

## The relationship between the risk decision making and framing effect

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### **Abstract**

*In this study we aimed to analyze the correlation between risk decision-making and framing effect. Thus, we examined two hypotheses, namely: (A) there is a significant relationship between the types of framing and the types of decisions; (B) there is a significant relationship between the need for justification of the decision and type of decision taking. This study involved a total of 173 adolescents. The average age was  $m=17.77$  years old and the standard deviation  $SD=0.04$ . Participants were given two problems making decisions in risky situations. The data collected were processed using The Chi-square of association. The obtained results support the research hypotheses.*

**Keywords:** *framing effect, decision making, risk, teenagers*

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## I. INTRODUCTION

Decision making was ignored until 1950 when psychologists, mathematicians and economists have become interested in the subject. Mathematicians and economists wanted to know not how decisions are made, but how should be taken. This external influence psychology has left behind, meaning that mathematicians and economists have different concerns than psychologists.

In everyday life, we often make decisions, therefore, from a multitude of options available, at any given time, is an essential part of everyday life.

In the process of decision making, cognitive mechanisms play a decisive role.

Previous studies have shown that adolescents compared with adults, have a higher likelihood to engage in risky situations such as drug use or driving drunk. But risky situations can be presented in terms of loss (health, independence, driving license or car). This suggests the importance of this study, focused on the phenomenon called "framing effect" or framing, which we will present below.

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 (Kim et al., 2005).

The identification of alternatives amends the decision by activating different cognitive schemes. Tversky and Kahneman (1986) have done more research on this. They built an issue with two intervention programs. To highlight this, the experimental group was split in half. The first group was presented the issue in terms of gain and the second in terms of losses. Although intervention programs were equivalent in mathematical terms, 72% of subjects first batch have opted for the first approach, unlike those in the second group, where only 21% voted for the same variant (Miclea, 1998).

Framing effect may be diminished in a positive emotional context. Instead, people tend to take great risks in extreme situations. When information is presented numerically, the framing effect is maintained; but when it is presented visually, the framing effect disappears (Retamero, et al., 2011). These are a few rules observed by researchers on the effect of framing.

In another study by Tversky and Kahneman (1985) on teenagers, many of them did not seem affected by the framing effect, giving the same responses regardless the framing. However, those who gave different answers showed the same pattern as in studies with adults - acceptance of risk to avoid big losses in the situation shown in negative terms and the risk not to lose what was sure that they would earn in one presented positive. Interestingly, no differences were seen between students, who were very good at math and others, although math is considered a discipline that forms thinking (Chien, et al., 1996).

One of the hypotheses that start from our research is that the justification for the decision changes the type of decision. Active involvement is a justification analytical processing. This process produces responses in line with what has been traditionally considered as correct.

Another information processing system which decision making is based on is heuristic processing. This, in contrast, often produces judgments and decisions that contradict existing rules.

The second type of processing was observed more in preadolescents, adolescents and young adults. At the same age categories, analytical processing was enhanced if offered a specific framework to enable eye problems in a logical manner.

Researchers have also noted that the difference between the uses of predominantly type of heuristic processing decreased with age (Klaczynski, 2001). However, evidence in the literature that even mains with experience or expertise are not immune to the effects of framing, especially for framing's report.

In a study on dispositional anxiety and decision making by avoiding risk, the authors showed that the level of anxiety is correlated with the rate of avoidance risk in decisions. They presented evidence for the link between anxiety and individual differences regarding the presence of basic forms of decision making with risk avoidance (Maner, et. al., 2007).

Individuals with relatively high levels of social anxiety, general anxiety and concern took decisions by avoiding risk. The same was observed in a sample of individuals with anxiety disorder.

The mentioned research (Maner et al., 2007) and the like suggest that anxiety is associated with biased decision-making. It has been found that the reaction is specific in anxiety, whereas the same results were obtained in patients with other affective disorders such as those with major depression (Hartley, et. al., 2012).

