



Published in final edited form as:

J Gerontol B Psychol Sci Soc Sci. 2005 July ; 60(4): P215–P218.

Framing Effects in Younger and Older Adults

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Abstract

A growing literature on decision making in older adults suggests that they are more likely to use heuristic processing than are younger adults. We assessed this tendency in the context of a framing effect, a decision-making phenomenon whereby the language used to describe options greatly influences the decision maker's choice. We compared decision making under a standard ("heuristic") condition and also under a "justification" condition known to reduce reliance on heuristics. In the standard condition, older adults were more susceptible than younger adults to framing but the two groups did not differ when participants were asked to provide a justification. Thus, although older adults may spontaneously rely more on heuristic processing than younger adults, they can be induced to take a more systematic approach to decision making.

THE term framing effect refers to a phenomenon whereby the choices people make are systematically altered by the language used in the formulation of options. For example, in the well-known Asian disease task (Tversky & Kahneman, 1981), participants in the so-called positive frame condition make a treatment choice based on a description of lives saved (e.g., 200 out of a total of 600 people will be saved); by contrast, in the so-called negative frame condition, participants make a treatment choice based on a description of lives lost (e.g., 400 out of a total of 600 people will die). Despite the identical underlying basis of the two versions of the problem, people make different choices: They are more likely to be risk averse (i.e., to move away from a risky option) when questions are framed as gains (i.e., positively) and more risk seeking (i.e., to move toward a risky option) when questions are framed as losses (i.e., negatively).

The literature on these and other framing-effect problems is extensive (for reviews, see Levin, Schneider, & Gaeth, 1998; also see Kühberger, 1998). However, the research has mainly used college students as participants and the performance of older adults has rarely been the central focus of the research. Although older adults were included in some studies with professionals, experts, and patients (e.g., Loke & Tan, 1992; McNeil, Pauker, Sox, & Tversky, 1982; Roszkowski & Snelbecker, 1990), the age of the samples in these studies was also confounded with other characteristics such as expertise and some medical conditions.

Previously, we (Kim & Hasher, 2005) demonstrated superior performance by older adults in decision making using attraction-effect tasks, suggesting that older adults can, under some circumstances, show performance better than that of younger adults, perhaps because they have greater life experience in decision making (e.g., Hertwig, Barron, Weber, & Erev, 2004). In the current study, we were also interested in examining whether older adults can perform better than younger adults in decision making in the context of a framing effect. As in our previous

study, it is conceivable that older adults are less likely to show framing effects than younger adults because they have greater life experience in decision making. However, an alternative hypothesis is also possible.

In the framing-effect literature, there is some evidence that even people with experience or expertise are not immune to framing effects (e.g., Loke & Tan, 1992; Roszkowski & Snelbecker, 1990). Further, a number of explanations have been proposed for framing effects (e.g., see Kühberger, 1997, for a review); there has been some agreement that, in many instances, “framing” is the product of heuristic information processing (e.g., McElroy & Seta, 2003). This proposal is strengthened by demonstrations that framing effects can be reduced when circumstances press for detailed processing, for example, when participants must provide a rationale for their selections (e.g., Sieck & Yates, 1997; Takemura, 1993). Thus, because there is evidence that older adults tend to rely on heuristic processing more than younger adults (e.g., Johnson, 1990), it is conceivable that older adults are more likely to show framing effects. Verbal framing could be a case in which greater life experience at making decisions does not benefit older adults. If it is such a case, then our question becomes whether asking for a rationale for a decision can increase reliance on detailed processing and thus make it possible for older adults to make decisions that are similar to those of younger adults.

METHOD

Participants

One hundred and eighty-six undergraduate students (aged 17 to 28 years) from the University of Toronto and 186 senior citizens (aged 58 to 78 years) from the Toronto area participated in this study. Older adults had significantly higher vocabulary scores ($M = 29.43$, $SD = 9.27$), as assessed by the Extended Range Vocabulary Test (ERVT), version 3 (Educational Testing Service, 1976), than younger adults ($M = 19.39$, $SD = 7.04$), $t(368) = 11.75$. Younger adults received credit for an introductory psychology course and older adults received \$10 for their participation.

Materials

We used two problems, each with a positive and negative frame. We adopted one problem, the “fatal disease” problem, from Wang, Simons, and Brédart (2001). We did not use the well-known Asian disease problem in this study because of the demographic characteristics in the Greater Toronto area, in which a considerable portion of the population is Asian. We adopted the other problem, the “cancer treatment” problem, from McNeil and colleagues (1982; see Appendix). Note that, for both problems, the option labeled as B is the one that previous work shows is chosen reliably more in the negative frame than in the positive frame.

