Department of Political Science,
Major in Politics, Philosophy and economics
Chair of Behavioral psychology and economics

Prospect Theory, Neuroeconomics and Political Choice

decision making theories for international politics

Supervisor:
Massimo Egidi

Candidate:
Myrlande Nardi
074372

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To mom and dad,

without whom I would never have reached this point.

Abstract

The need of understanding the mechanism which bring us to take determined decisions has always been pronounced. Since the 17th century scholars have observed and analyzed the processes through which we make choices. Until 1979 the most popular theory in this area was Expected Utility Theory, then Kahnemann and Tversky conceived what has become known as Prospect Theory. The theory, which was developed to be an alternative to Expected Utility Theory, is based on the concepts of framing and risk aversion. Moreover, it was influenced by psychology and the new discoveries in neuroscience, such as the effects that emotions have on the decision making processes. As these discoveries became more significant, a new area of study developed which came to be known as neuroeconomics as it was born thanks to the convergence between various areas of study namely economics, psychology and neuroscience. Furthermore, even though Prospect Theory presents determined limitations, it was applied to various cases of international politics. Among these one of the most interesting is surely the Iran Hostage Crisis. The theory seems to be capable of explaining the irrational decision that were taken by the various actors in this context.

Index

Introduction:

Decision-making is an integral part of our life as human beings. We take decisions every day, spacing from political to economic to private life decisions. The very act of waking up in the morning and starting a new day is a decision, and depending on our final choice, there are costs to be compounded. In economics this cost is called "opportunity cost". To better understand this concept let's take as an example the act of getting up from bed in the morning, in order to go to work or to follow a lesson at the university. If we get up, we might gain money or knowledge by performing our tasks, but we give up on the energy one could spare by staying in bed. On the other hand, the opportunity cost of remaining in bed is the money and knowledge one loses by deciding not to perform their daily agendas. This kind of decision is very easy to understand in that every single human being has found him or herself in the situation of having to make a choice of this kind. There are though a series of other decisions which are not so straightforward, and in which the opportunity cost might be very high, not only for a private agent but for society in general. Let's think about economic decisions, such as deciding whether to invest or not, or political decisions, for instance the choice between engaging in a war or not. These all have long lasting effects and taking the right decision might be very important. This is why learning to understand how we take decisions and why sometimes human beings do not make choices that would maximize utility, is of the most fundamental importance.

Many scholars during the years have studied the mechanisms through which we take decisions. One of the most important and most influential of these decision-making theories is surely Prospect Theory which has been theorized by Daniel Kahnemann and Amos Tversky in 1979.[1] The theory represented a total revolution in the area, in that it suggested that individuals are not entirely rational when taking decisions. The very foundation of the economic choice theories was shaken and starting from that point forward, studies started to take place on the functioning of the human brain. What came to light was that during the decision making process a very big part is played by emotions and thus by unconscious mechanisms. A big push in this direction was given by the Somatic Marker Hypothesis which was formulated by Antonio Damasio. When the influence of emotions on decision-making had been universally accepted, the issue that started to rise was that of how the two systems interacted. The unitary-dual debate then arose. To this day there is no universally accepted truth underlying this debate.

The new discoveries in neuroscience and the new understanding of economics that started to develop in those years placed the bases for the birth of a new doctrine which came to be known as neuroeconomics. Neuroeconomics takes into account the constraints placed by the cognitive and neural activity of our brain and links these to the mathematical decision models that have been determined during economic studies, in order to try to understand decision-making. [2]

[1] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 11

[2] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

In this paper I will speak about these new areas of study and I will try to explain the Iran Hostage Crisis of 1979 using prospect theory and the new discoveries on the functioning of the human brain and on the influence of emotions in decision-making.

Chapter 1: Prospect theory

I. Historic context:

In 1654 Pascal and Fermat theorized the mathematical bases of probability theory.[3] It was thought that individuals took decisions after having evaluated the expected value of each option. This was calculated according the following formula:

$$EV=px$$

where EV stands for expected value, p was the probability of obtaining a given outcome and x was the outcome.[4] Rational individuals were supposed to be risk neutral, that is, they should always choose the option which yields the highest expected value. In reality it was observed that people tend to be risk adverse, in that they prefer to choose the option which is sure to one that has an equal or higher expected value. Later in the years it has been seen that some individuals are risk seekers in that they prefer the option that is risky to one which is sure and with equal or higher expected value. It was also observed though that these individuals are rare and they usually present some kind of brain damages. [5] Nevertheless, the problem with expected utility was that it did not take into consideration risk aversion. In order to resolve this difficulty Daniel Bernoulli, a Swill mathematician, theorized expected utility theory. According to this theory, people do not take into account expected value but instead they calculate expected utility. Utility is defined as moral value in that it is the value an individual give to a certain gain taking into account his or her level of wealth. It was observed that the marginal utility, defined as "the additional satisfaction or benefit (utility) that a consumer derives from buying an additional unit of a commodity or service"[6], diminished as the level of wealth increased. Expected utility is calculated using the following formula:

$$EU=pu(x)$$

where EU stands for expected utility, p is the probability and u(x) is the utility that comes from earning

[3] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 11

[4]The Editors of Encyclopædia Britannica, *Marginal Utility*, http://www.britannica.com/topic/marginal-utility

[5]Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 pp. ch.11

[6]The Editors of Encyclopædia Britannica, *Marginal Utility*, http://www.britannica.com/topic/marginal-utility

outcome x. [7]In 1947 Von Neumann and Morgenstern listed a set of 6 axioms which became the base of expected utility theory. [8] The first of these axioms is "ordering of alternatives", according to which individuals should be able to prefer one option to another when comparing to alternatives, or be indifferent between them. "Dominance principle" instead states that individuals should always choose the option which is dominant. In other words, they should always prefer the option that entails the highest expected utility. According to "cancellation principle", individuals should only take into consideration characteristics that are different, when choosing between two options. In other words, they should be indifferent between alternatives which are the same or that yield the same expected utility. In a chain of options, according to "transitivity principle", individuals who prefer option A to option B and option B too option C should also prefer option A to option C. "Continuity principle" states that individuals should always choose the option which entails a gamble between the best and worst outcome to a sure intermediate option, if in the first case the probability of obtaining a negative outcome are minimal. At last "invariance principle" states that individuals should not be affected by the way the options are presented.[9] Von Neumann and Morgenstern were able to demonstrate mathematically that when these axioms are violated, utility is not maximized; still it was demonstrated that most individuals systematically violate these principles.

The first to do so was Maurice Allais who in 1953 demonstrated the violation of "cancellation principle". To better understand what has come to be known as the Allais paradox, let's see what happens if we provide individuals with two gambles each of which has two options. The gambles are these:

Problem 1:

1) Choose between (A) $1,000,000 for sure or (B) 10% of winning $2,500,000, 89% of winning $1,000,000 and %1 of winning $0

2) Choose between (C) 11% of getting $1,000,000 and 89% of getting $0 or (D) 10% of winning $2,500,000 and 90% of winning $0[10]

[7] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 pp. ch.11

[8] Scott Plous, *The Psychology of judgment and decision making*, McGraw-Hill, 1993

[9] Scott Plous, *The Psychology of judgment and decision making*, McGraw-Hill, 1993

[10] Scott Plous, *The Psychology of judgment and decision making*, McGraw-Hill, 1993

[11] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

[12] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

Let's notice that the expected utility in each gamble is higher in the second option (B in gamble 1 and D in gamble 2), so according to the expected utility theory and the cancellation principle, individuals who choose option B in gamble 1 should then choose option D in gamble 2. In reality this was not the case. Test takers did choose option D in the second gamble but strangely chose option A in gamble 1. Why is this? Let's remember that it has been observed that people tend to be risk adverse, and thus is gamble 1 they prefer to choose the sure gain. In gamble 2 though there is no sure gain, and the difference between 11% and 10% is minimal, while the 2,5000,000 gain is much higher than the 1,000,000 gain. Individuals in this case tend to prefer the risk, because it is minimal.

Starting with the Allais paradox violations of multiple axioms of the expected utility theory were discovered. In the late 1970s and early 1980s many scholars started to think that themselves behavioral economists.[11] In 1979 Amos Tversky and Daniel Kahnemann published on Econometrica, a paper, "Prospect theory: an analysis of decision making under risk" which demonstrated violations of the expected utility principle and at the same time tried to hypothesize an alternative theory that presented axiomatic bases which were influenced by psychology. This theory, the Prospect theory, became very popular in the following years and influenced many studies in economics and not only.

Want is a prospect? Kahnemann and Tversky define it as follows: "a prospect $(x_{1,}\, p_{1;\ldots;}x_{n,}\, p_{n)}$ is a contract that yield outcome x_1 with probability $p_{i,}$ where $p_1 + p_2 + \ldots + p_n = 1$." [12] In other words, it is the same gamble present in expected utility theory. The difference rests in the fact that whilst in expected utility theory the utility function took into consideration only final states, in prospect theory the value is placed upon losses and gains. Moreover, decision weight, which tend to be lower than probabilities except in the case of low probabilities, replace probabilities themselves. The value function tends to be convex for losses, and concave for gains. It is also less steep for gains than for losses.