Subjective biases are ways to conceptualize problems, but they are kind of shortcuts arisen over evolution. They are “attractive” because they simplify the process of thinking.

The reasoning that results, as their name indicates, is incorrect. Such an error of judgment in decisions making is illustrated by the principle of negativity, which includes avoiding the loss when negative events are evaluated as being stronger than their size are positive objective. For example, in a typical demonstration of loss aversion, the fact of losing \$ 100 is rated as more unpleasant than pleasant ranked as the fact of winning \$ 100.

Even if the amount is equal, people weigh losses as greater than gains. Recent research suggests that psychological asymmetry is evolutionarily adaptive in terms, since overestimation of losses is important to preserve the physical integrity. Similar studies have found the same phenomenon in young children and capuchin monkeys (Li et al., 2011).

Contrary to popular belief, the teenagers are able to assess the risks, but they are influenced by a number of factors, such as: other teenagers or hope to fast and easy gain. Old perspective, in which the teenagers are naive, appears questionable.

Fischhoff (2000) shows that the self-esteem by teenagers opportunities to have varied life experiences (e.g. being arrested) correlates, on the one hand, the risk factors relevant, on the other hand, are predicting significantly upcoming events life. What they said during the interview was matched to a significant extent with what they have lived a number of years later, when they were retested.

The predictive value of self-esteem of risk and conventional prediction ways were compared - use already known risk factors for each type of risk area (arrest, drug use, pregnancy) (Fischhoff et al., 2002).

What happens in the brain when we make decisions?

In general, framing effect can be identified when individuals are presented problems in terms of loss or gain. Systematic elections are different.

Sohrab, Smith, West & Cameron (2015), present an explanatory theory based on cost-benefit trade-offs described in the behavior quota.

This theory suggests that people examining various alternatives trying to determine how to make a good decision while submitting a minimal cognitive effort.

For the study, researchers used functional magnetic resonance imaging (fMRI) to assess the persons who were asked to choose between some alternative and risky alternative response to framing issues as gains or losses.

The results indicated that when a person must choose a sure win cognitive effort was considerably less than cognitive effort required to choose a risky win.

Instead, it filed cognitive effort in choosing a safer loss was equal to the effort put in cognitive loss risky choice.

fMRI showed that cognitive functions used by the makers of this study were located in prefrontal and parietal cortex, a finding that suggests the involvement of working memory and images in the selection process.

On the other hand, the study brings into question the relationship between prefrontal cortex and replying to the types of framing.

First, the desire to reach a good decision can be loaded with strong emotions in people who try to do well and avoid bad results.

Secondly, the desire to minimize the cognitive effort can lead to activation of PFC.

Other studies have shown that emotional effects produce a decision-making impaired and that a section of PFC known as the ventromedial prefrontal cortex (BA 11, 12, 13 and 25) is particularly important for decision-making (Bechara, Damasio, Tranel, & Damasio, 1997).

If there is a lesion in the ventromedial prefrontal cortex, it may preclude the use of somatic signals needed to guide decision in an advantageous direction (Bechara, 2000).

So fMRI results show that cognitive effort involved in choosing a vested interest is considerably lower than cognitive effort involved in selecting a risky winning. In contrast, cognitive effort required in choosing a guaranteed loss is as high as that spent in choosing a risky loss (Sohrab, Smith, West, Cameron, 2015).

Our research started from a study by Kim et al. (2005), where they demonstrated that framing effects can be reduced when circumstances require detailed processing, for example, when subjects must provide a reason for their selection (Kim et al., 2005).

Authors cited included as subjects mostly adults - younger (17-28) and older (58-78 years). In standard condition (heuristic) older adults were more likely than younger ones to framing (language used to describe options), but there was no difference when participants have been asked to provide a reason. Therefore, although older adults may be based more on spontaneous heuristic processing than younger ones, they can be made, however, have a more systematic approach to decision making.

In his research Sunghan Kim and his colleagues, the question offered was linked to a fatal disease and its treatment.

The results showed that in this issue in negative terms, older adults had a higher search attitude of risk, and at the more positive they avoided risk compared younger participants.

