0.55$, $p < .001$) such that experiences were rated as more

[4] We thank a reviewer for suggesting the elicitation of such a measure.

negative in the negative experience conditions (M_N = -1.6) than the positive experience conditions (M_P = 2.1). We also ruled out the alternative explanation that the longer listing task could have affected valence: the average rating across the first two experiences did not vary as a function of the ease-of-retrieval manipulation.

Self-Reports Of Behavioral Frequencies And Expenditures

We predicted that when participants have difficulty retrieving instances of a behavior (recall-8 condition), they would report a lower frequency than when it is relatively easier (recall-2 condition), and the valence of the information recalled would have no effect. Results are presented in Table 1. We conducted 2 x 2 ANOVAs on each of the three frequency measures: subjective frequency (SF), objective frequency (OF), and expense estimates (Exp). These analyses revealed a significant main effect of number of items recalled for all dependent measures ($F_{SF}(1,90) = 12.01$, $MS_{eSF} = 2.35$; $F_{OF}(1,90) = 5.32$, $MS_{eOF} = 86.16$; $F_{Exp}(1,90) = 3.14$, $MS_{eExp} = 650809.25$; all p's < .01). No other effect was significant. Subjective frequencies were higher when participants were asked to recall two items ($M_{2SF} = 4.9$ vs. $M_{8SF} = 3.8$), a pattern repeated for estimates of objective frequencies ($M_{2OF} = 10.4$ vs. $M_{8OF} = 6.0$); and expense estimates ($M_{2Exp} = 841.31$ vs. $M_{8Exp} = 545.91$). Thus ease-of-retrieval is informative of behavioral frequency judgments.

Attitudes And Behavioral Intentions

We predicted that valence would interact with ease-of-retrieval such that attitudes towards dining out and intentions to eat out would be more favorable when information was easier to retrieve (recall-2 > recall-8) if participants were asked to recall positive experiences, but less favorable when asked to recall negative experiences (recall-2 < recall-8). Univariate 2 x 2 ANOVAs on our dependent measures indicate significant interactions for all four measures (see Table 2), with a similar pattern of means. Participants were more satisfied when asked to recall-2 items in the positive valence condition ($M_{2P} = 5.5$ vs. $M_{8P} = 4.6$; contrast $F(1,91) = 5.77$, $p < .05$), but lower when information was easy to recall-2 items in the negative valence condition ($M_{2N} = 4.0$ vs. $M_{8N} = 5.3$; contrast $F(1,91) = 12.35$, $p < .05$; interaction $F(1,90) = 16.92$, $MS_e = 1.68$, $p < .001$). No other effect was significant.

Insert Table 2 about here.

Analogously, when positive information was recalled, attitudes were more favorable when

participants were asked to recall 2 items (M_{2P} = 6.0 vs. M_{8P} = 5.5), but the reverse occurred when negative information was recalled (M_{2N} = 5.1 vs. M_{8N} = 6.0;interaction $F(1,90) = 8.04$, $MS_e = 1.22$, $p < .001$). The interaction effects for predicted positive attitude ($F(1,90) = 6.93$, $MS_e = 1.96$, $p < .001$), predicted negative attitude ($F(1,90) = 3.15$, $MS_e = 2.13$, $p < .001$), and purchase intention ($F(1,90) = 5.31$, $MS_e = 3.42$, $p < .001$), all followed the same pattern. All contrasts between the recall-2 and recall-8 conditions are significant within each valence (positive/negative) condition for each of these measures.

Note that, overall, the pattern of means for attitudes and intentions follow the discrepancy between expected and experienced ease-of-retrieval, lending credence to our model.

Summary

Experiment 1 results reveal that the ease with which information can be retrieved from memory affects people when they arrive at objective and subjective frequency judgments. We thus extend the literature of the subjectivity of "factual" frequency information (Aarts & Dijksterhuis, 1999; Menon et al., 1995; Schwarz et al., 1985). Further, we go beyond this extant research and delineate that the reason why ease-of-retrieval is informative is because of the discrepancy between expected and experienced ease-of-retrieval.

