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How often did I do it? Experienced ease of retrieval and frequency estimates of past behavior

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Abstract

The present research investigates the role of experienced ease of retrieval in frequency estimates of personally performed past behavior. Based on the logic that it is more difficult to remember more than a few different personal instances of past bicycle use, we speculated that the experienced ease (or difficulty) associated with this task rather than the content of recall guides subsequent frequency estimates of past bicycle use. Furthermore, to test whether the possible influence of the experienced ease of recall can be attenuated, we investigated the effects of the number of recalled examples on the frequency estimates under low and high accuracy motivation conditions. Results of two experiments showed that participants' frequency estimates were lower after they had generated 8 rather than 3 examples. However, this effect did not emerge when participants were motivated to be accurate in their estimates. © 1999 Elsevier Science B.V. All rights reserved.

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1. Introduction

We rely heavily on the contents of long-term memory to furnish judgmental and behavioral responses. Through recollections of the past, we provide ourselves with knowledge that we use to guide future judgments and actions. Sometimes judgments are made after an extensive search in memory and an elaborate analysis of the retrieved information (e.g., Newell & Simon, 1972). On other occasions, judgments are made relatively effortlessly on the basis of knowledge that comes to mind most readily (e.g., Tversky & Kahneman, 1973). Effortful or not, in both cases the contents of our recollections constitute the input on which future decisions on courses of action are based. Admittedly, this notion that judgmental outcomes are affected by knowledge retrieved from memory is so obvious that it comes across as fairly trivial. After all, it would be a waste not to use our past experiences and the contents of long-term memory.

Still, recent research suggests that it is not necessarily the content of our recollections per se that determines judgmental outcomes. When we busy our minds to arrive at a particular judgment, we retrieve instances pertaining to these judgments. Apart from the contents, however, our judgments can be affected by the experienced ease or difficulty of retrieval that accompanies this retrieval process (see Schwarz, Bless, Strack, Klumpp, Rittenauer-Schatka & Simons, 1991; see also Kelley & Jacoby, 1998; Kelley & Linday, 1993; for a discussion about the experienced fluency of processing effects on perceived familiarity or confidence). In other words, the perceived ease or difficulty of executing a mental activity can be an important mediator between the memorial recollections and the judgmental outcomes, because the experienced ease or difficulty itself serves as an informational cue for judgment.

As a further elaboration of the cognitive mechanism underlying Tversky and Kahneman's (1973) availability heuristic, Schwarz et al. (1991) demonstrated that judgments can be based on the perceived ease or difficulty with which individuals bring instances to mind, rather than the content of their recall itself. Schwarz et al. (1991) asked participants to list either 6 or 12 instances in which they behaved assertively. Pretests indicated that recalling six examples was experienced as relatively easy, while recalling 12 examples was experienced as difficult. After retrieving the examples, participants rated how much difficulty they had experienced retrieving the examples and evaluated their assertiveness on a 10-point scale. If participants were merely to rely on the content of recall, they would report higher assertiveness after recalling 12 rather than 6 examples. As Schwarz et al. (1991) expected, this is not what happened. Self-ratings of assertiveness showed that participants perceived themselves as less assertive after recalling 12 rather than 6 examples of assertive events. Apparently, participants who were asked to retrieve 12 instances concluded that they were not very assertive simply because retrieving the instances was perceived to be very difficult. To support this argument, Schwarz et al. (1991) showed that participants' ratings of ease of retrieval were negatively correlated with the self-ratings of assertiveness. Thus, the more difficult participants found the recall task, the lower their self-ratings of assertiveness.

2. Experienced ease of retrieval and frequency estimates of past behavior

The work of Schwarz et al. (1991) has inspired some researchers to test the experienced ease of retrieval effect in other areas, such as attitude judgments, stereotyping and impression formation (see, Dijksterhuis, Macrae & Haddock, in press; Haddock, Rothman & Schwarz, 1996; Rothman & Hardin, 1997; Wänke, Bless & Biller, 1996). The data of this impressive but small set of available studies clearly provide evidence for the fact that experienced ease of retrieving material from long-term memory can serve as an informational cue to guide judgments of a variety of targets, such as "Are men impolite?", or "Do I like riding a bike?".