Another difference from expected utility theory is the fact that it accepts certainty effect, that is the attitude of individuals to prefer certain outcomes to merely probable ones. Kahnemann and Tversky tried to show the fact that people tend to overweight certain outcomes by using a lightly different choice problem than that used by Allais to demonstrate his paradox.

Problem 2:

1) choose between

A: 2,500 with probability .33
2,400 with probability .66
0 with probability .01

B: 2,400 with certainty

72 people took part in the experiment, and of these 18 chose the first option while 82 chose the second option. [13]

2) choose between

C: 2,500 with probability .33
0 with probability .67

D: 2,400 with probability .34
0 with probability .66

72 people took part in the experiment and of these 83 chose the first option and 17 chose the second option. [14] As it happened in the Allais paradox of which we spoke earlier, the choices made by the experiment takers violated the cancellation principle of expected utility theory. The reason is the same, and it has to do with the fact that when the problem entails a sure prospect, this will be more desirable by most individuals. In a situation in which the utility pattern is the same, but there is not a certain outcome, and in addition the difference in probabilities are very low, individuals will tend to choose the higher outcome, even though it has a lower probability.

The certainty effect is not the only case in which the cancellation principle is violated. Kahnemann and Tversky give the following example to explain a further violation of the principle.

[13] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

[14] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

Problem 3:

1)

A (6,000, .45) B. (3,000, .90)

2)

C: (6,000, .001) D. (3,000, .002)[15]

The test takers were 66 and in the first problem, 14 chose option A and 86 chose option B. In the second problem, 73 chose option C ad 27 chose option D. Again individuals violate the cancellation principle, by choosing in the first problem the option which has the highest probability[16] (notice that the difference between .45 and .90 is very large), and in the second problem they chose the option with the highest outcome because the difference in the probabilities was very small.[17] Other scholars obtained similar results, namely MacCrimmon and Larsson. [18]

Another effect that has been noticed is the reflection effect. Kahnemann and Tversky observed that if the prospects involve a loss then the preferences are reversed. Let's see an example to better understand this behavior.

Kahnemann and Tversky displayed four of the problems they had already used in their paper, and which were originally positive prospects, that is they did not entail losses. They then reversed the sign of the outcome.

[15] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

[16] notice that the difference between .45 and .90 is very large

[17] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

[18] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

Table 1:

Positive prospects			**Negative prospects**		
Problem 3: (4,000, .80) < (3,000).			Problem 3': (-4,000, .80) > (-3,000).		
N=95	[201]	[80]*	N=95	[921*	[81]
Problem 4: (4,000, .20) > (3,000, .25).			Problem 4': (-4,000, .20) < (-3,000, .25).		
N = 95	[65]*	[35]	N=95	[42]	[58]
Problem 7: (3,000, .90) > (6,000, .45).			Problem 7': (-3,000, .90) < (-6,000, .45).		
N=66	[86]*	[I4]	N=66	[8]	[92]*
Problem 8: (3,000, ,002) < (6,000, ,001).			Problem 8': (-3,000, ,002) > (-6,000, ,001).		
N=66	[27]	[73]*	N=66	[70]*	[30][19]

N is the number of test takers, and the number in brackets indicate the number of individuals who chose that option. The > sign denotes the preference which was preferred by most individuals. We can now see that people tend to completely change their preferences when the sign is switched, this means that individuals tend to be risk averse if the prospect is positive, but risk seeking when the prospect is negative. In the negative domain people do not chose the sure option even if this has a higher expected utility, as in problem 3. This is the outcome, once again, of the tendency of people to overweight certain options, and once again the axioms of the expected utility theory are violated. This behavior is linked to the tendency of decision makers to be influenced by the form in which the choices are presented. This behavior known as the isolation effect has been theorized by Von Restorff, a psychologist, who observed that peculiar characteristics are remembered more easily than those which are known to our brain. This means that when making a decision the components which are not shared by all prospects are taken more into consideration by decision makers. In decision making this behavior may lead to inconsistencies because here is not one universal way of decomposing a pair of prospects and this multitude of modalities may lead to diversity in preferences. Let's see another example.

PROBLEM 4: Consider the following two-stage game. In the first stage, there is a probability of .75 to end the game without winning anything, and a probability of .25 to move into the second stage. If you reach the second stage you have a choice between

(4,000, .80) and (3,000).

Your choice must be made before the game starts, i.e., before the outcome of the first stage is known.[20]

[19] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

Consider the fact that the expected utility in this problem is given by .25 x .80= .20 probability of winning 4,000 and .25 x .1.0= .25 chance of winning 3,000. Then the final prospects are (4,0000, .20) and (3,000, .25). These are the same options that we found in Problem 4 of Table 1, but the preferences displayed by test takers changed. Individual tend to ignore the first stage and chose according only to the options of the second step. In line with the certainty effect which we have analyzed previously, most of the test takers (78%) chose the second opinion.

At last Kahnemann and Tversky analyzed the attitude of individuals in a situation in which the starting budget is not the same. Let's see the following example.

PROBLEM 5:

1) In addition to whatever you own, you have been given $1,000.

You are now asked to choose between

A: (1,000, .50) and B (500)

N=70 [16] [84]*[21]

2) In addition to whatever you own you have been given 2,000.

You are now asked to choose between

C: (-1,000, .50) and D: (-500)

N=68 [69]* [31][22]

Observe that in problem 9 test takers preferred option B while in problem 2 they preferred option C. This is conforming to the reflection effect we have analyzed previously, but it has an additional characteristic. This time a bonus premium was given. The second problem was derived from the first one by simply subtracting 1000 to all options and adding 1000 to the bonus. However, if we calculate the final outcome of both problems, we observe that they are identical.

A= (2,000, .50; 1,000, .50)=C and B (1,500)=D[23]

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[20] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

[21] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

[22] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

This is inconsistent with utility theory, in that according to such theory the initial wealth should not be counted in the final utility calculation. Taking into account risk aversion, rational individuals should always choose the option which is certain. This experiment and others though have proved that this happens only when the individuals own a smaller amount of money. This implies that individuals are more interested in the changes on wealth rather than on final states. We will see that this idea represents the very foundation of prospect theory.

II. Prospect theory:

After having proved the inadequacy of expected utility theory as a descriptive theory of human decision making behavior, Kahnemann and Tversky go on to outline their alternative theory; prospect theory. Prospect theory starts as an economic theory, developed on the basis of prospects involving monetary outcomes and given probabilities. The theory though can be applied to all sorts of decision making processes, not forcibly in the area of economic studies. We will analyze further the applications this theory has in the international politics domain, and we will analyze a case study in this contest. In all cases though, according to the theory there are two phases in the decision making process. First the individual passes through a stage of editing of the information received and subsequently they pass to the evaluation of such information. [24]

Whilst editing the prospect the individuals analyze the information which is given to him or her and creates a simpler representation of these; afterwards it evaluates them choosing the one with the highest value.[25] Let's remember that, contrary to expected utility theory, the value given to each prospect is not necessarily the one that yields the highest utility, in mathematical terms. In fact, we must remember that one of the basic characteristics of prospect theory is that, in contrast to most normative models of decision making under risk, it does not present description invariance. This means that choices according to the theory are influenced by the way in which the individual perceives them. In other words, as we have already seen, decision-makers will take different decisions and will present different degrees of risk aversion, if they perceive themselves to be in a situation of loss or alternatively of gain. This process is called framing in that individuals frame the different opinions and the way they frame these options influences their choices.[26] This may bring the individual to take decisions that may seem abnormal in that they might not choose the option which yield the

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[23] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

[24] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

[25] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

[26] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 11

highest expected utility if we use a traditional cost/benefit calculation. We will speak about framing more in depth when we will talk about the mechanisms of the brain, now let's see the editing phase more in detail.

There are several operations that the decision maker brings forward whilst editing the information given. We have said that people tend to evaluate the value of outcomes as gains and losses and not as final wealth. These gains and losses are related to a reference point which is different for each individual, even though it usually corresponds to the initial level of wealth of the individual. The reference point though is influenced by both the formulation of the prospect and the expectation of the individual. [27]The process of pinpointing the reference point is called coding. Another process is combination. [28]During combination individuals associate outcomes that have the same probability. Afterwards during the cancellation process, individuals discard common characteristics. This is what happened in problem 8, in table 1. Many inconsistencies in decision making are to be brought back to anomalies in preference during the editing phase. In fact, we will see how emotions have a very big influence in the decision-making process, through what are known as heuristics. An heuristic is defined as "a mental shortcut that allows people to solve problems and make judgments quickly and efficiently".[29]

After the editing phase we have said that individuals pass to the evaluation of each prospect. The value of each prospect is indicated as V and is expressed with two scales π and v. [30]π is associated with a probability p and it indicates the impact that p has on the overall value of the option. The other scale v indicates the variation from the reference point, in other words it indicates the losses and gains.[31] Markowitz[32] was the first one, in an attempt to improve expected utility theory, to propose to define utility as losses and gains rather than final assets.[33]Taking into account this, Kahnemann and Tversky hypothesized that the value function indicating changes from the reference point are concave about the reference point, and convex below. This means that the marginal value of gains and losses tends to diminish as the reference point

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[27] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

[28] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

[29] Kendra Cherry. "What is heuristics". VeryWell, 2016 https://www.verywell.com/what-is-a-heuristic-2795235

[30] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*.