EXPERIMENT 2

Recency Of Occurrence

This experiment examines the moderating effect of recency on the informativeness of ease-of-retrieval for frequency. In Experiment 1, participants were asked to recall recent events. Events that occurred recently should be expected to be more accessible than those that happened in the less recent past.[5] If people are asked to recall less recent (or distant) events, then they should be able to attribute the difficulty of recall to recency, and ease-of-retrieval manipulated through the recall task (2 or 8 incidents) should be less informative. In essence, people would be able to explain away any discrepancy between expected and experienced ease by invoking recency. Since judgments of behavioral frequencies have

[5] A post-test (n=14) asked participants to rate the difficulty of hypothetically recalling two versus eight restaurant experiences from the current term (Fall) or the past term (Spring), using a 7-point scale anchored at "1=Not at all difficult" and "7=Very Difficult." A within-subjects 2 x 2 (time x recall length) ANOVA showed a main effect of time, recall task, and their interaction ($F(1,13) = 17.33$, 20.77, and 6.30 respectively; MS_e's = 0.81, 4.46, and .18, all p's < .05). Recalling 2 restaurant experiences from the current term was rated as the easiest (M = 1.57), followed by two experiences from the past term (M = 2.29), eight experiences from the current term (M = 3.86), and finally eight experiences from the spring term (M = 5.14). All contrasts are significant.

been demonstrated to be a function of this experienced ease of retrieval in Experiment 1, we would expect this interaction to manifest in own behavioral frequency judgments. Hence, the number of instances recalled and the recency of the events will interact to affect *self-reports of behavioral frequencies* such that when queried about the *recent* past, recalling two incidents results in higher frequency estimates than recalling ten incidents (as observed in Experiment 1); but when queried about the *more distant* past, the effect of number of incidents recalled will be attenuated.

Target Of Judgment

The proposed framework suggests that ease-of-retrieval should not be informative of an "average person." In the current context, respondents may use the number of incidents that they are asked to recall as a cue for the typical number of times that an average person engages in the behavior being queried. This should be the case regardless of whether they are queried about recent or distant time frames, because unlike self-reports that are memory-based judgments, reports about the average other are context-based judgments (see Menon et al. 1995, 1997). Note that the effects posited for the average person are the opposite of those posited for self due to the differential effects of memory-based vs. context-based judgments (see Menon et al.2002 for a discussion of these effects).

Method

Design

We used a 2 (*number of instances retrieved*: two vs. ten) x 2 (*recency* manipulated through reference time frame: in the last four months, July-October, vs. in the previous Spring semester, January-April) x 2 (*valence of retrieved information*: positive vs. less positive) between-subjects design. The experiment was conducted at the end of October. To manipulate valence more subtly, so as to provide convergent validity for Experiment 1 results, we asked people to recall incidents of eating out in at "regular sit-down restaurants" (positive experience) and "fast-food restaurants" (less-positive experience). A pre-test (n=16) showed that these two different restaurant contexts differed in their valence. One hundred and sixty eight undergraduate students participated in this experiment for partial course credit. Degrees of freedom in the multivariate tests reported in some tests are lower due to partial non-response.

Procedure

Participants were run in groups of 12-15. They were assigned at random to one of the eight

experimental conditions. They first recalled two (or ten) instances of eating out at a regular (vs. fast-food) restaurant in the last four months of the ongoing Fall semester (vs. four months of the prior Spring semester), and then completed dependent measures.[6] Similar to experiment 1, we followed this up by measuring *behavioral frequencies* eliciting: ***(a)*** Objective frequencies: how many times a month they generally eat out, using an open-ended format; ***(b)*** Subjective frequencies: to estimate on a scale anchored at "rarely = 1" and "frequently = 7"; and, ***(c)*** Expense estimates: how many dollars they had spent in ***(i)*** regular and ***(ii)*** fast-food restaurants since January 1 of the year. Next, *satisfaction* and *attitudes* were measured as in experiment 1. To measure *intentions*, we asked participants the following on 7-point scales anchored at "not at all" and "very" likely: ***(i)*** the likelihood of initiating the next eating out incident; ***(ii)*** likelihood of choosing a regular sit-down restaurant the next time they eat out; and ***(iii)*** likelihood of choosing a fast-food restaurant the next time they eat out.