The present study aims to further demonstrate the effects of experienced ease of retrieval on judgments in a different domain, namely, reported frequency of personally performed past behavior. Instead of establishing the influence of experienced ease of retrieval on evaluations of social or nonsocial targets, we focus on the influence of experienced ease of retrieving instances of a given behavior on the reported number with which that behavior has been performed itself. It is our intuition that experienced ease of recalling different examples of past actions not only affects evaluations of the self (as in the Schwarz et al., 1991 study), but also plays an important role in the reported frequency of occurrence of these same actions in the past. The question "How often did you behave assertively?" or "How often did you travel by bicycle last month?", will elicit a search in personal memory for relevant past actions and events to subsequently produce an answer revealing a summary quantity. The subjective experiences accompanying this search in memory will affect the reported frequency of this behavior, and, following the logic of Schwarz et al. (1991), if we experience difficulties in recollecting instances of bike use, we should draw the conclusion that we did not use the bike very often (resulting in lower frequency judgments).

The fact that we believe that judgments about frequency of past behavior is subject to the experienced ease of retrieving instances of that behavior is based on the following consideration. When requested to report on the frequency of actions we engage in relatively often, the recall of all the instances usually requires much cognitive effort and time. Research on the cognitive operations underlying the generation of self-reports of frequent behavior suggest that persons make no attempt to search for and retrieve all episodic instances. Instead, they estimate the frequency of behavior or use a general impression (Blair & Burton, 1987; Burton & Blair, 1991; Menon, 1993). We believe that, in many cases, individuals will use the availability heuristic in which the estimate is based on the experienced ease of retrieving instances. In a task context, then, where the demands of memory retrieval are varied (i.e., easy versus difficult), we anticipate that subjective ease of recall will affect frequency estimates of past behaviors. Specifically, the number of reported past actions would decrease as the difficulty of retrieving examples of past actions from memory increases.

As an important extension to previous work, we expect that the ease of retrieval effects on frequency estimates of past behavior to be moderated by the individual's motivation to be accurate. Accuracy motivation is generally thought to influence

judgment through the initiation of a more systematic and effortful mode of information processing (e.g., Chaiken, Giner-Sorolla & Chen, 1996; Kruglanski, 1990; Kunda, 1990). In other words, upon setting the goal to arrive at correct and objectively valid judgments persons turn to strategies in which they concentrate on and scrutinize relevant information, which attenuates the impact of information that is not (or less) germane to making the judgments. For instance, dual-process models of persuasion and attitude change posit that individuals evaluate persuasive messages on the basis of argument quality when they are motivated to hold accurate attitudes (Chaiken, 1980; Petty & Cacioppo, 1986). Consequently, they are less influenced by peripheral cues (e.g., an attractive source) or abandon the use of simple decision rules (e.g., "experts can be trusted"). In short, people do not (or to a lesser extent) rely on heuristics to arrive at judgments when they are instigated to be accurate and precise. The same logic may be extended to the perceived ease of retrieval effects on judgments such as frequency estimates of past behaviors. The experienced ease of retrieving information from long-term memory can be conceived of as a heuristic cue that guides judgmental outcomes in certain situational contexts. Consistent with this line of reasoning, then, we expect that ease of retrieval effects on self-reported frequencies of past behavior will be manifest when individuals are not motivated to be accurate. Ease of retrieval effects will be absent when self-reports are driven by accuracy motivation.

3. The present experiments

In our experiments, we focus on bicycle use among Dutch college students as an example of mundane behaviors that are relatively frequently performed. For many Dutch students, bicycle is the mode of transport that is used on a daily basis for a variety of different purposes (Aarts, Verplanken & van Knippenberg, 1997). In an adaptation of the Schwarz et al. (1991) paradigm, we asked participants to retrieve a specific number of different destinations for which they used their bike in the past (Experiment 1). Subsequently, we tested whether the experienced ease of retrieval of these instances is an important determinant of participants' subsequent frequency estimates of overall past bicycle use. In Experiment 2, we examined the moderating role of accuracy motivation.

3.1. Experiment 1

3.1.1. Method

3.1.1.1. Participants and design. Because the experiment focused on regular bicycle use, only university students were recruited who owned a bicycle and who had used their bike in the month prior to the experiment. Seventy-eight undergraduate students of the University of Nijmegen participated in a 2 (Number of recalled instances: 3 vs. 8) factorial between-participants experiment. Participants were randomly assigned to the conditions.

