Interpretation of Risk Communication using Affect and Availability Heuristics

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Abstract

Risk communication is a very important aspect in risk perception by people. Feelings and past experiences of an individual certainly affect its risk perception but the way of passing on the information of risk has also an important role in risk perception. Heuristics, specially affect and availability heuristics, plays an important role in risk perception. When provided with the same information of risk in different manner then people perceive different level of risk depending upon how the risk is communicated. In this project there were three studies has been done, first done by Carmen Keller in 2006, to see how the different aspects of providing risk information will change the level of risk perception.

Introduction

Some portion of risk perception of an individual is guided by the affect and availability heuristics. These heuristics are mental shortcuts to find the solution of a problem. Affect heuristic particularly deals with your emotional feelings. In this heuristics your decisions are guided by your emotional response and gut feelings. In 1994, Alhakami and Slovic proposed a model for affect heuristic saying that perceived risk is inversely proportional to the perceived benefits.

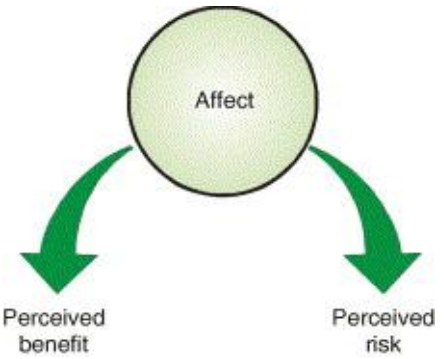

Fig 1: Model of affect heuristic proposed by Ali Alkahami and Paul Slovic (1994)

The model says that if your feelings (affect) towards an activity are positive then the perceived risk is low and perceived benefits are high. On the other hand if affect is negative then the perceived risk is high and perceived benefits are low.

In availability heuristic, decisions are mainly biased by the information and examples available in your mind. This term “availability heuristic” was first given by Amos Tversky and Daniel Kahneman in 1973 **[3].** In this paper they quote that “a person evaluates the frequency of classes or the probability of events by availability, i.e., by the ease with which relevant instances come to mind”.

In risk communication there are several factors which affect the perception of risk of an individual like feelings or intuition, availability of examples and instances, past experiences, way of communicating the risk, etc. The factor of way of communicating the risk is vital because you can make an individual to perceive more or less risk just by communicating the same risk in somewhat a different way. In 1978 Slovic **[2]** proved that by presenting the risk faced during a lifetime of driving induced more people to wear seat belts compared with the presenting the risk involved in the single trip. This certainly shows that representing the risk involved for longer period of time evokes high risk perception than presenting the same risk for shorter period of time.

Study 1

In the first study we studied how the risk perception changes when the same information of risk is provided for different period of time. A total of 148 Participants, students of IIT Kanpur, took part in this survey. They were given a situation that they were going to purchase a house and some information about the risk of coming earthquake at that place was given.

Any one of the following information was given to them (all of them are identical):

1. On an average, there is an earthquake every hundred years.
2. Each year, there is a 1% probability of earthquake.
3. Within 40 years, there is a 33% probability of earthquake.
4. Within 80 years, there is a 55% probability of earthquake.

Then participants were asked how risky would they consider living in a place like this? They were asked to rate their risk on a scale of 1(not risky at all) to 10(Highly risky).

This experiment is taken from the experiments done by Carmen Keller, Michael Siegrist and Heinz Gutscher in 2006, **[1]**

Results and Discussion of Study 1

Based on the responses from the participants results with means and standard deviations are shown in Fig 2 in comparison with the original experiment done by the Carmen Keller in 2006. Results clearly showed that the probabilities provided for longer period of time had greater risk perception. This can be explained on the basis of affect heuristic. Small probabilities do not evoke any emotional response (hazard images) in the mind of