We also asked respondents to estimate how often the average undergraduate at the university they attend eat out at the specific type of restaurant in a month, elicited using an open-ended question and a subjective seven-point scale. We expected that difficulty of recall would be informative of self-judgments, but judgments of another target may be based on a simpler contextual cue: length of the listing task. This is because difficulty of recalling information may be informative for oneself when it is expected to be easy to recall, but as there is no reason to expect information to be easy to recall for others, it should not exert an effect. Therefore, people may use a simple contextual cue to estimate frequencies for an "average person" – i.e., the more restaurants they are asked to recall, the more they believe others eat out. This implies a simple main effect of number recalled but in the opposite direction as expected for self-reports: estimated frequencies of an average person should be higher when the task is to recall ten vs. two incidents.

To measure whether the manipulations of information ease-of-retrieval worked as intended, we collected the data for the four scales that comprise the Difficulty Index (Cronbach's α = .89), as in Experiment 1. Further, as in Experiment 1, we asked participants at the end of the questionnaire to go back to the page where they had recalled instances and rate each incident they had listed on a scale of -3 (negative) to +3 (positive), with "0" indicating a neutral incident.

[6] We did the analysis including the people that completed the recall task as well as those that did not (n = 6). The manipulation check means for the efficacy of our ease-of-retrieval manipulation did not vary across these two groups of people. Therefore, we included everyone in our analysis.

Results

Manipulation Checks

A 2 x 2 x 2 ANOVA on the Difficulty Index revealed a significant main effect of number recalled ($F(1,155) = 21.85$, $MS_e = 1.82$, $p < .01$). As expected, recalling two instances was rated as easier than recalling ten ($M_2 = 3.2$ vs. $M_{10} = 4.2$ respectively). No other effects were significant at $p < .05$. Therefore, our manipulation worked as intended.

In addition, a 2 x 2 x 2 ANOVA on average valence ratings of experiences across all instances recalled revealed only a significant main effect of restaurant type ($F(1,155) = 48.15$, $MS_e = 0.81$, $p < .01$), such that eating out at regular restaurants is rated more favorably than eating out at fast-food restaurants ($M_{restaurant} = 1.8$, $M_{fast\text{-}food} = 0.8$). As the number of instances recalled did not exert a main or interaction effect (p's > .10), this indicates that longer listing tasks did not lead to less positive experiences being recalled and rules out the alternate explanation that the longer listing task prompts the recall of valence-inconsistent information. Note that these means are all on the positive side of the scale indicating that our manipulation of valence is positive vs. <u>less</u> positive rather than positive vs. negative.

Self-Reports Of Behavioral Frequencies And Expenditures

A set of four 2 x 2 x 2 ANOVAs across four dependent measures (objective frequencies, subjective frequencies, expense estimates for sit-down restaurants, and expense estimates for fast-food restaurants) revealed significant two-way interactions between recency of time frame and the number of instances recalled ($F(1,159) = 13.38$, 9.42, 19.76, and 5.73 respectively; MS_e's = 49.70, 1.82, 258206.63, and 176925.67, all p's < .05).

