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Framing Effects in Risk Perceptions of Aids

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Abstract

This paper examines a boundary condition of the ease-of-retrieval effect shown to affect risk perceptions of AIDS (Raghubir and Menon 1998; R&M). R&M had shown that when AIDS-related behaviors were difficult (vs. easy) to recall, people reduced their estimates of contracting AIDS, based on an inference that the more difficult an item was to recall, the smaller the population of behavioral experiences in memory, from which it was drawn. In this paper, we show that when people can attribute recall difficulty to task contingencies (i.e., the difficulty is not informative about their own behavioral experience), the *content* of the information recalled from memory, rather than the *ease* with which such information was recalled, affects judgments. In such a scenario, *framing* the recall task as one that *causes* AIDS leads to perceptions of higher risk versus one that *prevents* AIDS. Theoretically, these results show that the use of information accessibility as a cue is based on inferences about the population from which the information is drawn. Managerially, the results suggest that risk perceptions are based on contextual cues that affect content and accessibility of memory-based information.

Key words: risk perceptions, framing effects, experiments, social marketing

This paper examines framing effects in the perception of risk of AIDS. Prior literature has demonstrated that people's risk perceptions are an important determinant in their likelihood of engaging in preventive actions that can reduce the risk of contracting AIDS (Morris, Swasy, and Mazis 1994). However, Raghubir and Menon (1998; R&M) found that estimates of own risk are tensile and contingent on contextual cues. Specifically, they showed that when AIDS-related behaviors come to mind easily, people increase estimates of their own risk of AIDS, but as these behaviors became increasingly difficult to bring to mind, estimates of own risk decline. This was argued to occur because people use the *ease* with which information comes to mind as information in and of itself, and use it to draw an inference about the overall population of behaviors in memory (Schwarz et al. 1991; Tversky and Kahneman 1973). As frequent behaviors are easier to recall, the analogous inference suggests that the easier the recall of behaviors, the higher their frequency, or the

greater the population of behaviors from which they are drawn. It is this inference of population size that drives perceptions of risk, as the more the behaviors that relate to AIDS, the higher the likelihood of getting the disease.

This paper examines a boundary condition of the ease-of-retrieval effect shown by R&M to affect risk perceptions of AIDS. R&M showed that when AIDS-related behaviors were difficult to recall (inaccessible), people attributed their experienced difficulty in recall to there being few such behaviors, which, in turn, led them to feel that they were not at risk. In this paper, we show that even when recall of AIDS-related behaviors is difficult, people can be made to attribute this experienced recall difficulty to task factors (i.e., the difficulty is not informative about their own behavioral experience). When people can attribute recall difficulty to task contingencies, the *content* of the information recalled from memory, rather than the *ease* with which such information was recalled, affects judgments.

In such a scenario, *framing* the recall task as one that *causes* AIDS leads to perceptions of higher risk versus one that *prevents* AIDS. Issue framing is of particular relevance in the context of perceptions of the risk of AIDS as it can differentially affect arousal versus resolution of fear, the degree of fear aroused, and the types of resolution mechanisms activated to reduce the fear level, all of which are important constructs in determining the effectiveness of health related communications (Block and Keller 1995; Keller and Block 1996). Framing a behavior using a loss (vs. gain) has also been shown to affect beliefs about self-efficacy in the context of a breast self-examination (Meyerowitz and Chaiken 1987).

Our main thesis is that risk perceptions are constructed as a function of (i) contextual cues available to the respondent that differentially affect (ii) the accessibility of information in memory; and (iii) the content of such memory-based information. Based on prior literature on health communication, including the efficacy of fear appeals (Keller and Block 1996), the effect of issue framing (Block and Keller 1995; Meyerowitz and Chaiken 1987), and information accessibility (R&M 1998), we propose that people's perceptions of the risk of AIDS for themselves and for others is contingent on whether they focus on behaviors that cause AIDS (e.g., sharing needles, not using a condom), vs. the mirror image of these behaviors that can *prevent* AIDS (e.g., not sharing needles, using a condom), and whether the ease of recalling such behaviors can be attributed to the overall population of such behaviors.