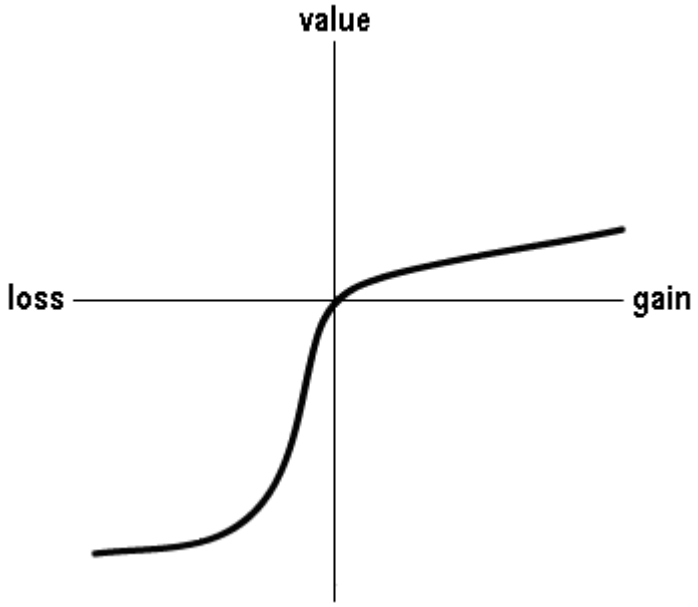
[31]Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

[32] American economists' winner of the Nobel Memorial prize in economic sciences along with Marton Miller and William Sharp in 1990

[33] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

[34]http://www.bing.com/images/search?q=rospcet+theory+value+function&view=detailv2&&id=274BA45E4254FF48D84CBC0BC27C49EE4CFBE85E&selectedIndex=12&ccid=csc1zPjt&simid=608007502818575878&thid=OIP.M72c735ccf8ed0279fcf0266bf3d58cb5o0&ajaxhist=0

increases. We already said that losses are felt in a deeper way than equal gains. This means that the value function in the area of losses will be steeper than that in the area of gains.



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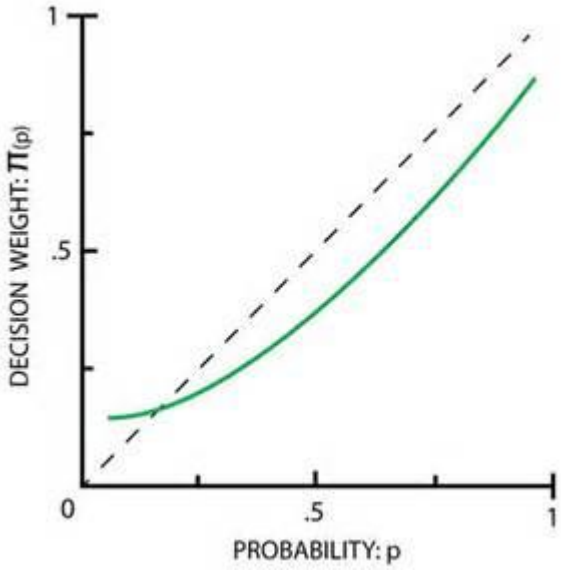
Another characteristic of prospect theory is the fact that the value of each option is multiplied by a decision weight.[35] Decision weights are not probabilities and they are derived from choices between options. They indicate the impact that events may have on the attractiveness of a prospect. In all the numerical problems we have seen previously, the probability was given and thus it's probable that the decision weights coincided with those probabilities. In real life though this is not always the case, in fact the perceived likelihood of events may be influenced by a number of factors, for example ambiguity. [36]

[35] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

[36] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 11



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III. Limitation to Prospect theory:

Prospect theory has become the key theory for predicting and explaining human behavior. Psychologists have demonstrated the validity of the axioms of the theory various times in the laboratory but economists are more skeptical. What they support is the thesis that the deviations from the principles of the expected utility theory that have been observed in decision-makers are only the result of the fact that the experiments were brought about inside a laboratory.[38] Individuals in that situation are presented with hypothetical situations ad not real life ones and thus, according to the economists, they do not use all their cognitive abilities in order to take the decision that would bring to the best outcome, because they do not have the appropriate incentives. In addition to this, the test-takers are not able to learn from past errors because they take the test only once and without any familiarity with it. In real life as we will see when speaking about the realm of emotions, experiences are important not only for the rational thinking but also for the emotive area. At last the economists argue that these anomalies can be explained through standard economic theory.[39]

In 1979 Grether and Plott brought forward a series of experiments that had the aim of demonstrating that the psychologists' observations could not be applied to economics. They concentrated on the preference reversal phenomenon, that refers to the fact that if the frame changes, preferences will tend to change too, even if the values and probabilities remain unvaried.[40] For example, the decision of the individual will be different if the

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[37] http://www.bing.com/images/search?q=decision+weights+prospect+teory&view=detailv2&&id=5EC35C09BDAFAC3CE38851C5ADD2B677CF20E5AB&selectedIndex=3&ccid=ncrAjOTZ&simid=608013520060025805&thid=OIP.M9dcac08ce4d9248b87bd52b4caf4f740o0&ajaxhist=0

[38] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pp. 87-112 http://www.jstor.org/stable/2600908

[39] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pp. 87-112 http://www.jstor.org/stable/2600908

[40] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pp. 87-112 http://www.jstor.org/stable/2600908

doctor states that a certain treatment has a 90% survival rate or if he states that it has a 10% mortality rate.[41] This phenomenon tends also to create a methodological difficulty for expected utility theory, through the "elicitation bias" issue.[42] The elicitation bias refers to the fact that stimulating preferences in different ways, creates diverse responses and thus causes a changement in the preference orders. Grether and Plott tried to increase motivation of test-takers by means of monetary incentives and by controlling income, order of repetitive choices and the effects of strategic bargaining. At the end of the experiment they concluded that the preference reversal phenomenon remains even though they controlled for all the economic-theoretical explanations.[43] This brought the overall attention upon the phenomenon even though someone doubted about the adequacy of the experimental design. Other economists thus conducted ulterior experimental tests. The question of incentives remained central but the outcomes were mixed. Grether and Plott in their experiment of preference on the reversal phenomenon and then Pommerehne, Schneider and Zweifel found that "even when the subjects are exposed to strong incentives for making motivated, rational decisions, the phenomenon of preference reversal does not vanish." [44] On the contrary Reilly in 1982 used another design and found that when payoffs are increased the rate of reversals is actually reduced but still a substantial percentage remains. What could be argued though is that the incentives used in these experiments were not adequate and thus there is still a problem of internal validity. To overcome this problem, which had the practical issue of the limited budgets that made it impossible to replicate the high-stakes of the real world, two methods have been used. The "random lottery incentive system"[45] in which test-takers are informed that they will actually receive only one of the payoffs of the various options and the conduction of the research in poorer societies in which the relationship between the monetary reward and the normal incomes is different. [46]Still anomalous behaviors persisted and thus the debate shifted to the causes at the base of the phenomena and to the influence of market environments on this behavior. [47]Thus the internal validity of these laboratory studies seems to not be the major problem and the challenge then becomes that of the external validity. When talking about international relations, where the stakes for actors are very high and complex, this issue becomes of the outmost importance.

In laboratory individuals are presented with prospects which entail outcomes with known values and probabilities; expected values are thus easy to understand and compare. Moreover, the frame is given in that

[41] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pp. 87-112 http://www.jstor.org/stable/2600908
[42] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pp. 87-112 http://www.jstor.org/stable/2600908
[43] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pp. 87-112 http://www.jstor.org/stable/2600908
[44] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pg. 94 http://www.jstor.org/stable/2600908
[45] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pp. 87-112 http://www.jstor.org/stable/2600908
[46] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pp. 87-112 http://www.jstor.org/stable/2600908
[47] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pp. 87-112 http://www.jstor.org/stable/2600908

it is inherent in the way in which the prospect is presented. In real-life these conditions are not present. Individuals tend to set their frame in a subjective way that can be very difficult to understand by an outside viewer. In addition to this the probabilities of a certain outcome and the true value of such outcome are very difficult to evaluate. In other words, in the laboratory there is a static situation in which the risks do not change over time. In international relations, present and future uncertainties are in a state of continuous interaction. [48]This makes it very difficult to understand if actors take decisions because of the way in which they framed them, of loss aversion, of the probability overweighting or because they performed a standard cost-benefit calculus. Moreover, the key hypothesis of prospect theory cannot be tested when the reference point cannot be identified and thus these have no explanatory power. For example, we will later analyze the case of the Iran Hostage crisis during the Carter administration in 1979. In this case we will see that the reference points of the various actors have been found and analyzed deeply retrospectively, but during the course of the events it was hard to understand the reasons beneath the decision of the President. He decided to bring forward the rescue mission because of the fact that he saw himself in a situation of loss and thus tended to be more risk taking, or he did this because of standard cost-benefit calculus and perceived that option to be the one which would bring the most utility with the less effort? It is difficult to differentiate between these two options, in that they could also be intertwined.