3.1.1.2. Procedure. Participants were told that the study was concerned with the performance of mundane behaviors among university students in the Netherlands. Hence, the experiment was embedded in a larger questionnaire on all kind of activities (e.g., cooking, watching television). Participants were run in groups in a regular classroom. As part of the questionnaire, participants learnt that we were interested in their travel behavior, and therefore wanted to know for which destinations they use their bike. To gather this information, they were required to list either 3 or 8 different travel destinations for which they used their bicycle in the past month. A pretest indicated that most students could easily generate 5 or 6 different bicycle travel locations but found it difficult to come up with more than 8. Participants could take as much time as they required for this task.

Immediately after this task we measured the dependent variables. To obtain a measure of frequency estimates, participants were requested to indicate how many times they had traveled by bicycle in the past month. They were required to provide an actual number. In addition, participants were asked to estimate how difficult it was to generate the requested number (i.e., 3 or 8) of items. Responses were given at a 9-point scale ranging from 'not at all difficult' (1) to 'very difficult' (9).

3.1.2. Results and discussion

Experienced ease of generated destinations. Responses to the measure of subjective ease of retrieval showed that participants who were requested to generate 8 bicycle travel locations found the recall task more difficult ($M = 4.05$) than participants who were asked to generate 3 bicycle travel locations ($M = 2.42$), $F(1,76) = 7.24$, $p < 01$.

Frequency estimates of past bicycle use. Analysis of variances revealed a significant main effect of the Number of recalled examples, $F(1,76) = 4.17$, $p < 05$. Inspection of the means for both conditions showed that participants who generated 3 travel locations reported a higher estimation of past bicycle use ($M = 37.74$) than participants who generated 8 travel locations ($M = 25.88$). This pattern of results corroborates the idea that the ease of retrieving examples of past behavior affects the perceived frequency of this behavior in the past.

In order to demonstrate the influence of subjective ease of retrieval on the frequency estimates, we calculated the correlation between the experienced ease measure and the measure of self-reported frequency of bicycle use (see Rothman & Hardin, 1997; Haddock, Rothman & Schwarz, 1996; Schwarz et al., 1991; for a similar procedure). As predicted, this correlation was reliable $r = -0.29$, $p = 0.01$; the more difficult participants found the retrieval of the requested travel locations, the lower the estimation of past bicycle use they reported.

3.2. Experiment 2

Experiment 2 served two purposes. First, we tried to replicate the effects of experienced ease of retrieval on self-reported frequency of past behavior. Second, we investigated whether the effects of experienced ease of retrieval are moderated by accuracy motivation. Hence, in addition to the manipulation of the number of recalled bicycle destinations, we experimentally varied the level of accuracy motivation

(low vs. high) as regards reporting on the overall frequency of past bicycle use. It should be noted that investigators distinguish different types of accuracy motivations that each have different processing effects. For instance, accountability demands are used to establish the processing consequences of accuracy motivation to defend one's beliefs (defense motivation) and to communicate to others a particular impression of one's beliefs (impression motivation; Chaiken, Giner-Sorolla & Chen, 1996; Tetlock, 1992). However, such manipulations may confound accuracy and accountability motivation. In the present study we wanted to make sure that the findings are due to a concern about accuracy per se. Therefore, participants were explicitly instructed to be accurate in their reports (or not) (cf. Maheswaran & Chaiken, 1991; Neuberg, 1989). It is expected that the ease of retrieval effects are absent when participants are motivated to be accurate.

3.2.1. Method

3.2.1.1. Participants and design. As in Experiment 1, only university students were recruited who owned a bicycle and who had used their bike in the month prior to the experiment. Hundred undergraduate students of the University of Eindhoven participated in a 2 (Number of recalled examples: 3 vs. 8)$\times$2 (Accuracy motivation: low vs. high) factorial between-participants experiment. Participants were randomly assigned to the conditions.

3.2.1.2. Procedure. Upon arrival at the laboratory, participants were told that they would take part in a research program on the performance of mundane behaviors among university students in the Netherlands. As part of the research program they were told that the present study was concerned with travel behavior. The experiment was run on computers and the computer program provided all the instructions. Participants worked in separate cubicles. As in the previous experiment, all participants learnt that we wanted to know for which destinations they use their bikes as a mode of transportation. To gather this information, they were asked to list either 3 or 8 different destinations for which they had used their bicycle in the past month. Participants could take as much time as they required for this task. After completion of the recall task participants rated how difficult it was to generate the required number of items, and reported on the number of times they had traveled with their bicycle in the past month.