We report results from an experimental study that manipulated the recall of AIDS-related behaviors and measured perceptions of the risk of AIDS. Subjects were asked to recall behaviors that either *cause* or *prevent* AIDS. They were then given information about task difficulty that either supported (i.e., the task was difficult) or discredited (i.e., the task was easy) their experienced ease of retrieval. The framing of the behavior to be recalled affected perceptions of the risk of AIDS only when respondents believed that the recall task was difficult. Results suggest that risk perceptions may be based on contextual cues in conjunction with the content and accessibility of memory-based information. Theoretically speaking, this investigation elucidates the antecedents of the use of accessibility as information. Practically speaking, it will help in the design of behavioral health communication – specifically, AIDS advertising.

1. Literature Review and Hypothesis

One of the antecedents of accessibility is the frequency of a behavior: more frequent behaviors are easier to recall than those performed less frequently (Higgins 1989). Conversely, the felt ease or difficulty of recalling a behavior may imply that the behavior is not performed often (Schwarz et al. 1991; R&M 1998). Specifically, in the Schwarz et al (1991) studies, when subjects were asked to recall 6 examples of assertive behaviors, they rated themselves as *more* assertive than when they were asked to recall 12 examples, presumably because as the length of the recall task increased, the behaviors became increasingly difficult to recall, leading subjects to infer that they were lower on the trait exemplifying that behavior.

R&M (1998) applied this theory to the context of perceptions of the risk of AIDS and showed that when AIDS-related behaviors were easier to recall, people judged their own risk of contracting the disease as higher than when these behaviors were difficult to recall. Their argument presumes that recall difficulty is attributed to population frequency rather than task difficulty. This population frequency would encompass all those AIDS-related behaviors that the respondent is aware of, including those that s/he has herself/himself engaged in in the past. In this paper, we examine whether accessibility or ease of recall continues to play a role in judgment formation, even when it can be attributed to task difficulty. Evidence from Schwarz et al's (1991) studies show that when inaccessibility is discredited as a diagnostic cue, then information content rather than information accessibility affects related judgments.

Specifically, when a person experiences difficulty in recalling AIDS-related behaviors, they should infer that there are few such behaviors, and therefore, a low risk of contracting AIDS. While R&M (1998) argued that this would lead to lower perceptions of the risk of AIDS, we now assert that any effect would be contingent on whether the difficulty of recall could be attributed to a lack of available behaviors in memory. To the extent the experienced difficulty in recall could be ascribed to task-related factors, accessibility of information should be less informative, and in the extreme, uninformative. In such a condition, the *content* of the information recalled should exert an effect as the effect of information accessibility would be lower.

In the study reported in this paper, we manipulate information content via framing a behavior as one that "causes" versus one that "prevents" AIDS. Note that the behaviors are mirror images of one another, with one behavior being a negation of the other. However, as past literature has shown, framing a behavior can have a profound effect on consumer's attitudes, intentions and behaviors to perform a desirable health-related behavior (Block and Keller 1995; Meyerowitz and Chaiken 1987). For example, Meyerowitz and Chaiken (1987), hypothesized and found that subjects who read a pamphlet with arguments framed in "loss language" showed more positive attitudes, intentions, and behaviors towards breast self-exams than did subjects who were exposed to the same pamphlet framed in "gain language". Meyerowitz's and Chaiken's effects were mediated by self-confidence. They ruled out fear arousal, better memory for pamphlet content, and greater perceived susceptibility to breast cancer as routes through which framing affected behavior. However, more recent research on framing has found evidence for a fear-mediated route through which framing affects attitudes and behaviors (Block and Keller 1995). Based on R&M, we expect framing to affect judgments via risk perceptions.

As per R&M, the most commonly recalled AIDS-related behaviors are:

a. unsafe sex (including not using condoms during vaginal or anal intercourse or oral sex, multiple partners) vs. safe sex or abstinence,
b. sharing needles for drug use vs. not,
c. working in higher risk occupations without taking precautions against accidental exposure to bodily fluids (e.g., workers in the medical field, drug rehabilitation centres, blood donor organizations, pathology laboratories etc.) vs. avoiding such occupations or taking the necessary precautions while working in them, and
d. other activities placing one at accidental risk due to poor hygienic practices (e.g., body piercing, tattooing, electrolysis, donating/receiving blood/organs, blood tests, injections, vaccinations, undertaking surgery, visiting a dentist etc.) vs. not engaging in these activities.