It is very important to understand that prospect theory is not a complete theory of decision-making.[49] It explains the mechanisms that bring to make choices given the basic parameters of decision problems. These are of course the options given, the possible outcomes of these options, the values and probabilities associated with these outcomes and at last the framing process. However, these parameters are not endogenous in the theory. Also for the value function, its typical s-shape and the steepness it presents on the loss side have been achieved thanks to experimental evidence in an inductive fashion. There is a lack of theoretical explanation for the reasons that bring individuals to act in this way when taking decisions. It is true though that Kahnemann and Tversky state that the value function does reflect "three basic facts: organisms habituate to steady states, the marginal response to changes is diminishing, and the pain is more urgent than pleasure". [50] These all have an effect on the shape of the value function. These theoretical limitations are at the basis of most critiques to the theory.

Yet, in trying to apply prospect theory to international relations the issues that arise are others and in particular two of them. [51]The first one is referred to as the aggregate problem. We must never forget that in

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[48] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pp. 87-112 http://www.jstor.org/stable/2600908

[49] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pp. 87-112 http://www.jstor.org/stable/2600908

[50] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pg. 100 http://www.jstor.org/stable/2600908

[51] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pp. 87-112 http://www.jstor.org/stable/2600908

international politics actions and interactions between states, international organizations or corporations are involved. These are, in principle, collective decision-making bodies, while prospect theory and the parameters of decision making have been tested on individuals. We cannot thus assume that these can be automatically be linked to group decision-making. It is true that in some cases, as in situations involving centralized regimes, there is the presence of an actor whose influence is so strong that it overshadows the collective decision making mechanism. Moreover, the unitary actor model, which states that states are single entities which try to enhance national interests, could be enough in certain cases. There is though still a strong need of some theoretical foundations to properly associate the individual decision-making theory to the collective decision-making one.

The second problem in the application of the theory to international relations is the so-called strategic interaction problem. We said that there is a need to move from an individual choice theory to one of collective decision making in order to produce a logically comprehensive theory of foreign policy. At the same time there is a need to move from a theory of foreign policy to one of interactive choice in order to arrive to a true theory of international behavior.[52] Here as in the previous problem, prospect theory find itself behind rational choice theory. To gain ground it should build a theory of strategic interaction using as base reference dependence, loss aversion and nonlinear response to probabilities.

Nonetheless applications of prospect theory to international relations have been analyzed thoroughly throughout the years. This was possible even thanks to the enormous contributions of a new doctrine which came to be known as Neuroeconomics, and to the new discoveries in the neuroscience area. In the next section we will analyze these two areas with a certain emphasis on the role of emotions in the decision making process.

[52] Jack S. Levy. *Prospect Theory, Rational Choice and International Relations.* The International Studies Association, International Studies Quarterly, Vol 41, No 1, 1997. Pp. 87-112 http://www.jstor.org/stable/2600908

Chapter 2: Neuroeconomics and the mechanisms of the brain

2.1 Neuroeconomics

I. Historical context:

Neuroeconomics is a young doctrine, born out of the convergence between multiple areas of study, namely, economics, psychology and neuroscience. We will start to reconstruct the stages that brought to the development of this discipline, by analyzing the history of economics, from the classical period to the "Keynesian revolution" and continuing with the birth of behavioral economics. We will then analyze the history of neuroscience and cognitive psychology. To conclude we will see how these areas of study, that may seem so different, were able to converge in order to improve one another.

The publication in 1776 of Adam Smith's "The wealth of the nations" is often seen as the determinant for the birth of classical economics.[53] Classical economics is characterized by a stressing of the importance of economic growth for a nation which could be reached through economic freedom, laissez-faire ideas and free competition. According to Smith it was of the most fundamental importance to not interfere in markets operation in that they were capable of producing wealth and growth by themselves. Political interference would only have caused problems. The famous metaphor he uses for describing this phenomenon is that of the invisible hand that drives individual actions and brings them to increase benefits for the society. In the late 19th century John Stuart Mill used the term "homo economicus" to describe the kind of individual that could be associated with the ideas of Adam Smith. This individual was rational and self-interested. In the following years, the economics studies arena became very heterogeneous, and different school of thought arouse.[54] One of these, guided by the ideas of John Maynard Keynes, brought forward the idea that predictions could be made on the future behavior of individuals, thanks to the study of the individual's choice regularities. Keynes stressed that analyzing regularities in consumer behavior could help in fiscal policy decisions that aimed to manage economic fluctuations. In the 1930s the Weak Axiom of Revealed Preferences (WARP) was developed by Paul Samuelson.[55] According to his approach which was fundamental for the neoclassical revolution, if a consumer making a choice between two baskets of goods, chooses one over the other, then he is revealing a preference for the basket of goods he choose.[56] Samuelson later showed mathematically that these binary choices which revealed some kind of preferences could have fundamental consequences. Some years later in 1950, the Generalized Axiom of Revealed Preference

[53] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. Neuroeconomics- decision making and the brain. Elsevier, 2009 ch. 1

[54] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

[55] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

[56] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

(GARP) was founded, as an extension of the WARP. [57]The model demonstrated that the preference for objects which had not been directly related could be assumed through chains of preferences. If an individual preferred basket A to B, and basket B to C then basket A is indirectly preferred to basket C.[58] Starting with the revealed preference approach,[59] many other theorems with the same characteristics where developed. These all started with an axiom, a set of assumptions, which incorporated a theory which explained the implications that individual choices would have on variables. The fundamental difference between these theories and the ideas of the classical period is that the latter used a priori psychological information to determine choice. In the former case instead, consumers' preferences were observed and analyzed to determine future choices they would or would not make, not on psychological grounds but using a mathematical structure. In this period theories such as the "expected utility theory" of Von Neumann and Morgenstern were developed and the foundation of game theory where laid as well. These theories became very important in that they were able to assume which could have been the consumer's behavior and thus could be used as basis to determine the consequences of policy changes. These were normative theories, in that they explained how people would behave by following certain requirements, but they did not explain how they actually behaved. Thus there can be cases in which decision makers violate these theories. The French economist Maurice Allais in 1953 demonstrated through a choice problem, that the cancellation principle of the expected utility theory could be violated.[60] As we have already seen while speaking about prospect theory, in expected utility theory there are six principles: ordering of alternatives, dominance, cancellation, transitivity, continuity and invariance. [61] The cancellation principle states that "if two risky alternatives include identical and equally probably outcomes among their possible consequences, then the utility of these outcomes should be ignored in choosing between the two options." [62] Thus if the theory was to be inviolable, all consumers would only decide between alternatives which have different outcomes, leaving aside during decision making, alternatives which are identical. Yet during a conference in France many participants who took part in the Allais paradox experiment, violated this principle. In 1961 the Ellsberg paradox, again challenged the cancellation principle and in 1969 Amos Tversky demonstrated a violation of the intransitivity principle, which is based on the over mentioned GARP. [63]The ordering of alternatives principle according to which "rational decision makers should be able to compare any two

[57] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1
[58] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1
[59] which encapsulated the WARP and the GARP
[60] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1
[61] Scott Plous. *The Psychology of judgment and decision making*. McGraw-Hill, 1993
[62] Scott Plous. *The Psychology of judgment and decision making*. McGraw-Hill, 1993

[63] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

alternatives, preferring one to the other or being indifferent to them" [64] was demonstrated to be violable by Sarah Lichtenstein and Paul Slovic.[65] All these experiments shocked the very heart of the axiom based theories. The idea that emerged was that the neoclassical models worked only under a determined set of circumstances. In the late 1970s and 1980s though Daniel Kahnemann and Amos Tversky, showed that the amount of phenomena which violated these principles was much broader then the precedent paradoxes had demonstrated. Kahnemann, Tversky and other psychologists and scholars, started to call themselves behavioral economists and argued that psychology could help in the improvement of neoclassical economic models of human behavior. For example, the framing principle, according to which decisions frame which are determined by the formulation of the problem and by the norms, habits and characteristics of the decision maker, can change the choices individuals make, challenges the axiom of "description invariance". In fact, according to this axiom, people should not choose among objects depending on the description of these last ones. [66]Neuroeconomics emerged from behavioral economics, in that both of them stress the importance of psychology as a way to improve economic analysis.[67] Neuroeconomics though goes on to include also neuroscience methodology, by observing directly neural activity in the individuals during decision making.