To vary the level of accuracy motivation, half of the participants were told that it was very important for us to obtain exact and objective data of each students' bicycle use. Therefore, it was stressed that they should be accurate and precise in their frequency reports. These participants were thus provided with *high accuracy motivation* instructions. The other half of the participants were told that we were after a rough and general picture of students' bicycle use. This condition is referred to as the *low accuracy motivation* condition.

As a check on the relative demands imposed by the accuracy motivation instructions we measured the amount of time (in seconds) it took participants to generate the requested frequency estimates. The computer measured the time that

elapsed between the moment participants were confronted with the question to report on the frequency of past bike use and the moment they entered their answer.

3.2.2. Results

Experienced ease of generated destinations. Analysis of variances showed that participants who were requested to generate 8 bicycle travel locations found the recall task more difficult ($M = 4.57$) than participants who were asked to generate 3 bicycle travel locations ($M = 2.94$), $F(1,96) = 12.01$, $p < 0.001$. No other effect was significant.

Time to generate frequency estimates. Furthermore, the time participants needed to report on the frequency of past bike use was longer for those in the high accuracy motivation condition ($M = 29.35$ s.) than for those in the low accuracy motivation condition ($M = 13.44$ s.), $F(1,96) = 18.10$, $p < 0.001$. These differences suggest that with high accuracy motivation instructions participants expended more mental effort in order to report the frequency of past behavior than with low accuracy motivation instructions. No other effect reached significance.

Frequency estimates of past bicycle use. As shown in Fig. 1, participants who were provided with low accuracy motivation instructions reported a higher number of past bicycle use after recalling 3 ($M = 51.15$) rather than 8 bicycle travel locations

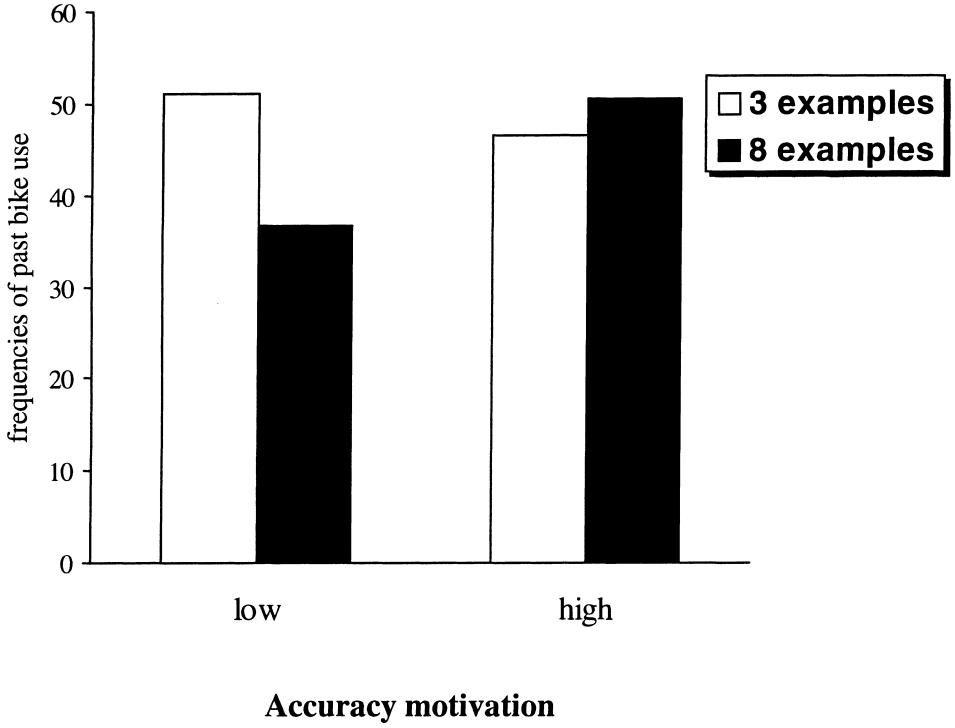

Fig. 1. Mean self-reported frequency of past bike use as a function of number of recalled examples and accuracy motivation.

($M = 36.68$). However, participants who were instructed to be accurate tended to estimate the frequency of past bike use as equal after recalling 3 ($M = 46.56$) or 8 locations ($M = 50.63$). This pattern was reflected in a significant Number of Recalled examples $\times$Accuracy motivation interaction, $F(1,96) = 3.99$, $p < 0.05$. Neither of the main effects of Number of Recalled examples and Accuracy motivation were significant, $F(1,96) = 1.26$, and $F(1,96) = 1.02$, ns, respectively.