The pattern of the means is similar across all measures (see Table 3). The effect of number of instances recalled is stronger in the recent time frame as compared to the less recent time frame. For example, when queried about a recent time frame (i.e., the last four months), participants reported a higher subjective frequency of eating out when asked to recall two instances ($M_= 5.5$) than when asked to recall ten ($M = 4.4$; contrast $p < .05$). When a less recent time frame is queried (i.e., the previous Spring), however, there is no difference when asked to recall two instances ($M= 5.0$) or ten ($M = 5.1$; contrast $F < 1.0$). The same pattern is evident with other measures: while respondents estimated they had eaten out an average of 19.4 times at sit-down restaurants (14.1 at fast-food restaurants) when they recalled only

two instances; this number fell dramatically to 9.2 times (9.7 for fast-food) when they recalled 10 instances. However, when the experiences were in the relatively distant past there was no difference in conditions (Recall 2 vs. 10 = 8.9 vs. 8.0 for sit-down and 12.9 vs. 14.9 for fast-food).

Insert Table 3 about here.

These effects were also evident in participants' estimated expense of eating at restaurants as well: over $900 when they recalled 2 instances ($952.50 and $904.56 depending on restaurant condition), dropping to less than half that when they recalled 10 instances ($267.63 and $329.09 depending on restaurant condition). Again, the effects disappeared when the estimate was for the relatively distant past: $452.27 vs. $538.42 for recalling 2 vs. 10 in the sit-down restaurant condition; and $422.50 vs. $477.82 for the fast-food condition. The same pattern replicated for estimated expense of eating out at fast-food restaurants (see means in Table 3).[7]

Attitudes And Behavioral Intentions

We predicted a three-way interaction on attitudes and intentions. Results are presented in Table 4. The predicted three-way interaction was tested using 2 x 2 x 2 ANOVAs on each measure ($F(1,159)$ = 9.90, 7.86, 12.41, 2.51, and 1.91 for satisfaction, attitudes, and the three intentions measures respectively, MS_e's = 0.96, 0.80, 2.13, 2.03, and 3.04 respectively, p's < .05 for the first three measures).

Insert Table 4 about here.

The means driving the three-way interaction follow the expected pattern for each of the measures. For example, satisfaction ratings in the recent time frame condition are higher when participants are asked to recall two (M = 5.5) vs ten instances (M = 4.7; contrast $p < .01$) of eating at regular sit-down restaurants, a category of experiences meant to exemplify positive events. Fast-food experiences, a less positive exemplar has the opposite pattern (M_2 = 4.9, M_{10} = 5.9; contrast $p < .05$). However when queried about a less recent time frame, the differences disappear (Sit-down: M_2 = 4.8, M_{10} = 5.1; Fast-food: M_2 = 5.6, M_{10} = 5.9; contrast ps > .10). Means of the other dependent measures follow

[7] Note that respondents in both the fast-food and sit-down restaurant condition estimated the amount they spent in both types of restaurants. Results show that a similar effect obtains for the restaurant type that was not recalled, as for the restaurant type that was. This pattern suggests the possibility that participants use the ease-of-retrieval as a cue to make judgments related not only to the specific content domain, but it also has spill over effects to related content domains. Our design cannot disentangle whether the process through which this occurs is via expense estimates for a sub-category (e.g., fast-food) affecting estimates for the larger product category (restaurants in general), and through this affecting estimates for another related sub-category (e.g., sit-down restaurants), or whether the inferential route is more direct: based on beliefs regarding the relationship about the amount spent in two sub-categories (e.g., if I spend $100 in sit-down restaurants, I probably spend $50 in fast-food restaurants).

the same pattern of results: a shorter listing task improves attitudes for a more positive experience, a longer one for a less positive experience, but only when the recall is of recent events (see Table 4).