When they were asked to justify their decision, frame effect was significantly reduced for both older adults and for younger people.

In an attempt to explain the results, Hess, Rosenberg and Waters (2001) released the following hypothesis: Because older adults have cognitive limited resources, they tend to rely on processing heuristic information, to preserve their mental energy for important tasks. Therefore, they can have results as good as younger ones in tasks requiring more limited resources; they are very motivated to process information systematically.

Framing effects can be reduced when circumstances require detailed processing, for example, when subjects must provide a rationale for their selection. Older people tend to rely more on heuristic processing. They are therefore more susceptible to the framing effect. Framing the report is a situation in which greater life experience does not help the elderly. The question is whether asking and arguing the decision will increase reliance on a detailed processing and thus help them to make decisions similar to the young (Kim et al., 2005).

## **II. METHOD AND OBJECTIVES**

### **1. Theoretical objective**

Starting from the premise of the importance of assuming, supporting and justifying decisions among teenagers, the present study aims to explore the possible correlations between types of framing and the types of decisions and correlation between the need and justification of the decision taken and its type.

### **2. Explanatory objective**

This research can have a major influence regarding awareness of the importance of justification for decisions made among teenagers. Thus, the types of decisions, the kinds of justifications, the types of framing, and, especially, the possible existing correlations can be extrapolated in social programs, education, and integration of young people or immigrants.

### **3. Assumptions**

H1: There is a significant relationship between framing types and kinds of decisions.

H2: There is a significant relationship between the need and type of decision justifying the taken decision.

Research variables: framing (positive / negative), Decision (Plan A / Plan B) Justification Decision (justified / unjustified).

### **3.1. Method**

In this study, we used two issues presented in two ways, positively and negatively. We couldn't use problem used by McNeil, Pauker, Sox, and Tversky (1982), because it did not comply with the real issues of the age group selected from the population. What was kept, however, is how exposure to plan B affects the selected group. In addition, in the case of the second issue, although exposure mode is similar to the first, when asked to justify its reply to explore that when asked a justification for their choice, response type is "weighed" rationalized, before being given.

#### **Participants**

This study included 173 patients (89 teenagers responded to the negative framing and 84 teenagers responded to the positive framing of the two problems). The teenagers were from urban areas (from High School Videle, High School I.L. Caragiale in Bucharest and Mihai Eminescu National College from Botoşani).

Participants were aged 17 and 18,  $M=17,77$  and a  $SD= 0.045$ . Sampling was quasi - random, the problems being presented to more students.

In this study, for the first issue, which did not require the justification for the negative framing, 24 students chose plan A and 65 students chose plan B and for the positive framing, 55 students chose plan A and 29 students chose plan B. In the case of the second problem, which demanded justification, for the negative framing 58 students chose plan A and 31 plan B and for the positive framing, 53 students chose plan A and 31 students chose plan B.

### **Design**

In this study, the within subject design was used: 2 framing (positive/negative) X 2 Decision (Plan A / Plan B) X 2 Justification Decision (justified /unjustified).

### **Procedure**

Participants were presented two problems in two ways, both positive and negative:

*A group of 45 young people was ventured into the mountains. In the evening it was found that they disappeared. The group's life is in great danger due to adverse weather conditions. Mountain rescuers have developed two Action Plans A and B. Which one would you choose?*

*Positive frame:*

*A. If plan A is adopted, 15 young people will certainly be rescued.*

*B. If plan B is adopted, there is 1/3 (33.33%) chances of rescuing all 40 young and 2/3 (66.66%) chances of not saving any of them.*

*Negative frame:*

*A. If plan A is adopted, 30 teenagers will die.*

*B. If plan B is adopted, there is 1/3 (33.33%) chances that no one will die and 66.66% chance that all 45 would die*

*Explain your answer: .....*

*Due to the difficulties of the degree examinations, 6,000 students will fail the Baccalaureate. To remove this risk, two intervention programs were designed: A and B.*