Design and Procedure

The experiment was a 2 (Age: young and old) \times 2 (Frame: positive and negative) \times 2 (Justification: with and without justification) between-subjects design. There were 53 participants in each without-justification group and 40 in each with-justification group. Participants in the with-justification condition were asked to provide a rationale in writing for their choice prior to actually indicating their choice (Sieck & Yates, 1997). Participants who were in the without-justification condition were not asked to provide a rationale for their choice.

Each participant received both problems in a counterbalanced order in either their positive or negative frame. Because research has shown that a reliance on analytic strategies is more likely at optimal times of day whereas a reliance on heuristic strategies is more likely at nonoptimal times (e.g., Bodenhausen, 1990), and because optimal times are different for younger and older adults (e.g., Yoon, May, & Hasher, 1999), we tested at normatively optimal times for each

group, that is, in the morning for older adults and in the afternoon for younger adults. Our goal was to increase the likelihood that analytic strategies would be used by both groups in the standard condition.

RESULTS

For Each Problem: Problem-by-Problem Analysis

The dependent variable was the proportion of younger and older adults selecting Option B in each problem (see Table 1). We used a chi-square test to assess whether the choice proportions were significantly different across the two frames (especially, whether the choice proportion is significantly higher in the negative frame than in the positive frame), indicating the presence of a framing effect. In the without-justification condition, younger adults did not show a reliable framing effect in the fatal disease problem, $\chi^2(1, N = 106) = 0.99$, and they showed a marginal effect in the cancer treatment problem, $\chi^2(1, N = 106) = 3.13, p = .08$. (The effect size of the original Asian disease problem is actually exceptionally large; its effect size was categorized as an outlier in the meta-analysis of Kühberger, 1998. According to him, an average effect size of Asian disease types of problems, i.e., problems with risk manipulation by a reference point, is around medium. To give room for an effect to go up or down with younger and older participants, we selected problems with effect sizes slightly lower than medium in the current study. Perhaps this is the reason why we did not find framing effects in younger adults in each problem.) Older adults, by contrast, showed a significant framing effect for both the fatal disease problem, $\chi^2(1, N = 106) = 9.95, p < .01$, and the cancer treatment problem, $\chi^2(1, N = 106) = 16.06, p < .01$.

In the with-justification condition, younger adults did not show a framing effect for either the problem of fatal disease, $\chi^2(1, N = 80) = 0.25$, or of cancer treatment, $\chi^2(1, N = 80) = 1.26$. Similarly, older adults did not show a framing effect = for either the fatal disease problem, $\chi^2(1, N = 80) = 1.32$, or the cancer treatment problem, $\chi^2(1, N = 80) = 1.35$.

Across Problems: Pooled Data Analysis

We combined the choice data from the two problems to enable a powerful test of our hypotheses. (In order to examine the independence of participants' responses across two problems, we used McNemar's test. McNemar's test is a test used to examine whether repeated categorical responses in two different conditions are independent of each other. The test results showed that responses or choices are independent, i.e., significantly different, from each other across the two problems for younger and older adults, respectively, in each justification condition. Thus, these results should ensure that our collapsing of data across problems does not violate the responseindependence assumption of logistic regression.) We analyzed these pooled data by using logistic regression to examine main effects and interactions among three independent variables: frame (positive and negative), age (young and old) and justification (with and without justification). First, we carried out model selection by using stepwise and backward selection methods to find a logistic regression model that best fits the data (e.g., SAS Institute, 1989).

The final model we selected (Hosmer-Lemeshow goodness-of-fit $\chi^2 = 1.58, p = .95, df = 6$) excluded the three-way interaction (Age \times Justification \times Frame) and the one two-way interaction (Age \times Justification), and it included only three main effects (frame, age, and justification) and two two-way interactions (Age \times Frame and Justification \times Frame). Of these five parameters in the final model, three (one main effect and two interactions) were statistically significant. Specifically, the main effect of frame was significant, $\chi^2(1, N = 744) = 6.84, p < .01$, indicating an overall framing effect. This effect, however, was qualified by two

hypothesized interactions—Age \times Frame, $\chi^2(1, N = 744) = 4.66, p < .05$, and Justification \times Frame, $\chi^2(1, N = 744) = 4.53, p < .05$.

The Age \times Frame interaction indicates that participants' age had an effect on the magnitude of the framing effect. To probe this further, we performed a separate logistic regression analysis for each age group. The main effect of frame was significant only for older adults, $\chi^2(1, N = 372) = 22.29, p < .01$, but not for younger adults, $\chi^2(1, N = 372) = 3.13, p = .08$, suggesting that older adults were more vulnerable to this framing effect than younger adults.

The Justification \times Frame interaction indicates that the justification manipulation had an effect on the magnitude of the framing effect. Separate analyses that we performed for each justification condition revealed a significant main effect of frame only for the without-justification condition, $\chi^2(1, N = 424) = 23.14, p < .01$, but not for the with-justification condition, $\chi^2(1, N = 320) = 2.12$. These results suggest that the justification manipulation significantly reduced the framing effect for both younger and older adults.