Whether a person brings to mind behaviors that cause AIDS or those that prevent AIDS will differentially affect perceptions of the risk of AIDS. When behaviors that cause AIDS are brought to mind, people should infer that the population of such behaviors is large and accordingly should rate themselves more at risk to get AIDS. On the other hand, when they recall behaviors that prevent AIDS, as they infer that there are a large number of things they can do to reduce risks, they should lower their estimate of contracting the disease. However, this should happen to a greater extent when the accessibility of information recalled is uninformative.

Take the case of behaviors which cause AIDS. When it is difficult for people to recall behaviors that cause AIDS, they infer that there are very few such behaviors, and, accordingly, they may estimate their risk of AIDS as low (R&M 1998). However, when the difficulty of recalling such behaviors is discredited as a diagnostic cue for the overall population of such behaviors, then people should increasingly focus on the fact that there are a number of behaviors that can lead to AIDS, and their perceived risk of AIDS should be higher. On the other hand, when thinking of behaviors that prevent AIDS, the opposite should happen. People should increase their estimate of contracting the disease when they are told that this task is easy vs. difficult, given that they are having difficulty recalling behaviors. That is, if difficulty is attributed to the task, then accessibility of recalled information should be relatively uninformative–and primarily the content of recalled information should matter. However, if they don't know the task is difficult and they experience difficulty recalling behaviors from memory, then the content of the information recalled may be much less informative than the ease with which the information came to mind. Accordingly, we hypothesize:

Hypothesis: Estimates of risk of AIDS for oneself are likely to be moderated by: (i) the content of the behaviors made accessible through the question frame, and (ii) the extent to which the accessibility of these behaviors is informative, such that:

(a) As accessibility of recall becomes increasingly uninformative, recall of behaviors that *cause* AIDS will lead to perceptions of higher own risk as compared to behaviors that *prevent* AIDS.
(b) When accessibility is informative, the effect of information content will be lower.

2. Method

2.1. Subjects

Students (n = 150) enroled in a marketing course took part in the study for partial course credit. Due to partial non-response, degrees of freedom may vary across dependent measure.

2.2. Design

We used a 2 × 2 between-subjects design. We manipulated two levels of *framing of recall task* (causal vs. preventive behaviors) and two levels of *information about task difficulty* (easy vs. difficult). These are explained below.

(a) *Frame*: To manipulate the recall frame, we asked subjects to either list five behaviors that CAUSE AIDS or five behaviors that PREVENT AIDS. They were asked to list five behaviors on the basis of R&M's (1998) studies which showed that this is not an easy task.[1]
(b) *Information about task difficulty*: Given that the behavior listing task was a difficult one, we manipulated the diagnosticity of the ease of retrieval of information by informing subjects that this was either an easy or a difficult task. The manipulation read:

> "Studies conducted at other universities among undergraduate students have shown that students found this task EXTREMELY EASY (DIFFICULT) to do. The awareness of AIDS-related behaviors in _____ was found to be VERY HIGH (LOW). On average, it took students VERY LITTLE (A LOT OF) TIME AND THOUGHT to complete the task."

We expected that when subjects were told that the task was difficult they would not use the inaccessibility of such behaviors in memory as a cue to infer the population base of such behaviors in memory. In other words, this manipulation aimed at reducing the diagnosticity of the inaccessibility of information in memory. On the other hand, when subjects were told that the task was easy and they had difficulty in retrieving the required behavioral information, then we expected that the diagnosticity of the inaccessibility of such information would be high and this would accordingly affect the estimate of risk of AIDS.

2.3. Dependent Measures

(a) *Own risk level*: Subjects estimated their risk of contracting AIDS within the next 15 years on a scale from 0 to 100 ("0 = Not at all probable" and "100 = Very probable").

[1]The mean difficulty rating for listing of 5 behaviors was 4.24 on a seven point scale anchored at "1 = Easy" and "7 = Difficult."

(b) *Others risk level*: Using the same scale, subjects estimated the likelihood of an average undergraduate and an average person contracting AIDS in the next 15 years. We elicited perceptions of others = risk to replicate the R&M (1998) finding of a self-positivity bias, where the self is perceived to be less vulnerable to negative outcomes (in this case, AIDS) than others.