*Which one would you choose?*

*Positive frame:*

*A. If program A is adopted, 2.000 students will certainly be saved.*

*B. If program B is adopted there are 1/3 (33.33%) chances to save all 6,000 students and 2/3 (66.66%) chances of not saving any of them.*

*Negative frame:*

*A. If program A is adopted, 4,000 students will fail the Baccalaureate.*

*B. If program B is adopted there are 1/3 (33.33%) chances that no one will fail the Baccaulaureate and 2/3 (66.66%) chances that all 6,000 students would fail the Baccaulaureate.*

Participants were assured that there is no right or wrong answers and that their opinion is important.

#### IV. RESULTS

Regarding descriptive analysis, it is presented in Tables 1 and 3, and in the charts one, 2 and 3. Thus, it is observed that 30.4% of those who responded to the first problem chose plan A and plan B 69.1%, while 65.2% of respondents to issue two chose plan A and 36.9% chose plan B. It also noted that if in the first issue, the unreasonably, most chose to risk, in the case of the second one, most chose to save a few people safe than to lose them all.

Regardless of framing, according to the graphs, it is noted that the tendency to ask is to choose the first instance (issue 1, where not required justification) to risk (plan B) and after being required for justification, they streamlined response and choose to save a few lives, and not to lose them all.

Regarding inferential data analysis, chi-square test was applied at a significance level of 99%. Thus, applying the test ( $\chi^2 (1) = 34.30, p = 0.0001, p < 0.01$ ) achieved a significant correlation between framing and type of decision taken in the first issue, and in the case of the second issue we obtained a significant correlation between the type of framing and the type of decision ( $\chi^2 (1) = 32.71, p = 0.0001, p < 0.01$ ). The effect size as measured by the coefficient is 0.45 in the first case and 0.66 in the second case.

Regarding the second hypothesis, it can be said that it is confirmed. After applying chi square test, with a confidence level of 99% we obtained significant correlation between the type of decision and its justification need ( $\chi^2 (1) = 26.18, p = 0.0001, p < 0.01$ ). Effect size = 0.4 as expressed by the coefficient, is high.

Table 1. Descriptive analysis

		decision_p1		Total
		1	2	
Framing	Count	24	65	89
	Expected Count	40.6	48.4	89.0
	% within framing	27.0%	73.0%	100.0%
	% within decision_p1	30.4%	69.1%	51.4%
	% of Total	13.9%	37.6%	51.4%

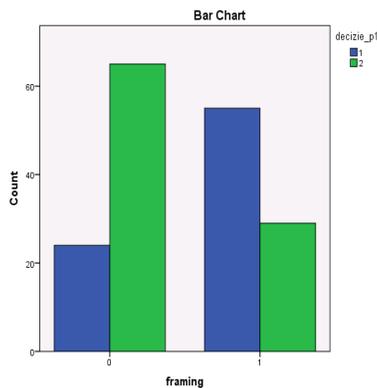
	Residual	-16.6	16.6	
	Count	55	29	84
	Expected Count	38.4	45.6	84.0
	% within framing	65.5%	34.5%	100.0%
	% within decision_p1	69.6%	30.9%	48.6%
	% of Total	31.8%	16.8%	48.6%
	Residual	16.6	-16.6	
	Count	79	94	173
	Expected Count	79.0	94.0	173.0
Total	% within framing	45.7%	54.3%	100.0%
	% within decizie_p1	100.0%	100.0%	100.0%
	% of Total	45.7%	54.3%	100.0%

Table 2.

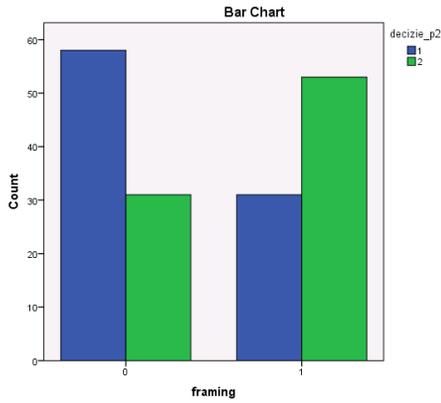
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	35.829 <sup>a</sup>	1	.0001		
Continuity Correction <sup>b</sup>	34.300	1	.0001		
Likelihood Ratio	36.499	1	.0001		
Fisher's Exact Test				.0001	.0001
Linear-by-Linear Association	35.680	1	.0001		
N of Valid Cases	173				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 38.36.