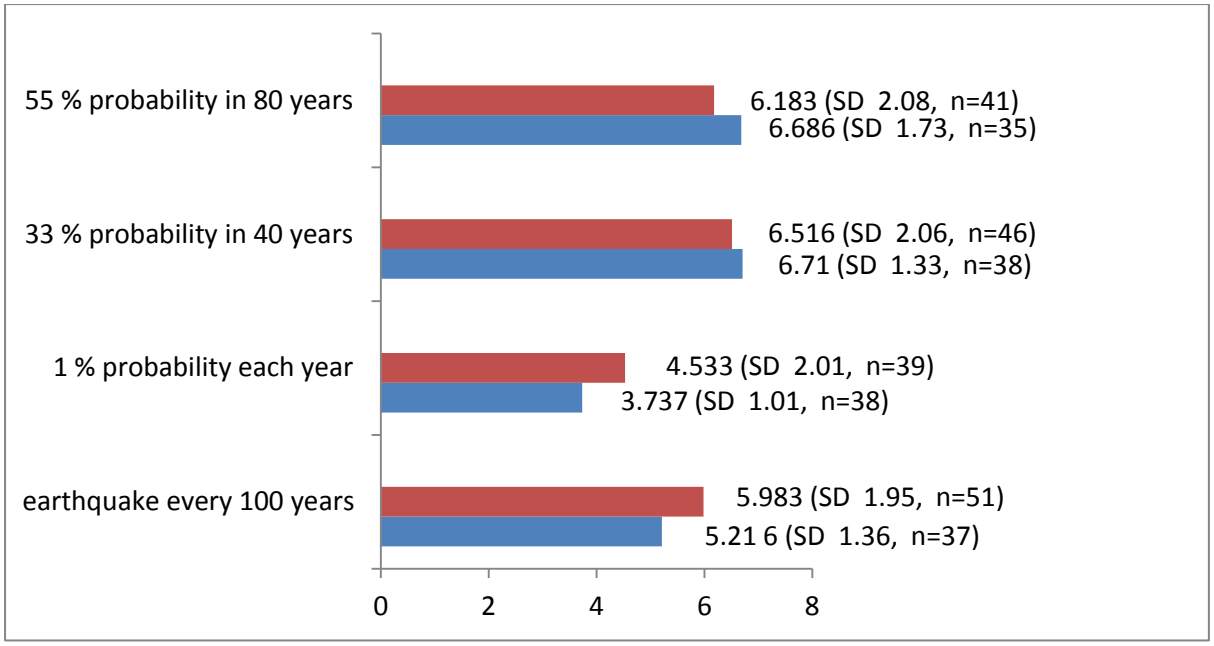

Fig 2: Results of study 1 (BLUE) in comparison with Carmen Keller survey (RED). Mean is plotted and standard deviation (SD) is given in parenthesis with the number of participants (n). Rating is done on the scale of 10, Not risky at all (1) to highly risky (10).

participants whereas higher probabilities evoke images of associated hazard in mind and increase the level of risk perception.

Study 2

In the second study we studied the effect of graphical display in risk communication. A total of 122 Participants, students of IIT Kanpur, took part in this survey. Again the same situation was given to the participants but the information provided was a bit different.

Any one of the following information was provided to the participants:

1. Each year, there is 1% probability of flood; without graphical display
2. Each year, there is 1% probability of flood; with graphical display
3. Within 30 years, there is 26% probability of flood; without graphical display
4. Within 30 years, there is 26% probability of flood; with graphical display

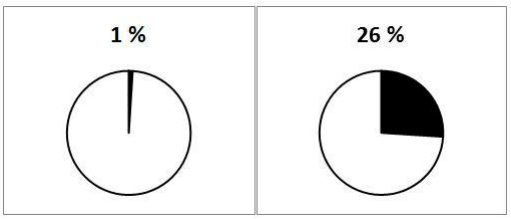

Fig 3: Graphical display of probability of flood in 1 year and 30 years, taken from experiment of Carmen Keller Michael Siegrist and Heinz Gutscher in 2006

Then participants were asked how risky would they consider living in a place like this? They were asked to rate their risk on a scale of 1(not risky at all) to 10(Highly risky).

This experiment is also taken from the experiments done by Carmen Keller, Michael Siegrist and Heinz Gutscher in 2006, **[1]**

Result and Discussion of Study 2

Based on the responses from the participants results with means and standard deviations are shown in Fig 4 in comparison with the original experiment done by the Carmen Keller in 2006.