To assess the pattern of the interaction and to test the specific hypotheses, we conducted separate analyses for the low accuracy motivation condition of the design and the high accuracy motivation condition of the design. In the low accuracy motivation condition, participants who had to generate 3 examples reported a significantly higher number of past behavior than participants who had to generate 8 examples, $F(1,49) = 5.20$, $p < 0.03$. However, in the condition where participants were explicitly instructed to be accurate, there were no significant differences between participants who had to generate 3 or 8 examples, $F < 1$. This pattern of results corroborates the idea that the experienced ease of retrieving examples of past behavior affects the frequency of having executed that behavior in the past, but only when one is not motivated to be accurate. The effects of ease of retrieval on estimated frequency of past behavior were not manifest when persons were highly motivated to be accurate in their reports.

As in Experiment 1, we calculated the correlation between the experienced ease of retrieval measure and the measure of self-reported past bicycle use to demonstrate the influence of subjective ease of retrieval on the frequency estimates. As anticipated, in the condition where participants received no (or low) accuracy motivation instructions the manipulation check was significantly correlated with the measure of self-reported past bicycle use, $r = -0.41$, $p<0.005$; the more difficult participants found the recall of the requested bicycle travel locations, the lower the number of past bicycle use they reported. However, the correlation between these two measures was not significant when participants were explicitly instructed to be accurate, $r = -0.04$, ns.

4. General discussion

First, in the present experiments we have obtained evidence for the idea that subjective ease of retrieval affects frequency estimates of our own past actions. We established these effects for relatively frequent behaviors in the domain of travel behavior. Second, we have demonstrated that the impact of ease of retrieval effects on judgments is conditional: Under conditions of accuracy motivation, experienced ease of retrieval does not affect estimates. Let us now briefly elaborate on these two findings.

5. Ease of retrieval effects and accuracy motivation

People may use their subjective experiences of the ease of mental retrieval as a heuristic (cf. Schwarz & Clore, 1988, for a similar argument as to the perceived

affective state as a source of information). The finding that experienced ease of retrieval effects were qualified by accuracy motivation seems compatible with current dual-process models of information processing in the domain of, for instance, persuasion and attitude change, decision making, and person impression (see for an overview, Chaiken & Trope, 1998). Many of these models postulate that individuals will engage in heuristic processing when they are not motivated to be accurate or personally involved in the judgments. However, when receiving the goal to be accurate, individuals switch to a more systematic or analytical mode of processing, characterized by effortful attention in which they scrutinize information relevant for the task at hand.

Rothman and Hardin (1997) followed a similar logic to provide an explanation for their experienced ease of retrieval effects on in-group and out-group judgments. In their study, they found that experienced ease of recall affected judgments of an out-group (e.g., when men make judgments about women), while content of recall seemed to be responsible for in-group judgments (e.g., when men make judgments about men). Assuming that people are more involved (and thus more strongly motivated to be accurate) in judgments of in-groups than out-groups, the judgments of the in-group may be guided by more systematic processing, while the judgments of out-groups may evoke a more heuristic mode of processing. In a recent study, Rothman and Schwarz (1998) showed that when persons made judgments about the risks of heart disease, they relied on the experienced ease of recall heuristic, but only when the judgments were not personally relevant. The results in the present study are in line with these observations.

Given the list of potential moderators provided by research on the dual-process models of information processing, it seems possible that ease of retrieval effects on judgments are also qualified by other variables, such as time pressure and mental load. Future research of this kind would therefore be informative as to the conditions and circumstances under which experiential aspects of the retrieval process, the content of previous recall or neither of these two are more likely to guide judgment and decision making.