Estimates Of Behavioral Frequencies For The Average Person

A 2 x 2 x 2 ANOVA across the two frequency questions about the average person, the open-ended question and the scaled question, yielded the predicted main effect of the recall task (Open-ended: $F(1,159) = 4.36$, $MS_e = 68.31$, $p < .01$; Scaled: $F(1,159) = 6.32$, $MS_e = 0.94$, $p < .05$), such that reported frequency for the average person was higher when participants were asked to recall ten instances ($M_{open} = 16.2$; $M_{scale} = 5.8$) vs. two ($M_{open} = 13.5$; $M_{scale} = 5.5$). In addition, we obtain a main effect of the type of restaurant (Open-ended: $F(1,159) = 9.74$, $p < .01$; Scaled: $F(1,159) = 8.74$, $p < .01$) such that the estimated frequencies were higher for fast-food restaurants ($M_{open} = 16.9$; $M_{scale} = 5.9$) than for regular restaurants ($M_{open} = 12.9$; $M_{scale} = 5.4$). No other effects were significant.

Summary

The data support our overall conceptual framework that ease-of-retrieval effects are obliterated when the discrepancy between expected and experienced ease-of-retrieval can be attributed. Specifically, when instances are difficult to recall but are expected to be easy to recall participants report lower frequencies and expenditures for the behavior regardless of the valence of the information retrieved. However, when they are difficult and expected to be difficult, then the experienced difficulty, while felt, is uninformative for self-judgments. The results of this experiment indicate that recency interacts with ease-of retrieval to determine the effects judgments of own behavior, but not for estimates of an “average” other’s behavior. Further, valence if information retrieved interacts with these variables to affect attitudes and intentions. When positive experiences are recalled, attitudes and intentions are highest when participants are asked to recall two incidents in the recent past. However, when less positive incidents are recalled, the results reverse.

DISCUSSION

The two experiments reported in this paper show that the *ease-of-retrieval* of information in memory (i.e., the ease with which something can be brought to mind), as distinct from the *valence* of the information itself (indicative of the effects of information content), affect behavioral frequency reports, but

only for recent behaviors, and only for estimates of oneself. Experiment 1 showed that when people can recall incidents of a behavior easily, they report a higher frequency of engaging in the behavior. Additionally, when such recalled incidents are positive, attitudes and behavioral intentions are more positive as well. These results reverse when the information recalled is negative. Experiment 2 demonstrates that the effects noted in Experiment 1 are greater when events occur in the recent past than in the distant past. This is in line with our proposed model that suggests that the recency of an event allows for people to attribute the felt difficulty of recall to timing of the events, rather than frequency of the event. At the same time, we obtain a further understanding of the process by which the twin antecedents of ease-of-retrieval work to affect estimated frequency of a behavior; we determine that inferences are made from the context-based judgment task about the average person, and judgments about self are based on the experiential memory-based information. The valence of the behaviors then interacts with the subjective frequency to affect related attitudes and intentions.

Building on the current theory of the informative value of ease-of-retrieval (see review by Schwarz, 1998), we suggest that the informative value of ease-of-retrieval is a function of expectations of its informativeness, in the domain of behavioral frequency judgments. In the person perception literature, Schwarz et al. (1991) demonstrated that content and ease-of-retrieval affect subjective self-judgments. We add to the evidence that frequency judgments (i.e., seemingly "objective" phenomena) are amenable to biases, in much the same way as are self-perceptions and attitudes (see also Aarts & Dijksterhuis, 1999), and shed light on the process by which ease-of-retrieval affects behavioral frequency judgments.

To summarize, the informativeness of the "ease-of-retrieval" as a cue can be examined through asking: Why is it informative? When will it be informative? For whom is it informative? For what is it informative? And is it symmetrically informative when it is easy versus difficult? We argue that ease-of-retrieval is informative because it diverges from expectations of recall difficulty. On the basis of this argument, we showed that it will be more informative for recent events (that are expected to be easier to recall) than for distant events. Our model and studies provide answers to the first two questions, and provide a framework for thinking about the remaining ones.

Study Limitations And Areas Of Future Research

We provide tentative evidence that ease-of-retrieval is more informative for self-judgments than

for other-judgments. However, as our experiments used an “average” person as the target “other”, these results need to be replicated by examining effects across a range of “other” persons differing on their proximity to the target, to assess whether it is schematic similarity or knowledge of an other person’s behaviors, that leads to differential effects for oneself versus another.