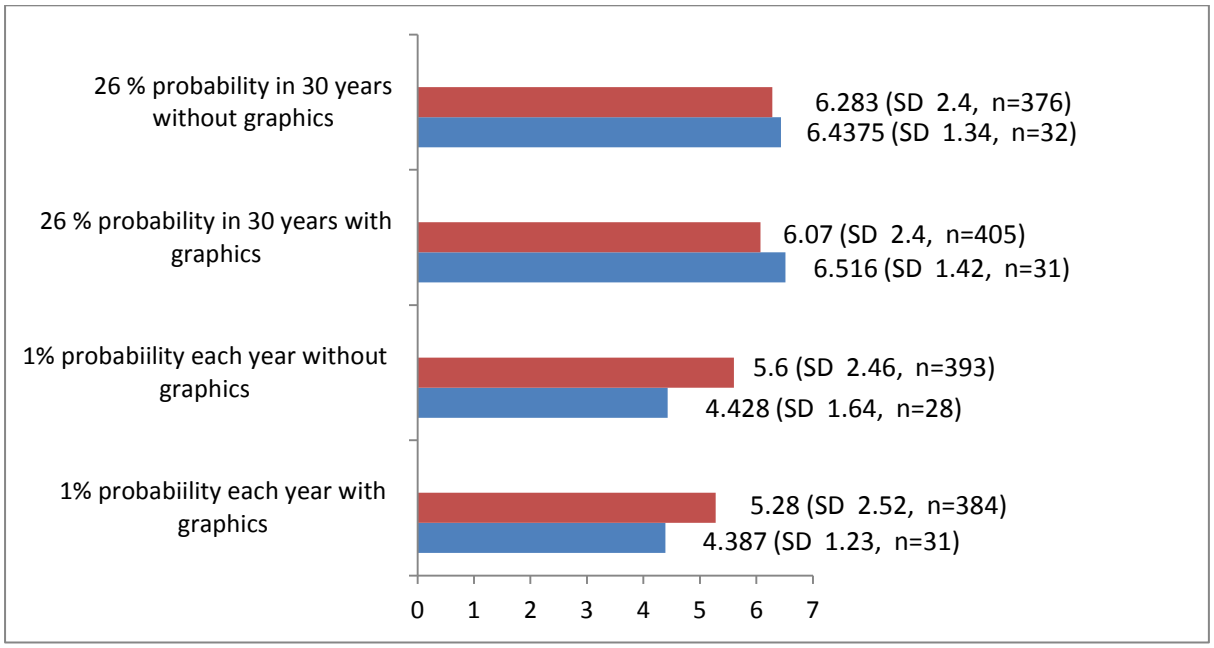

Fig 4: Results of study 2 (BLUE) in comparison with Carmen Keller survey (RED). Mean is plotted and standard deviation (SD) is given in parenthesis with the number of participants (n). Rating is done on the scale of 10, Not risky at all (1) to highly risky (10).

Results show there is not any significant effect of graphical display in risk perception but we can easily see that the probability expressed for 30 years has higher risk perception than 1 year. In Carmen Keller study the risk perceived by the participants in graphical display case decreased slightly. Whereas in my study risk perception decreased slightly in 1 year case and increased slightly in 30 years case.

Study 3

In the third study we studied whether the availability of hazard laden images with the information will lead to higher risk perception? A total of 146 Participants, students of IIT Kanpur, took part in this survey. In this survey participants are divided into two groups. Here situation was same of purchasing a house. Group 1 was shown with two photographs of

normal houses for 30 seconds and group 2 was shown with two photographs of earthquake affect laden images.

Then, both the group participants were provided with any one of the following information:

1. Each year, there is 1% probability of flood
2. Within 30 years, there is 26% probability of flood

Then participants were asked how risky would they consider living in a place like this? They were asked to rate their risk on a scale of 1(not risky at all) to 10(Highly risky).

This experiment is also taken from the experiments done by Carmen Keller, Michael Siegrist and Heinz Gutscher in 2006, **[1]**

Results and Discussion of Study 3

Based on the responses from the participants results with means and standard deviations are shown in Fig 5 in comparison with the original experiment done by the Carmen Keller in 2006.