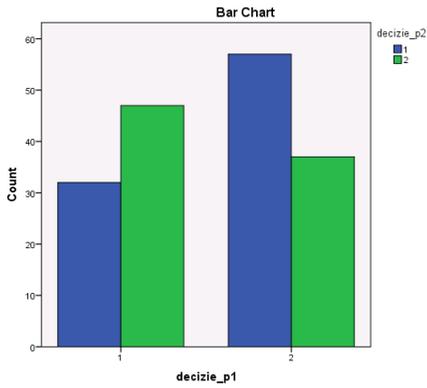
b. Computed only for a 2x2 table



Graph1



Graph 2



Graph 3

Table 3.

		decision_p2		Total	
		1	2		
Framing	0				
		Count	58	31	89
		Expected Count	45.8	43.2	89.0
		% within framing	65.2%	34.8%	100.0%
		% within decision_p2	65.2%	36.9%	51.4%
		% of Total	33.5%	17.9%	51.4%
		Residual	12.2	-12.2	
		Count	31	53	84
		Expected Count	43.2	40.8	84.0
		% within framing	36.9%	63.1%	100.0%
	% within decision_p2	34.8%	63.1%	48.6%	
1					

	% of Total	17.9%	30.6%	48.6%
	Residual	-12.2	12.2	
	Count	89	84	173
	Expected Count	89.0	84.0	173.0
Total	% within framing	51.4%	48.6%	100.0%
	% within decision _p2	100.0%	100.0%	100.0%
	% of Total	51.4%	48.6%	100.0%

Table 4.

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	33.820 <sup>a</sup>	1	.0001		
Continuity Correction <sup>b</sup>	32.712	1	.0001		
Likelihood Ratio	34.007	1	.0001		
Fisher's Exact Test				.0001	.0001
Linear-by-Linear Association	33.740	1	.0001		
N of Valid Cases	173				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 40.79.

b. Computed only for a 2x2 table

Table 5.

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	26.965 <sup>a</sup>	1	.008		
Continuity Correction <sup>b</sup>	26.182	1	.010		
Likelihood Ratio	27.009	1	.008		
Fisher's Exact Test				.010	.006
Linear-by-Linear Association	26.924	1	.009		
N of Valid Cases	173				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 38.36.

b. Computed only for a 2x2 table

## V. CONCLUSIONS

Discussion:

### a) Limits

The present study reveals a significant relationship between framing and type of decisions, but also between the need to justify the decision and type of decision taken by teenagers. Besides the practical usefulness of the data presented, this study also implies some limitations.

The first limit resides in the presentation of the two issues. We noted that students must work individually as there is no right or wrong answers. Current sample included in the study is large, but we believe it would have been very helpful to include more age groups or even schools in rural areas to achieve more detailed and representative information.

### b) Future Directions

- We recommend the use other experimental designs that allow illustrating the types of correlations that we have obtained.
- The inclusion of more representative samples involving people of different ages from many backgrounds, professions.

This study can have a major influence in terms of awareness among teenagers of the importance of justification for decisions made. Thus, the types of decisions, types of justifications and types of framing and especially possible existing correlations can be extrapolated in social programs, education, integration of young people or immigrants) involve various benefits.

In addition, it is necessary for teenagers to take decisions, to be able to provide relevant justifications for them because it is necessary for them to become responsible and move to a new stage of development - youth. Beyond this assumption and justification for decisions have implications for teenagers in various areas: choosing the school, choosing the appropriate profile with their abilities and skills, choosing faculty in some collective integration.

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