II. The contributions of cognitive neuroscience:

Cognitive neuroscience was very important for the development of Neuroeconomics. As in economics there was an interaction between different approaches, namely the neurological and the physiological one.[68] In the neuroscience area, scholars have brought forward several experiments with human patients or animals to understand what are the consequences of neurological injuries on the behavior. The most famous example is certainly the experiment of David Ferrier who demonstrated that when an injury in the precentral gyrus of the cortex is present, the result is a decrease in the movement generation.[69] The precentral gyrus of the cortex is the part of the brain where the primary motor cortex is situated. The motor cortex oversees the execution of voluntary movements and is involved in planning and control action. [70]It is not difficult then to understand why a malfunctioning of this area of the brain might bring to reduced movements. It is precisely because of this facility in the understanding and in the observation of these stimuli that during the classical period of neuroscience, all the experiments focused on the sensory or movement systems. The physiological approach instead "involves correlating direct measurements of biological state, such as the firing of action potentials

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[64] Scott Plous. *The Psychology of judgment and decision making*. McGraw-Hill, 1993

[65] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

[66] Scott Plous. *The Psychology of judgment and decision making*. McGraw-Hill, 1993

[67] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

[68] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

[69]Susan Y. Bookheimer, Precentral Gyrus, Springer New York, Encyclopedia of Autism Spectrum Disorders, 2013 pp 2334-2335 http://link.springer.com/referenceworkentry/10.1007%2F978-1-4419-1698-3_203

[70] BrainHQ**.** *The anatomy of movement***.** Brain connection, 2013 http://brainconnection.brainhq.com/2013/03/05/the-anatomy-of-movement/

in neurons, changes in blood flow and changes in neurotransmitters, with events in the outside world". [71] These studies were very important to understand the nervous system, but there were methodological constraints. The methods used were frequently invasive and destructive.

During the 1960s and 1980s these two approaches started to approach and then fused together. There were however two big problems, the resolution of which will become the center of the cognitive neuroscientific revolution. The first one was the surplus of models describing the same or similar phenomena. These models were related and it was hard to choose between one or the other. The second problem was the limited amount of data. In fact, as we saw methodological problems in the physiological area made it difficult and slow to conduct experiments even though they yielded precise data. In the neurological arena, experiments were quicker but less precise. The study of decision making was not a central element in this revolution, but it gives us the link between Neuroeconomics and Neuroscience.

The first observation of the effects of a brain injury on decision making was made thanks to the case of Phineas Gage in 1848. [72]After an incident which had damaged his brain Mr. Gage, changed his decision-making abilities and exhibited a personality swing. After that, in the 1990s, Antonio Demasio, Antoine Bechara and other colleagues, started to analyze decision-making under risk by bringing forward an experiment where individuals where asked to sort a set of cards. [73]This experiment was able to demonstrate the link between frontal cortex area damages to a theory of decision making which was based on emotions and was very influential. We will discuss these experiments and the issue over the overall usage of cognitive control and emotion based decisions forward in this paper.

III. The birth of neuroeconomics:

As we have seen in the 1990s there was a tension between the neoclassical axiom based theories and the behavioral economists. A series of experiments had demonstrated that the theories that had emerged during the neoclassical period, could only predict human behavior, but frequently individuals violated the principles of these theories. Behavioral scholars tried to develop alternative theories to predict behavior and different methods to test those theories. Neuroeconomics thus was developed thanks to the overlapping of two different communities, who understood that they could help one another. Behavioral economists and cognitive psychologists understood the importance of brain imaging in order to test and develop new theories of preference. On the other hand, physiologists and cognitive neuroscientists, used theories in economics as theoretical tools to understand behavior in humans and animals. During the 1990 and early 2000 neuroeconomics grew exponentially and economists, neuroscientists and cognitive psychologists started to hold several meetings and conferences. The first of these meeting was held at the Carnegie-Mellon

[71] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

[72] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

[73] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

University in 1997, and was organized by Colin Camerer and George Lowenstein, two economists.[74] The 2001 meeting by the Grunter Foundation for law, focused on the intersection between neuroscience and economics.[75] The Princeton meeting which took also place in 2001 is seen as the beginning of what is now known as the Society of Neuroeconomics.[76] At this meeting economists and neuroscientists discussed the convergence of their field of study even though there was no general desirability of a convergence. The meeting though had resonance and in 2003 a small meeting was held on Martha's Vineyard. [77]During this meeting a number of scholars started to call themselves explicitly neuroeconomists. The following year, at another meeting, it was decided to form a society and set an annual event that would serve as a meeting point for neuroeconomics all over the world. Paul Glimcher was elected president of the society and the first formal meeting was held in 2005.[78]

The contributions of neuroscience were very important for the birth of neuroeconomics. The mechanisms of the brain during decision making have been analyzed thoroughly and the discoveries that were made are very interesting. In particular, the role of emotions is essential to understand wholly how we take decisions and why sometimes the choices we make seem to be strange from a rational point of view. In the next section we will focus on these mechanisms.

2.2 Rationality, emotions and the dual/unitary model debate

I. Effects of brain damages in decision making:

In 1992 the functional magnetic resonance imaging (fMRI) was first used during experiments.[79] This technique permitted to see which regions of the brain were functioning during decision making. With the advent of such methods that could imagine neural activity in a not invasive way, scholars were able to have a better understanding of brain activity during cognitive activity. The research in this area, begun with the observation of individuals who presented severe damages to the brain. We already mentioned the case of Phineas Gage, to whom an iron rod had destroyed much of the left frontal lobe of the brain due to an accident. Mr. Gage displayed a changement in behavior and personality after this event, which triggered the curiosity of researches. This case is said to be the benchmark of future research in this field. It has been observed for instance that damage to the dorsolateral pre-frontal cortex (dllPFC), which is the part of the

[74] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

[75] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

[76] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

[77] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

[78] Paul W. Glimcher; Colin F. Camerer; Ernst Fehr; Russell A. Poldrack. *Neuroeconomics- decision making and the brain*. Elsevier, 2009 ch. 1

[79] *Functional Magnetic Resonance Imaging (fMRI).* Reflexions. http://reflexions.ulg.ac.be/cms/c_7613/en/functional-magnetic-resonance-imaging-fmri

brain involved in the management of cognitive processes, can influence very intensively cognitive control. Also injuries to the ventromedial pre-frontal cortex (vmPFC) have repercussions on the individual's behavior, even though these are not as easy to detect as the ones that are triggered by injuries to the dllPFC. Individuals with injuries at the vmPFC tend to have difficulties in situations where a balance between rewards and risks is needed.

The reason why these areas are so important for decision making is that the pre-frontal regions of the frontal lobes of the brain are involved in the executive functions. That is, they are involved in what is generally called cognitive control. Cognitive control (CC) is that mechanism which controls behavior and makes sure individuals select the best behaviors needed for the attainment of a specific goal. The importance of cognitive control in economics, is due to the fact the there is an assumption that individuals are rational. Thus an individual which does not present damages in the areas of the brain involved in the cognitive control process, should always rationally choose the alternative that most probably will maximize his or her utility. This is what the "homo economics" of John Stuart Mill did. In fact, it is true that in standard economic theory internal constraints are rarely taken into consideration. Factors influencing choices are usually indicated as prices or income, thus external factors. Emotions are not considered in that it is supposed that an individual which is influenced by emotions during decision making in the economic sphere, is an irrational individual. However, emotions do exist and it has been shown that the part of the brain which controls them is the phylogenetically older limbic system. Instead the pre-frontal cortex, which is more developed in human beings, is related to cognitive control as already mentioned. There is an ongoing debate on whether these two systems work in a unitary or dualistic manner. In the dual model, there is an independence between the cognitive control systems, and the emotion related processes, thus these can generate decisions independently without being influenced by one another. The unitary model instead states that there are different systems at work, but these cannot work independently from one another and influences are inevitable. To better understand this debate, let's take into consideration specific cases in which individuals display inconsistencies during decision-making.

II. The dual-unitary debate:

Individuals are asked every day to take decisions which involve risk. Choices about study plans, about medical assistance, about investments, are all taken in a circumstance of risk and uncertainty. It is though easy to understand why the cognitive processes that bring people to take certain decisions instead of others, has always fascinated scholars. Understanding how people make decisions of this kind and why, would enormously help policy makers and economists. In the effort to understand the behavior of individuals, as we already saw, John William Atkinson developed the Expected Value theory during the 1950s and the 1960s. According to this theory: "behavior is a function of the expectancies one has and the value of the goal toward which one is working. Such an approach predicts that, when more than one behavior is possible, the

behavior chosen will be the one with the largest combination of expected success and value."[80] This theory though was rejected by the St. Petersburg paradox. In order to resolve the St. Petersburg paradox, Bernoulli theorized the expected utility theory, according to which people do not maximize expected value but expected utility. When Von Neumann and Morgenstern provided an axiomatic foundation for the theory, this last one became the dominant theory to understand not only repeated behavior but also unique decisions. The limitation of this theory is to be found in the fact that it assumes that individuals do not take into account the context in which the gains are generated. In simple words, it is referent-independent. Now it is known that people instead tend to analyze the choice they made with the one they could have made and compare the two outcomes, the one they got and the one they could have gotten. In the case in which the outcome they chose is better than the other, they rejoice, in the opposite case they feel regret. Feelings of regret though tend to be felt in a stronger way than feeling of rejoice. Thus individuals tend to avoid feelings of regret, by attempting to maximize expected utility. Daniel Kahnemann and Amos Tversky introduced prospect theory which had to provide an alternative to expected utility theory. The main difference rested in the fact that prospect theory introduced the idea of the reference point.