DISCUSSION

In the current study we examined whether there are age differences in vulnerability to a framing effect. Faced with a problem couched in terms of the number of people who will die as a result of two treatments—the classic negative frame—older adults were more risk seeking than younger adults and, by contrast, when given the identical problem couched in terms of the number of people who will live—the positive frame—older adults were more risk averse than younger adults. We observed a very similar pattern in the second problem, with older adults in this instance proving more likely to focus on short-term survival in the negative frame and on long-term survival in the positive frame. In other words, older adults' decisions were more influenced by the language frame, at least for problems such as those used here, both of which may well have an emotional context.

Furthermore, as we expected on the basis of earlier studies asking younger participants to provide a rationale for their decisions (e.g., Sieck & Yates, 1997; Takemura, 1993), the justification manipulation significantly reduced the present framing effect for both younger and older adults. Clearly, older adults can use analytic processes that enable them to base their decisions on a problem's deeper structure, rather than on its superficial language.

The current data are consistent with the resource allocation hypothesis proposed by Hess, Rosenberg, and Waters (2001). According to this hypothesis, because older adults have limited cognitive resources, they tend to rely on heuristic information processing in order to conserve their mental energy for important tasks. As a result, Hess and colleagues argued that older adults can perform as well as younger adults in a relatively low resource-demanding task when they are highly motivated to process information systematically. Our data fit with this explanation, if this decision situation can be thought of as one making a low demand, in that older adults were more likely to show framing effects than younger adults because they tended to rely on heuristic information processing more than younger adults, but their performance improved up to the level of younger adults when they were encouraged to process information systematically.

Our current findings have important practical implications for older adults' decision making, especially in medical decision domains. This is a domain full of risky decisions that have to be made. Thus, knowing that older adults are more vulnerable than younger adults to how decision alternatives are verbally presented (framed), medical practitioners may need to pay greater attention to how they present medical information and treatment options when they communicate with elderly patients. However, our current finding that older adults' heightened susceptibility to verbal framing can be ameliorated by a simple justification manipulation

suggests that a relatively easy, everyday solution may be available to older adults—along with others—to reduce some biases in choice.

ACKNOWLEDGMENTS

This research was supported by Grant R37 AGO4306 from the National Institute on Aging. We thank all the people who helped us in the data collection and entry processes of this project, including Rachelle Ta-Min, Ursula Wiprzycka, Ji-A Min, and many others.

APPENDIX

APPENDIX

Fatal Disease and Cancer Treatment Problems

Fatal Disease Problem (Wang, Simons, & Brédart, 2001)

Positive Frame:

Imagine that the entire human population on the earth (i.e., approximately 6 billion people) is infected by a fatal disease. Without treatment they will die. Two alternative medical plans to treat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the plans are as follows:

—If plan A is adopted, 2 billion people will be saved.

—If plan B is adopted, there is a one-third probability that all 6 billion people will be saved and two-thirds probability that none of them will be saved.

Which plan would you prefer?

Negative Frame:

Imagine that the entire human population on the earth (i.e., approximately 6 billion people) is infected by a fatal disease. Without treatment they will die. Two alternative medical plans to treat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the plans are as follows:

—If plan A is adopted, 4 billion people will die.

—If plan B is adopted, there is a one-third probability that none of them will die and two-thirds probability that all 6 billion people will die.

Which plan would you prefer?

Cancer Treatment Problem (McNeil, Pauker, Sox, & Tversky, 1982)

Both Treatment A and Treatment B are medications that are administered to a patient hospitalized for cancer. Both are given intravenously and neither one has significant side effects. Treatments A and B are considered equal except in their survival rates.

Positive Frame:

Of 100 people having Treatment A, 90 will survive during treatment; 68 will have survived by 1 year and 34 will have survived by 5 years.

Of 100 people having Treatment B, 100 will survive during treatment; 77 will survive by 1 year and 22 will survive by 5 years.

Which treatment would you prefer?

Negative Frame:

Of 100 people having Treatment A, 10 will die during treatment; 32 will have died by 1 year and 66 will have died by 5 years.

Of 100 people having Treatment B, none will die during treatment; 23 will die by 1 year and 78 will die by 5 years.

Which treatment would you prefer?

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Table 1
 Percentages of Participants Choosing Option B in the Positive and the Negative Frames for Younger and Older Adults in Each Problem in the Without- and With-Justification Conditions

Problem	Without Justification				With Justification			
	Young		Old		Young		Old	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Fatal disease	34	43	26	57	30	25	32	45
Cancer treatment	49	66	43	81	47	60	57	70