2.4. Covariates

Since the primary dependent variable was self-perception of the risk of AIDS, we wished to ensure that the groups did not differ from each other in terms of the frequency of behaviors that are associated with AIDS. Subjects rated their subjective frequency of engaging in seventeen AIDS-related behaviors (e.g., engaging in unprotected sex, using intravenous drugs, etc.) after completing the dependent measures. Responses were measured on a six-point scale with numerical values of 1 = never, 2 = at least once, 3 = sometimes/occasionally, 4 = often, 5 = very often, and 6 = always. Subjective frequency estimates on these behaviors were averaged to form the Risk Index (see Table), which was analyzed to ensure that there were no differences among groups (all p's $> .20$).

2.5. Manipulation Checks

We wished to ascertain that subjects believed the information that the task was differentially easy or difficult. We used three measures: subjective perceptions of task difficulty, estimates of time taken to perform the task, and ratings of awareness level of AIDS in their country. We expected that subjects informed that the behavior listing task was easy would rate it as easier and estimate it to take less time on average than those told that the task was difficult. We also expected that they would rate the awareness level of AIDS in their country to be higher.

2.6. Procedure

As part of a cover story, subjects were told the study related to the awareness of AIDS among tertiary-level students. They were told that their responses were completely confidential and totally anonymous. They were instructed to not respond to any question they found invaded their privacy. Subjects were then asked to list 5 AIDS-related behaviors, a task that should have been difficult based on R&M's (1998) manipulations. The type of behavior (causal vs. preventive) they were asked to list differed depending on the condition they were assigned to. They then responded to the dependent measures, covariates and manipulation check questions. The procedure took about 20 min. Subjects were then encouraged to guess the purpose of the study. After discussing the experiment for 10 min and ensuring that there was no hypothesis guessing, subjects were debriefed and excused.

Table 1. Study Results

Means (Standard Deviations) by Condition	*Causal* Behaviors		*Preventive* Behaviors	
	Easy (n = 33)	Difficult (n = 37)	Easy (n = 34)	Difficult (n = 33)
	Manipulation Checks			
Effort Index[1]	3.49	4.14	3.65	3.88
Estimated Awareness level of AIDS	4.03	3.50	4.19	3.59
Estimated time taken for task	8.58	11.21	9.41	9.88
	Perceptions of Risk			
Self[2]	10.00	15.32	11.94	9.29
	(10.01)	(12.84)	(10.17)	(11.06)
Average Undergraduate[2]	21.42	31.32	20.65	24.09
	(16.28)	(21.45)	(13.65)	(16.57)
Average Person[2]	29.03	38.97	29.50	34.32
	(18.21)	(26.12)	(17.13)	(18.59)
	Covariate			
Risk Score[3]	1.46	1.39	1.38	1.43

[1]Based on the summation of four seven-point semantic differential scales anchored at "Not at all Difficult - Very Difficult," "No Effort – A lot of Effort, "No time – A lot of time" and "No thought – A lot of thought," where higher numbers indicate greater effort.
[2]Measured using a 0 = Not at all/100 = Very Likely scale.
[3]Index based on subjective frequency of engaging in related behaviors such as unprotected sex, homosexual intercourse, heterosexual intercourse, number of partners, intravenous drug use, sharing of needles, receiving blood transfusions, assisting in nursing tasks, etc., where higher numbers indicate greater risk.

3. Results

3.1. Manipulation Checks

Means are presented in Table 1.

Task Difficulty Assessment: Following the method used by Menon, Raghubir, and Schwarz (1995), we used an index of four 7-point scales to measure the task difficulty of recalling AIDS related behaviors, anchored at "Not at all/Very Difficult," "No/A lot of Effort, "No/A lot of time," and "No/A lot of thought" ($\alpha = 0.84$). Subjects appeared to believe the information provided about others' task difficulty by reporting that the recall task was more effortful when they were told that others found it difficult (Mean = 4.02) versus easy (Mean = 3.57, $F(1,125) = 5.06$, $p < .05$). While in absolute terms these means are centred around the middle of the scale, R&M's (1998) studies using a similar population showed that recalling 5 AIDS related behaviors was, in fact, a difficult task.

Estimates of Time: Subjects were asked to estimate how long it would take an average undergraduate student to complete the task using an open ended response format. As expected the estimated time was higher (Mean = 10.56 min) when subjects were told that

the task was difficult as compared to when they were told it was easy (Mean = 9.00 min, $t_{125} = 1.93$, $p < .05$).