Going back to rejoice and regret, it is easy to understand why people tend to avoid losses. In fact, it has been demonstrated thanks to various researches that individuals are generally loss averse. Loss aversion refers to the tendency of individuals to prefer avoiding losses, even though they might have the possibility of gaining something, during risky situations. It is an example of inconsistency during decision-making and traditional economics considers this behavior completely irrational. In fact, it would be rational to value risks and gains at the same level. Inconsistencies of this type are easier to explain using the dual model. In this case for instance, it could be said that losses are processed by a different system than gain, namely in the emotional-sensory elated cortical regions.[81] Scholars who uphold the unitary theory, would state that this inconsistency is the result of different ways to process losses and gains within the same system.[82] The first neuroscientific studies on this problem seemed to support the dual system hypothesis. In fact, it has been observed that losses are related to systems such as the amygdala which are part of the limbic system and are involved in emotional reactions.[83] Gains instead where not processed by these systems, even though some exceptions have been observed, and where instead processed by the mesolimbic dopaminergic system which controls the brain's pleasure and reward centers.[84] However, a study by Tom et al has shown that gains and losses were processed asymmetrically by the same system which was activated by gains and deactivated by

[80] http://www.britannica.com/topic/motivation/Behavioristic-approaches-to-motivation#ref362909
[81] Scott Rick. Losses, *Gains and Brains: Neuroeconomics Can Help to Answer Open Questions about Loss Aversion.* Journal of Consumer Psychology, 2010 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1615202
[82] Scott Rick. Losses, *Gains and Brains: Neuroeconomics Can Help to Answer Open Questions about Loss Aversion.* Journal of Consumer Psychology, 2010 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1615202
[83] Scott Rick. Losses, *Gains and Brains: Neuroeconomics Can Help to Answer Open Questions about Loss Aversion.* Journal of Consumer Psychology, 2010 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1615202
[84] Scott Rick. Losses, *Gains and Brains: Neuroeconomics Can Help to Answer Open Questions about Loss Aversion.* Journal of Consumer Psychology, 2010 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1615202

losses. The deactivation process due to losses was larger than the activation one, thus it brought to loss-aversion. This experiment supports the unitary model. It must be said though that the tasks of Tom et al experiment was different from the previous ones, and this might partially explain the different results. Moreover, later experiments with a similar paradigm as Tom et al where not able to replicate the same results. In 1994 Antonio Demasio formulated the somatic marker hypothesis according to which emotional processes can influence and also bias all behavior and in particular decision making. We will analyze this theory more in depth later paper. In 2010 De Martino et al studied individuals with injuries to the amygdala and fond that these seemed to not display loss-aversion.[85]

Another example is the case in which the individuals find themselves in a risky situation but contrary to the cases in which loss aversion was observed, there is no loss involved. The experiments which have been used to observe decision making processes in individuals in this situation, offer the test taker two baskets of goods. One has a higher gain, but lower probability, the other is lower is the amount won but most of the times is a 100% probability. According to the utility maximization theory, individuals should not value the two baskets of goods in a different manner in that they both have the same expected value. In reality data has shown that people tend to choose the sure option displaying in this way an aversion to risk.[86] The dualistic model would state that the aversion to risk is due to emotions because it is a biased decision behavior, while unbiased decisions are due to overriding processes done in a deliberative way. The Venkatraman's results of 2009 give some evidence to this line of thought. According to this experiment, the act of overriding risk tendencies which are displayed by individuals requires a specific form of CC; they called this form of CC, strategy control. The experiment consisted of a FMRI study which tried to support the idea of "anatomo-functional specialization of CC within the medial prefrontal cortex (MPFC)."[87] The subjects had to take part to three tasks which represented increasing levels of cognitive control. They found out that the different tasks activated different regions which were located on an axis that went from the anterior part of the MPFC to the posterior part of the same. Response control, which is more superficial, activated the farthest regions which have the majority of connections of the lateral motor and premotor area. As CC became more elaborate, the areas interested became more and more anterior. According to this line of view CC serves to attenuate biases in decision making. To further support this view recent imaging studies showed that the dorsolateral prefrontal cortex (DLPFC) ,which is related to CC, is a very important area in the mediation of risk aversion.[88] Rustichini though argues that the unitary view cold also explain this behavior. The argument states that the DLPFC processes general information and does not take into account whether or not the

[85] Scott Rick. Losses, *Gains and Brains: Neuroeconomics Can Help to Answer Open Questions about Loss Aversion.* Journal of Consumer Psychology, 2010 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1615202

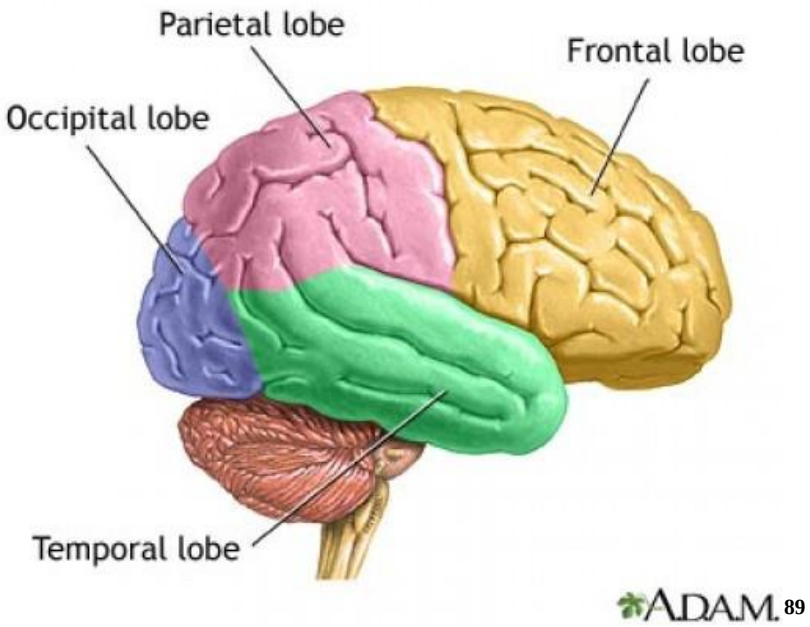
[86] Scott Rick. Losses, *Gains and Brains: Neuroeconomics Can Help to Answer Open Questions about Loss Aversion.* Journal of Consumer Psychology, 2010 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1615202

[87] Gabriele Chierchia; Giorgio Coricelli. *The role of cognitive control and emotions in decision-making: a neuroeconomics perspective.* Center for Mind/Brain Science, University of Trento, Max Planck Institute for Human Cognitive and Brain sciences, Economic department, University of Southern California. pg. 5 https://dornsife.usc.edu

[88] Scott Rick. Losses, *Gains and Brains: Neuroeconomics Can Help to Answer Open Questions about Loss Aversion.* Journal of Consumer Psychology, 2010 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1615202

stimulus is of emotional nature. This means that if this area displays damage, it will result in a lowering of the capacity of relating informational sources such as gains and probabilities; this would result in risk taking behavior.

III. Emotions:



[89]

Whether or not our brain functions thanks to a unitary or a dual process, there is no doubt that emotions do have an influence in decision-making and other cognitive functions. It is then interesting to analyze what emotions are and how they function. As can be seen from the above picture, the human brain is divided into four parts called lobes. These are the frontal, parietal, occipital and temporal lobes.[90] As we have previously said, the frontal lobe is involved in cognitive control activities and planning. The areas in the parietal lobe control motor action while the visual processes are governed by the occipital lobe areas. At last memory, recognition and emotions are controlled by the temporal lobes. These different areas are not completely independent one from the other in that neurons from the different lobes are interconnected. [91]For example, when one must decide between an option or another, the occipital lobe "pictures" the outputs of the various options, the temporal lobes associates an emotion with each outcome, the frontal lobe weights the different options using the emotions "created" by the temporal lobes and finally the frontal lobes take a final

[89] https://www.google.it/search?q=brain+lobes&hl=it&biw=1280&bih=785&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjVxKfE_pLNAhWIrRoKHRUtB_wQ_AUIBigB&dpr=1#imgrc=wmoV0h7Jc0G7MM%3A

[90] Colin F. Camerer; George Loewenstein; Drazen Prelec. *Neuroeconomics: Why Economics Needs Brains.* Scandinavian Journal of Economics 106(3), pg. 555-579, 2004 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=623342

[91] Colin F. Camerer; George Loewenstein; Drazen Prelec. *Neuroeconomics: Why Economics Needs Brains.* Scandinavian Journal of Economics 106(3), pg. 555-579, 2004 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=623342

decision. This is done in an instinctive way by all animals. What changes in the human brain is the presence of the larger cortex, which is involved in the rational thinking and thus makes sure that in decision-making not only primordial animal instincts are involved but also human deliberation and foresight.[92] The human brain presents three important functions: automaticity, modularity, sense-making.[93] Many of the decisions we take come from automatic and rapid processes which are unconscious and thus individuals generally do not know the reasons that brought them to make that kind of decision. These usually come from habits and to overcome these habits one must make a cognitive effort, but these reactions are still very important. Think for example at the very first time you went on a bicycle or drove a car. It seemed a very difficult task and at first it required a big amount of brain and body resources. Once you have learnt though you know automatically how to ride a bicycle or drive a car, even after long periods in which you have not engaged in such activities. Moreover, it is not easy to teach someone else what you now do in an automatic way.