Prior research has essentially focused on the informativeness of “ease-of-retrieval” for frequency judgments. However, our framework suggests that frequency is one of multiple domains for which this experienced ease-of-retrieval can be informative. Others include recency and the quality of one’s own memory. For example, research in the area of telescoping (i.e., the tendency of people to see an event as having occurred more recently than it did) suggests that pinpointing when exactly an event took place is a difficult task (see Brown & Schopflocher, 1998). In such a case, difficulty-of-retrieval maybe used to infer the recency of the event. This is an avenue for future research.

Further, the possibility exists that the discrepancy is attributed to a misperception of recall experience. That is, people modify the experienced ease or difficulty of recalling information, rather than their expectancies of it, using a “Well that was not as difficult as I thought while I was doing it.” This is an intriguing possibility that may occur when the experience is tensile and subject to reinterpretation, but the expectations are less so. We suggest this as an area for future research.

Finally, another question for future research is whether ease- and difficulty-of-retrieval will have symmetric effects. For example, when recalling a historical event, a distant product experience, or an infrequent one, the base-line expectation may be that specific features of the episode would be inaccessible. In such contexts, the ease-of-retrieval, rather than the difficulty-of-retrieval of information may be particularly informative The focus of this paper was on situations where the experience of recalling information was more difficult than the expectation; i.e., we focused on the informative value of recall difficulty. However, similar (if not symmetric) effects can be posited for when information is expected to be difficult to recall and comes to mind easily. Such a discrepancy may well be attributed to the features of the specific stimuli (or event) that made it memorable (e.g., “That must have been important/interesting/unusual”), allowing for it to be easily recalled.

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Table 1. **Experiment 1 results: Manipulation checks, behavioral frequency and expense-related judgments**

	Positive experiences		Negative experiences	
	Recall 2	Recall 8	Recall 2	Recall 8
Manipulation Checks				
Ease-of-retrieval: Difficulty Index (4 1-7 scales)	3.1 (1.7)	3.9 (1.6)	2.9 (1.3)	5.1 (1.3)
Valence: Average valence rating (-3 to +3)	2.2 (0.6)	2.0 (0.5)	-1.7 (1.0)	-1.5 (0.8)
Behavioral Frequency and Expense-Related Judgments				
Open-ended frequency for a month	12.1 (13.7)	6.6 (8.0)	8.7 (7.9)	5.3 (4.2)
Closed-ended frequency (1=rarely; 7=frequently)	5.1 (1.5)	4.1 (1.3)	4.8 (1.4)	3.5 (1.8)
Dollars spent eating at restaurants since Jan 1st	798.62 (1036.13)	595.45 (695.39)	884.00 (890.53)	496.36 (415.14)

Note. Figures in parentheses are standard deviations.

Table 2. **Experiment 1 results: Attitudes and behavioral intentions**

	Positive experiences		Negative experiences	
	Recall 2	Recall 8	Recall 2	Recall 8
Satisfaction with eating out experiences (1 = not at all; 7 = very)	5.5 (1.0)	4.6 (1.4)	4.0 (1.6)	5.3 (0.9)
Attitude towards eating out (index of 4-items; α = .91)	5.9 (1.0)	5.5 (1.0)	5.1 (1.5)	5.9 (0.7)
Likelihood that next eating out experience is positive (1=not at all; 7 = very likely)	5.5 (1.2)	4.9 (1.5)	4.6 (1.8)	5.5 (1.0)
Likelihood that next eating out experience is negative (1=not at all; 7 = very likely)	3.2 (1.3)	3.6 (1.5)	3.7 (1.6)	3.0 (1.3)
Likelihood of initiating next eating out incident (1=not at all; 7 = very likely)	4.5 (1.9)	3.7 (1.8)	3.4 (2.0)	4.4 (1.6)

Note. Figures in parentheses are standard deviations.