AIDS Awareness: We asked subjects to estimate the level of awareness of AIDS-related behaviors in their country, along a seven-point semantic differential scale (1 = Very Low and 7 = Very High). As expected, the level of awareness was perceived to be higher (Mean = 4.11) when subjects were told that the task was easy versus difficult (Mean = 3.55, $F(1,125) = 7.68$, $p < .01$).

Actual number of behaviors recalled: Given that the actual task difficulty had been controlled by asking subjects to recall 5 behaviors, we wished to ensure that the manipulation of others' task difficulty did not affect their actual recall task. A count of the actual number of behaviors listed in the recall task was analyzed using a 2×2 ANOVA. Reassuringly, this number did not differ across conditions (overall mean = 4.41, all p's > .05).

3.2. Replicating the Self-positivity Bias

We conducted a repeated measures MANOVA on the three estimates of risk of AIDS (target person: self, the average undergraduate and the average person) with the 2 (behavior: cause/prevent) $\times$ 2 (instructions: told easy/told difficult) design as between subjects factors. As predicted by the self-positivity bias, we expected a main effect for the person for whom the estimate was being made, with self-estimates lower than estimates for the average undergraduate which in turn were expected to be lower than estimates of riskiness for the average person. The analysis revealed a significant main effect of person for whom the estimate was being made ($F(2,268) = 136.06$, $p < .001$). An analysis of means reveals that the self perception of risk of AIDS (Mean = 11.73), was lower than the perceived risk of AIDS for the average undergraduate (Mean = 24.54, $F(1,137) = 120.53$, $p < .001$), which in turn was lower than the perceived risk of AIDS for the average person (Mean = 33.11, $F(1,150) = 64.83$, $p < .001$). Therefore, we replicated R&M's (1998) results that estimates of the risk of AIDS are lower for oneself than for others (see Perloff and Fetzer 1986 for similar effects of self-positivity in other undesirable domains).

Other significant effects of this analysis included a main effect of task ease ($\boldsymbol{F}(1,134) = 4.45$, $\boldsymbol{p} < .05$), that further moderated the effect of target person for whom the risk estimate was made ($\boldsymbol{F}(2,268) = 3.23$, $\boldsymbol{p} < .05$). These are discussed in the context of the hypotheses tests below.

3.3. Hypotheses Tests

We predicted a significant interaction between the nature of the behavior recalled (causal vs. preventive) and the information about task difficulty (i.e., when told that the task was easy vs. difficult). We expected that if subjects were explicitly told that recalling five behaviors was an easy task, then their actual experience that the task was a difficult one would serve as diagnostic information for them and this would swamp any effects of

whether they had recalled behaviors that caused or prevented AIDS. On the other hand, if they were explicitly told that the task was a difficult one, consistent with their experience, we expected that the inaccessibility of such information would not be diagnostic, and that estimates of own risk would be higher when they recalled behaviors that caused vs. prevented AIDS.

A 2×2 ANOVA on *self-perceptions* of the risk of AIDS reveals a significant interaction of the nature predicted ($F(1,134) = 4.42$, $p < .05$). Neither main effects were significant. The interaction is driven by significant differences in the framing condition when recall difficulty is attributable to task contingencies. Risk perceptions were higher when subjects recalled behaviors that caused AIDS (Mean = 15.32) as compared to behaviors that prevented AIDS (Mean = 9.29, $F(1,69) = 4.46$, $p < .05$) when they were told the task was difficult, but framing had no effect when they were told the task was easy (Means = 10 vs. 11.94, $F < 1$). Thus, our hypothesis was supported.

R&M's (1998) results showed that manipulations affecting the ease of recall affect perceptions of own risk to a much greater extent than perceptions of others' risks. This is because recall difficulty should be more informative of one's own behaviors than of others' behaviors. However, to the extent people's prediction of others is based on their self-reports: for behaviors (Menon, Bickart, Sudman, and Blair 1995), attitudes (Davis, Hoch, and Ragsdale 1986) and opinions (Hoch 1987, 1988), as well as risk estimates (Perloff and Fetzer 1986; R&M 1998), it is possible that a similar, albeit smaller effect may be seen for estimates of others' risks.