The term modularity refers to the use of functions in an individual and distinct way. [94]We have seen that even if the four lobes of our brain do work together, the modules of the brain are neuroanatomical separated. The "facial fusiform area"[95] for example is specialized in the recognition of face features, while Broca and Wernicke discovered language areas which are separated between an area specialized in semantics and another in comprehension and grammar.[96] Modularity is important in that it helps to understand why in different situations people tend to react differently. To better understand this concept, let's think about experiments brought forward in the lab and real life experiences. People will react differently because the difference in the two situations should activate two distinct parts of the brain. We already saw that this is a central point in the critiques and limitations that have been attributed to prospect theory.

We must not forget though that complex behavior does require cooperation between the various parts of the brain. As in a machine, different parts specialize in different tasks but the final outcome is due to a process of cooperation between the different regions. In neuroscience then the attention is not only on the specialization of the parts but primarily on the mechanisms that make cooperation possible. At last the struggle to understand our own behavior is due to sense-making functions.[97] An interesting characteristic of this function is that it is influenced by expectations which imply that we might miss factors we are not expecting. An example is the "gorillas in our midst" video in which individuals are asked to count the times a

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[92] Colin F. Camerer; George Loewenstein; Drazen Prelec. *Neuroeconomics: Why Economics Needs Brains.* Scandinavian Journal of Economics 106(3), pg. 555-579, 2004 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=623342

[93] Colin F. Camerer; George Loewenstein; Drazen Prelec. *Neuroeconomics: Why Economics Needs Brains.* Scandinavian Journal of Economics 106(3), pg. 555-579, 2004 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=623342

[94] Colin F. Camerer; George Loewenstein; Drazen Prelec. *Neuroeconomics: Why Economics Needs Brains.* Scandinavian Journal of Economics 106(3), pg. 555-579, 2004 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=623342

[95] Colin F. Camerer; George Loewenstein; Drazen Prelec. *Neuroeconomics: Why Economics Needs Brains.* Scandinavian Journal of Economics 106(3), pg. 555-579, 2004 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=623342

[96] Colin F. Camerer; George Loewenstein; Drazen Prelec. *Neuroeconomics: Why Economics Needs Brains.* Scandinavian Journal of Economics 106(3), pg. 555-579, 2004 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=623342

[97] Colin F. Camerer; George Loewenstein; Drazen Prelec. *Neuroeconomics: Why Economics Needs Brains.* Scandinavian Journal of Economics 106(3), pg. 555-579, 2004 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=623342

basketball is passed between members of a team. After 40 seconds a gorilla passes, looks at the camera, thumps its chest and goes away. The gorilla is present on the video for nine seconds but about 50% of the individuals looking at the video are not aware of the gorilla's presence even if they are asked about the intrusion. This in psychological terms is indicated as the top-down approach and it is also linked to the fact that the brain tends to fill up incomplete pictures or to detect patterns even if they are not present. Moreover, the brain can assimilate only a determined amount of information and thus it "overwrites" the previous beliefs. This creates what is called the "hindsight bias" which brings individuals to believe that events were predictable after that the fact has occurred, even if they were not.[98] These unconscious mechanisms are very important in that they are a key component of every decision-making process. This does not mean that rational thinking and deliberation are not present, the two mechanisms act together and analyzing both of them is important to understand wholly the decision-making mechanism.

We also said that emotions are very important in that these, thanks to the work of the temporal lobes, play a key role in deciding between options, but what are emotions? According to Antonio Demasio, emotions act as bridges between the rational part of our brain and thus the upper cortex and the non-rational lower parts. Emotions are felt only after "evaluative, voluntary, no automatic mental process". [99]Once we receive stimuli we filter them with our past experiences. The resulting emotions and their intensity are thus different from individual to individual. In childhood we experience what Antonio Demasio indicates as primary emotions. These are regulated by the limbic system circuit, the amygdala and the anterior cingulated.[100] Humans as animals are instinctively brought to associate certain emotions to certain features of the world or of living things, for example size, sounds or types of motions. Components in the limbic system, for example the amygdala, detects these features, then the neuron nuclei produce an image of such feature and this image triggers a determined body state which is associated with an emotion.[101] In the case of fear this body state will be a quick heart-beat, trembling lips and weakened limbs. If we feel range then we will flush in the cheeks, clench our teeth and dilate our nostrils. The actual sight of the feature is not needed in order to trigger these body states, what must be present is the mental image the neuron nuclei creates. Of course this can also create wrong images and trigger wrong emotions and body states. The utility of emotional states rest in the fact that they are quick and at times lifesaving.[102] Neuroscientists have observed that the process does not terminate with the ending of the body state which defines a determined emotion. The next step in the cycle is the "feeling of the emotion in connection to the object that triggered it". This means that if a feature, for example a snake, triggers fear, you will probably react in a fearful way every time you meet a snake or your neuron nuclei project the mental image of a snake. If we have this primordial instinctual way of

[98] Colin F. Camerer; George Loewenstein; Drazen Prelec. *Neuroeconomics: Why Economics Needs Brains.* Scandinavian Journal of Economics 106(3), pg. 555-579, 2004 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=623342

[99] Antonio R. Damasio. *Descartes' Error- Emotion, Reason, and the Human Brain.* Avon Books, 1994 pg. 130

[100] Antonio R. Damasio. *Descartes' Error- Emotion, Reason, and the Human Brain.* Avon Books, 1994 pp. 127- 223

[101] Antonio R. Damasio. *Descartes' Error- Emotion, Reason, and the Human Brain.* Avon Books, 1994 pp. 127- 223

[102] Antonio R. Damasio. *Descartes' Error- Emotion, Reason, and the Human Brain.* Avon Books, 1994 pp. 127- 223

avoiding harmful things and to safe our own life, then why do we have consciousness? Consciousness serves the aim of enlarging protection.[103] In simple words, if you feel fear for an object, situation or living thing, you can react in two ways. Either you do not control this emotion and you react to every feature that may only recall to your mind the object, situation or living thing that triggered said emotion, or you can analyze such object, situation or living thing in a rational way. Doing so will make sure that you will be able to think ahead and avoid whatever makes you fearful, instead of having to react to it at the last moment. This is the difference between emotions and feelings. Feeling an emotion means being conscious of such emotion in order to avoid being controlled by it. [104]

Once we start to experience feelings and not just emotions, the mechanisms of primary emotions are followed by those of secondary emotions. [105]The limbic system though is not sufficient for secondary emotions, in that these are in need of a broader network which encompasses also the prefrontal and the somatosensory cortices. [106] The process that brings to secondary emotions begins with the conscious deliberation of the relation you have with a situation, object of living thing. This deliberation, which is in simple an evaluation of the object, situation or living thing in which every aspect of the relation, including the past and present situation, and the impact you expect that the encounter will have on you or other people, is taken into consideration. This is consciously done; while at the unconscious level the prefrontal cortex responds to the above mentioned mental images thanks to acquired, and not innate as in primary emotions, dispositional representations. In short the emotional reactions have been paired to determined events, thanks to individual experiences. We must not forget though that these acquired dispositions are results of innate ones. For example, the innate disposition associated with the sight of a snake is usually of fear, but due to individual experiences this emotion can be felt with more or less intensity. In some people it might be absent and in others it might bring to a real phobia. [107]

Emotions constitute the basis for the so called somatic marker theory which, as previously said, was conceived by Antonio Damasio in 1994. What Damasio observed was that it is true that we use rationality to take decisions but before rationally analyzing the expected utility of each option we tend to associate different emotions with the outcomes. These emotions result in determined body states. For example, the emotions attached to a bad outcome are felt through "an unpleasant gut feeling".[108] These feelings are bodily and thus Damasio indicates them as somatic[109] states and because they are the result or "marks" of a mental image he called them markers. Somatic markers are, according to Damasio, a special kind of feelings that, as

[103] Antonio R. Damasio. *Descartes' Error- Emotion, Reason, and the Human Brain.* Avon Books, 1994 pp. 127- 223
[104] Antonio R. Damasio. *Descartes' Error- Emotion, Reason, and the Human Brain.* Avon Books, 1994 pp. 127- 223
[105] Antonio R. Damasio. *Descartes' Error- Emotion, Reason, and the Human Brain.* Avon Books, 1994 pp. 127- 223
[106] Antonio R. Damasio. *Descartes' Error- Emotion, Reason, and the Human Brain.* Avon Books, 1994 pp. 127- 223
[107] Antonio R. Damasio. *Descartes' Error- Emotion, Reason, and the Human Brain.* Avon Books, 1994 pp. 127- 223

[108] Antonio R. Damasio. *Descartes' Error- Emotion, Reason, and the Human Brain.* Avon Books, 1994 pg. 173
[109] From the greek word "soma" which stands for body

we have seen, are generated by secondary emotions. [110]Certain scenarios are associated to determined feelings and emotions due to the personal experiences of the single individuals. So when a negative somatic marker is associated to a certain future scenario, this acts as an alarm bell, if the somatic marker is positive instead it results in incentives to pursue that determined course of action. Negative signal may lead the individual to reject immediately the option which leads to the bad outcome and thus here is the reason why decision-makers tend to be risk and loss averse. Damasio states that the absence of the somatic markers leads to less accurate and efficient decisions.[111] In fact, after that the individual had rejected the negative courses of action, he can now choose between fewer options using the rational cost/benefit analysis. We must though remember that somatic markers do not decide for us but they only assist our decision making processes.