Table 3. **Experiment 2 results: Manipulation checks, behavioral frequency and expense-related judgments**

		Sit-down restaurants		Fast-food restaurants	
		Recall 2	Recall 10	Recall 2	Recall 10
Manipulation Checks					
Ease-of-retrieval: Difficulty Index (4 1-7 scales)	Recent	3.3 (1.5)	4.3 (1.0)	2.8 (1.2)	4.6 (1.0)
	Not recent	3.2 (1.6)	3.8 (1.7)	3.4 (1.4)	4.1 (1.2)
Valence: Average valence rating (-3 to +3)	Recent	1.8 (1.3)	1.6 (0.8)	0.6 (1.2)	1.18 (0.7)
	Not recent	1.8 (1.0)	2.0 (0.6)	0.9 (0.8)	0.8 (0.6)
Behavioral Frequency And Expense-Related Judgments					
Open-ended frequency for a month	Recent	19.4 (5.4)	9.2 (6.3)	14.1 (7.2)	9.7 (8.2)
	Not recent	8.9 (6.3)	8.0 (3.6)	12.9 (6.9)	14.9 (9.6)
Closed-ended frequency (1=rarely; 7=frequently)	Recent	5.6 (0.9)	4.2 (1.7)	5.4 (1.2)	4.5 (1.2)
	Not recent	4.9 (1.4)	5.1 (1.4)	5.0 (1.5)	5.1 (1.3)
Dollars spent eating at sit-down restaurants since Jan 1st	Recent	952.50 (836.58)	267.63 (173.03)	904.56 (733.61)	329.09 (266.34)
	Not recent	452.27 (216.29)	538.42 (695.87)	422.50 (224.73)	477.82 (392.23)
Dollars spent eating at fast-food restaurants since Jan 1st	Recent	556.50 (919.88)	155.10 (201.32)	373.91 (461.45)	174.18 (139.32)
	Not recent	180.68 (155.30)	173.95 (175.98)	245.65 (243.57)	276.04 (438.66)

Note. Figures in parentheses are standard deviations.

Table 4. **Experiment 2 results: Attitudes and behavioral intentions**

		Sit-down restaurants		Fast-food restaurants	
		Recall 2	Recall 10	Recall 2	Recall 10
Satisfaction with eating out experiences (1 = not at all; 7 = very)	Recent	5.5 (0.8)	4.7 (1.2)	4.9 (1.1)	5.9 (0.8)
	Not recent	4.8 (1.1)	5.0 (1.1)	5.6 (0.6)	5.9 (0.8)
Attitude towards eating out (index of 4 7-point scales; α = .87)	Recent	5.9 (0.7)	5.1 (1.4)	5.1 (1.3)	5.8 (0.8)
	Not recent	6.0 (0.6)	6.0 (0.8)	5.9 (0.5)	5.9 (0.6)
Likelihood of initiating next eating out incident (1=not at all; 7 = very likely)	Recent	6.2 (0.8)	4.9 (1.8)	4.8 (1.4)	5.8 (1.4)
	Not recent	4.7 (1.5)	4.7 (1.7)	5.9 (0.8)	4.9 (1.8)
Likelihood of choosing a sit-down restaurant (1=not at all; 7 = very likely)	Recent	6.1 (1.1)	5.2 (1.4)	5.3 (1.4)	4.8 (1.5)
	Not recent	4.9 (1.3)	5.3 (1.5)	5.0 (1.6)	4.4 (1.4)
Likelihood of choosing a fast-food restaurant (1=not at all; 7 = very likely)	Recent	4.4 (1.8)	3.9 (1.9)	3.1 (1.5)	4.8 (1.8)
	Not recent	3.6 (1.9)	3.3 (1.8)	3.9 (1.9)	4.3 (1.2)

Note. Figures in parentheses are standard deviations.

Figure 1. **A Process Model Of When and Why Ease-of-Retrieval Is Informative**