A similar 2×2 ANOVA on perceptions of risk of the *average undergraduate* showed a main effect of task ease ($F(1,134) = 5.16$, $p < .05$), reflecting perceptions of higher risk when the task was described as difficult (Mean = 27.86) versus easy (Mean = 21.03). A similar pattern emerged for the perceptions of risk of the *average person* (Easy = 29.27 vs. Difficult = 36.75; $F(1,134) = 4.51$, $p < .05$); while no other effects were significant in either analysis. This main effect may reflect inferences that subjects made about the state of knowledge about AIDS related behaviors among the populace at large, implying that the manipulation of task ease and difficulty that theoretically should have affected attribution of task difficulty for oneself, may have also carried direct information about others' knowledge structures, and, accordingly, their risk of contracting AIDS.[2]

Finally, a *post-hoc* examination of the effect of the task ease manipulation for each of the two frames shows that the manipulation had a strong effect when subjects were asked to recall behaviors that *caused* AIDS for each risk estimate: oneself ($F(1,66) = 4.92$, $p < .05$), the average undergraduate ($F(1,66) = 6.32$, $p < .01$), and the average person

[2]To further examine this effect, we re-did the analyses removing 41 subjects whose mean score on the difficulty index was less than 3 (as measured on a 7 point scale). This enables us to look at that section of the sample who were less likely to assume their own task difficulty based on others' task difficulty. The main effects of task ease/difficulty that were significant for the entire pool, now drop to non-significance (p's > .10 for both), in this analysis.

Using this sub-sample, we also conducted a correlation analysis: correlating the manipulation check with self-perceptions of risk. This analysis showed that the correlation (in absolute terms) was higher when accessibility should have been informative, i.e., when the task was described as "easy" ($r = .0936$) vs. "difficult" ($r = .0293$). We thank a reviewer for suggesting this analysis.

($F(1,66) = 4.37$, $p < .05$). In the *prevent* frame condition, no contrasts were significant (p's > .25 for all three). This asymmetric effect for behaviors that cause vs. prevent AIDS was not *a priori* expected. It is possible that the effect obtained because in some sense behaviors that "prevent" AIDS are more passive than those that "cause" AIDS in that they may reflect an absence of an irresponsible causal behavior (e.g., not engaging in unsafe sexual practices, not sharing needles etc.), albeit some require the actual taking of a specific precaution (e.g., wearing protective gloves, using condoms etc.). However, this speculation needs additional research to rigorously test the antecedents of asymmetry in the use of the "ease-of-recall" heuristic.

4. Discussion

This paper investigated the interaction between question framing and recall difficulty on judgments of risk of AIDS. The main issue is the attribution of difficulty in recalling AIDS-related behaviors. When recall difficulty is attributed to task factors (based on an instruction stating that the task is widely seen as difficult), the recall difficulty is less relevant for inferences about behavioral frequency. In such cases, the content of the information recalled, which in turn is affected by the framing of the question asked, is shown to affect risk judgments. Thus, framing affects risk judgments only when recall difficulty is attributable to the task (i.e., when the accessibility of information is "uninformative"), and not when the recall difficulty is attributable to actual behavior frequency.

Extant theories of health behavior suggest that the greater an individual's perceived risk, the greater his or her intentions to alter behavior (R&M 1998; Rogers 1975, 1983; Witte 1998). This suggests that AIDS-related advertising should focus their audience's attention on causal behaviors before directing it to preventive behaviors.

We found that information provided regarding the difficulty with which such behaviors could be brought to mind moderated these effects. When information was not easily accessible, but the diagnosticity of this reduced accessibility was discredited through external instructions, subjects paid more attention to the content in arriving at judgments about themselves and other people. On the other hand, when inaccessibility was not discredited, this information was used as a diagnostic cue in making judgments. This is of particular theoretical interest, since we found support for the proposition that the use of information accessibility is contingent on its being attributable to a small population. This result is consistent with Schwarz et al's (1991) proposition that people use information accessibility as a diagnostic cue because they believe it to be informative of the size of the population from which the information is drawn. Allowing an alternate attribution moderated the effects.

One limitation of this study is that we have no direct evidence that the manipulation of information regarding others' task difficulty affected attributions of the subject's own recall difficulty to either task related factors, or frequency of information in memory. While the pattern of results support the theory of the use of ease-of-recall as a heuristic, alternative explanations may exist.

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