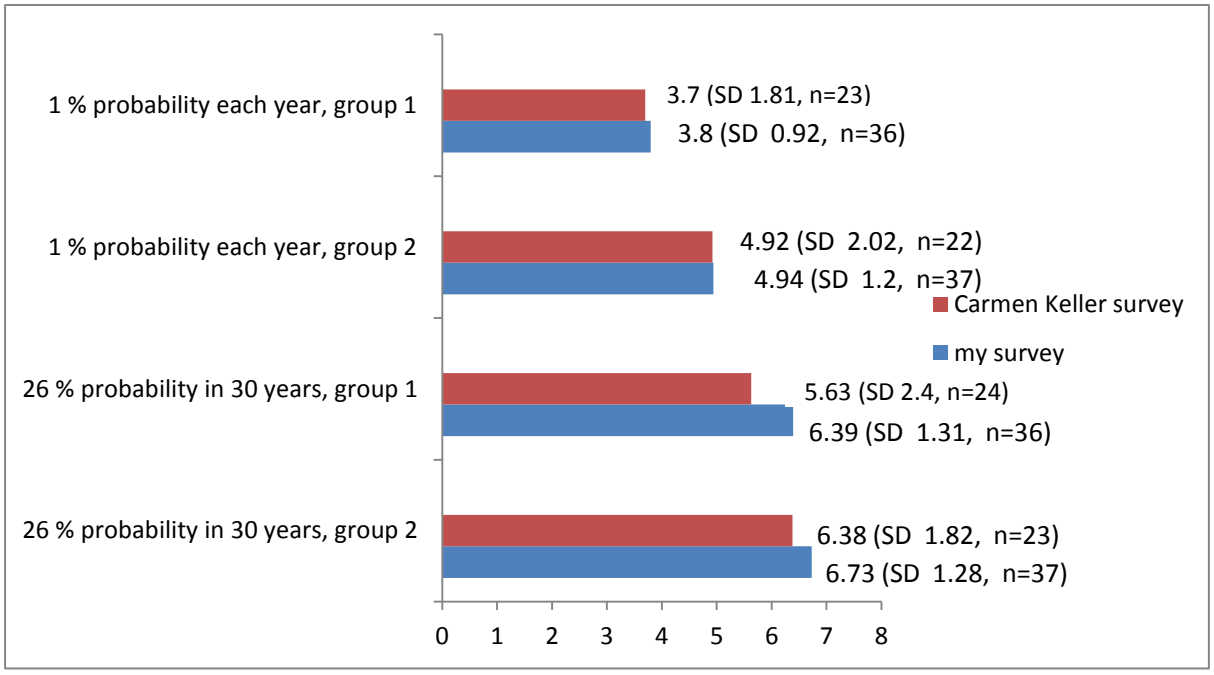

Fig 4: Results of study 3 (BLUE) in comparison with Carmen Keller survey (RED). Mean is plotted and standard deviation (SD) is given in parenthesis with the number of participants (n). Rating is done on the scale of 10, Not risky at all (1) to highly risky (10).

From results it can be easily seen that the risk perception of group 2 participants is high compared to group 1 participants. It can be explained using affect and availability heuristics both. We made the data available (earthquake affect laden images) to the participants of group 2 and it evoked negative emotions in the mind of participants. Hence the risk perception of group 2 is high.

References

[1] Carmen Keller, Michael Siegrist and Heinz Gutscher, "The Role of the Affect and Availability Heuristics in Risk Communication", Risk Analysis, Vol. 26, No. 3, 2006

[2] P. Slovic, B. Fischhoff, S. Lichtenstein, “Accident probabilities and seat belt usage: A psychological perspective”,Accident Analysis & Prevention, Volume 10, Issue 4, December 1978, Pages 281–285

[3] Amos Tversky, Daniel Kahneman, “Availability: A heuristic for judging frequency and probability” Cognitive Psychology Volume 5, Issue 2, September 1973, Pages 207–232

[4] Paul Slovic, Melissa L. Finucane, Ellen Peters, Donald G. MacGregor, “The affect heuristic”, European Journal of Operational Research, Volume 177, Issue 3,16 March 2007, Pages 1333–1352

[5] Melissa L. Finucane, Ali Alhakami, Paul Slovic and Stephen M. Johnson, “The A□ffect Heuristic in Judgments of Risks and Benefits”, Journal of Behavioral Decision Making, 1-17 (2000)

[6] Wikipedia, “Affect Heuristic”, “Availability Heuristic”