It should be noted that the pattern of means in Experiment 2 shows that the interaction effect between the number of retrieved examples and accuracy motivation is mainly qualified by the relatively low estimate in the low accuracy motivation group after retrieving 8 examples. In other words, accuracy motivation attenuated ease effects when 8 examples had to be generated (as indicated by an increase in frequency estimates), while this was to a lesser extent the case when 3 examples had to be generated (as indicated by a slight decrease in estimates). These results suggest that we primarily manipulated the perceived difficulty (rather than ease) of retrieval. Clearly, whether the retrieval task is experienced as easy or difficult depends on the number of instances that must be retrieved from memory. Thus it may be that the task to generate 3 bicycle destinations was not appropriate enough to induce sufficiently strong ease feelings of retrieval, and hence, ease effects did not influence the frequency estimates in the first place. As a consequence, the decreased influence of the retrieval task on estimates may not have been manifest, because ease effects did not have to be reduced by accuracy motivation. This does not imply, however, that

accuracy motivation is not capable of overruling ease effects when retrieval is experienced as really easy. For instance, if we are able to further increase the ease of the task, it is conceivable that participants would also demonstrate the attenuation effect when motivated to be accurate.

6. Experienced ease of recall and frequency of past behavior

The present experiments show that frequency estimates of past behavior are subject to the influence of subjective experiences. One question that manifests itself is whether frequency estimates of some behavior are more susceptible to such biases than estimates of other behavior. It seems reasonable to assume that ease of retrieval effects on frequency estimates of past behavior are related to the question whether the estimate is directly accessible. An estimate that is very accessible is presumably not susceptible to strong biases. This is the case when the estimate under consideration is very important for some reason or another. In such cases, frequencies are directly accessible and an extensive retrieval process does not come into play. Furthermore, sometimes the behavior under consideration is made temporarily salient. A scientist who is applying for a position will probably give a relatively accurate estimate of her number of publications. And even more obviously, when the frequency with which a certain behavior has occurred is very low, biases will not occur. Most people will give an accurate and unbiased answer to questions like "How often did you visit Ouagadougou?". In sum, frequency estimates of actions (or other events) that are of enough personal importance and/or have a very low frequency, are more likely to be directly accessible (cf. Bradburn, Rips & Shevell, 1987; Schwarz, 1990). In such cases, frequency estimates are less likely to be subject to experienced ease of retrieval effects.

However, when behavior is more frequently performed and not of extreme importance, individuals are less likely to have direct access to an estimate. This applies to mundane behaviors such as bicycle or car use, consumer behavior, visits to pubs, doctors and dentists and many more. It is our conviction that-except for a few very important matters-estimates of all behaviors that are carried out more than a few times can be biased by the experienced ease or difficulty of recalling examples of these past behaviors.

An important point that needs to be addressed is that we used a retrieval task in the present study that was somewhat detached from the dependent measure. That is, rather than asking participants to generate a number of past bike trips before having them to estimate the frequency of bike use, we employed a recall task that required the retrieval of bike use for different destinations. The fact that we obtained the anticipated effects in this context demonstrates that the ease of generating bicycle destinations generalizes to frequency estimates of overall bicycle use, which could be described as a generalized ease of retrieval heuristic for frequency estimates. However, it may also be that our results represent a more general "emotional priming" effect. In other words, the retrieval task may have elicited a general feeling of ease of retrieval. In that case, the ease or difficulty of retrieving bicycle

destinations might even affect ratings of frequency of other behaviors, such as the number of occasions public transport was used or social interactions. In more general terms, the experienced ease of retrieving different instances of past actions influences frequency estimates of any behavior personally performed in the past. This idea is compatible with the ''affect as information'' model, proposing that our current mood is capable of affecting evaluations of a variety of targets (Schwarz & Clore, 1983; 1988). Of course, there is no compelling reason why effects of experienced ease of retrieving specific behavioral instances should not extend to frequency estimates of other personally performed behaviors for that matter. Future research is therefore needed to chart the extent and boundary conditions of these effects.

The question we alluded to above is important since retrospective inquiries regarding the frequency of our own actions is often an inevitable venture when we need information to guide our judgments and actions. More specifically, we access our personal memory and retrieve instances of past actions when we need information about what we like and dislike, and when we want to determine appropriate behavior in a given context (Rubin, 1996). In social science, self-reported frequency measures of past behavior are used, for instance, to infer persons' attitudes (e.g., Bem, 1967), to predict their behavior in the future (e.g., Aarts, Verplanken & van Knippenberg, 1998), and to establish customs and norms of a society (e.g., Camic, 1986). Given the pervasive role of past behavior in psychological functioning, gaining more insight into the cognitive mechanisms underlying frequencies estimates of past behaviors may therefore contribute to an understanding of many aspects of human functioning. In our view, distinguishing the experiential factors associated with the working of the mind from the actual contents of what we bring to mind constitutes an interesting and important avenue for further exploration.

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