Where do somatic markers come from? We have seen that all living things are born with the capacity of reacting to stimuli with somatic states that reflect the so called primary emotions. Thanks to the various experiences we collect while growing up, human beings are able to connect certain body reactions to certain stimuli through the secondary emotions process. Somatic states are derived from this last class of emotions. [112]

Emotions are thus essential in the decision-making process, but how do they influence decisions in the international arena. In the next section we will try to understand the behavior of policy makers in international politics in the light of the cognitive mechanisms and of prospect theory, using as a guide the analysis made by Jack S. Levy in various papers he wrote during the years.

[110] Antonio R. Damasio. *Descartes' Error- Emotion, Reason, and the Human Brain.* Avon Books, 1994 pp. 127- 223
[111] Antonio R. Damasio. *Descartes' Error- Emotion, Reason, and the Human Brain.* Avon Books, 1994 pp. 127- 223
[112] Antonio R. Damasio. *Descartes' Error- Emotion, Reason, and the Human Brain.* Avon Books, 1994 pp. 127- 223

Chapter 3: Prospect theory and international relations:

3.1 Application of prospect theory to international relations:

I. The Status Quo bias, endowment effect and reference point:

Prospect theory has become the most influential theory of decision making. As we have seen its initial formulation was centered on economic based experiments. However, Kahnemann and Tversky precise that the theory can be applied to a wide range of situations and one of these and probably the most interesting for political scientists is the application it has to international relations.[113] Even though, we must always keep in mind the issues involving the external validity of the theory as we have already seen, we must also remember that the decisions that are taken by heads of state, Prime Ministers and parliaments, are always taken by human beings and thus are influenced not only by the axioms of prospect theory but also by the functioning of the human brain which we have analyzed previously. Recall that prospect theory is based on the assumption that individuals tend to be risk averse when they find themselves in a situation of gain and risk seeking when the situation on the contrary is of lost. Moreover, the very basis of the theory states that individuals tend to violate the principal axiom of expected utility theory according to which people tend to choose always the option that maximizes their utility. In other words, individuals are not rational. This does not shake only the basis of economic theory but also of international relation theory in which one of the main base points was founded on the idea of the rational man. As we have seen, according to prospect theory, individuals measure their losses or gains starting from a reference point. This reference point very often coincides with the status quo and due to loss aversion and endowment effect individuals tend to prefer not moving too far away from it, even if it means having a high probability of gain. [114] This is known as the status quo bias and it was demonstrated by Samuelson and Zeckhauser through various experiments.[115] In the first one the test-takers had to choose between hypothetical choice tasks in a version that did not define a status quo. An example of these options was: "you are a serious reader of the financial pages but until recently had had few funds to invest. This is when you inherited a large sum of money from your great-uncle. You are considering different portfolios. Your choices are to invest in: a moderate-risk company, a high risk company, treasury bills, municipal bonds." [116] Other test-takers were provided with the

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[113] Daniel Kahnemann; Amos Tversky. *Prospect Theory: An Analysis of Decision under Risk*. Econometrica, 47(2) pp. 263-291, 1979 http://www.econometricsociety.org.

[114] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pp. 215-241 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents

[115] Daniel Kahnemann; Jack L. Knetsch; Richard H. Thaler. *Anomalies- The Endowment Effect, Loss Aversion and Status Quo Bias*. Journal of Economic Perspectives- Volume 5, Number 1, 1991 pp. 193-206 https://www.jstor.org/stable/1942711?seq=1#page_scan_tab_contents

[116] Daniel Kahnemann; Jack L. Knetsch; Richard H. Thaler. *Anomalies- The Endowment Effect, Loss Aversion and Status Quo Bias*. Journal of Economic Perspectives- Volume 5, Number 1, 1991 pp. 198

same problem but this time the status quo was indicated as one of the options. The problem in this case continues as "…That is when you inherited a portfolio of cash and securities from your great-uncle. A significant portion of this portfolio is invested in a moderate risk company...(The tax and broker commission consequence of any change are insignificant)".[117] In other experiments, the problems that were presented had this same format. In this way Samuelson and Zeckhauser were able to analyze how many times the option that was presented as the status quo was chosen. The results highlighted the fact that an option tended to be chosen more often when it is indicated as the status quo. Also Quattrone and Tversky provided examples for such bias. The options that were given to test takers where these:

Problem 1: knowing that the current inflation rate is 42% and unemployment 15%, choose between
A: candidate Frank who wants to maintain inflation and unemployment at the current level
B: candidate Carl who wants to decrease the rate of inflation by 19% and increase the rate of unemployment by 7% [118]

Problem 2: knowing that the current inflation rate is 23% and unemployment is at 22%, choose between
A: candidate Frank who wants to increase inflation by 19% and decrease unemployment by 7%
B: candidate Carl who wants to maintain inflation and unemployment at the current levels[119]

Notice that the outcomes of the two options in each problem are identical. Candidate Frank wants to maintain inflation at 42% and unemployment at 15%, while candidate Carl wants to maintain inflation at 23% and unemployment at 22%. Still individuals preferred candidate Frank in the first problem and in the second one they preferred candidate Carl. This is in line with loss aversion and it outlines the status quo bias. In fact, the only difference in the two problems is that Frank's position coincided with the status quo in problem 1, but not in problem 2. These experiments are very straightforward but let's not forget the limitations that prospect theory presents due to the experimental designs. In order to overcome the internal validity issues, let's see an example of status quo bias which is not experimental but comes from a real life experience.[120] In Pennsylvania and New Jersey, he same automobile insurance legislation was implemented but the response was different. Car owners in the two states were given two choices: one was between an insurance

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https://www.jstor.org/stable/1942711?seq=1#page_scan_tab_contents
[117] Daniel Kahnemann; Jack L. Knetsch; Richard H. Thaler. *Anomalies- The Endowment Effect, Loss Aversion and Status Quo Bias*. Journal of Economic Perspectives- Volume 5, Number 1, 1991 pp. 198 https://www.jstor.org/stable/1942711?seq=1#page_scan_tab_contents
[118] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pp. 215-241 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents
[119] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pp. 215-241 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents

[120] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pp. 215-241 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents

legislation which placed some limitations of the right to recover damages but provided a less expensive policy. The other option was the opposite, with the possibility of more extensive claims but also a more expensive policy. In New Jersey though people would receive the less expensive policy by default unless they clearly requested the other option, in Pennsylvania it was the opposite. The option that was given by default was the more expensive on, with less limitations. The time and effort needed to request the option which was not given by default was minimal and both states actively invited citizens to take a thoughtful decision. Still the difference in responses was very high. In New Jersey over 70% of the car owners chose the less expensive policy while in Pennsylvania only less than 25% requested that option. In other words, in both countries the majority of the citizens chose the option that was given to them by default. This again depicts the status quo bias.

It must be said though that not always the status quo matches with the reference point. In fact, it can be the case in which people have aspirations or expectations which makes the reference point higher than the current status quo. Another case in which this can occur is when an individual has suffered a loss and thus makes the reference point match the previous status quo. Thus it would be better to speak about a reference point bias [121] which "subsumes the status quo bias whenever the reference point is defined as the status quo and under those conditions it will be stabilizing and reinforcing the status quo". [122] The importance individuals place over the reference point and their own aspirations and expectations, help to explain a number of situations. For example, in violence theories it has been noticed that revolutions and violent uprisings tend to erupt when the rate of improvement or the level of wealth doesn't match expectations or falls, moving away from the status quo. It is not sufficient then to live under conditions of enormous sufferings; there must be a generalized feeling of failing expectations. [123]

II. **Prospect theory applied to international politics:**

The application of Prospect Theory which has arisen the most interest in these years is surely that to international relations, in which many of the over mentioned patterns are present. The status quo bias can be seen in the attitude of states to prefer making greater efforts in order to preserve their status quo then to gain something. They will thus apply a greater force in the defense of a territory they already have than to acquire new ones. [124]Ross illustrated this by arguing that the Soviets tended to use more force in the defense of their territories than in the struggle to acquire new ones. Also public opinion counts, in fact political leaders may be supported more if the military intervention is seen as protective rather than

[121] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pp. 215-241 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents

[122] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pg. 223 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents

[123] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pp. 215-241 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents

[124] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pp. 215-241 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents

promotive.[125] The empirical support for this hypothesis comes from a study by Nincic (1997) who studied 18 American interventions and the support these had among the population. Also the U.S. congress tends to give its approval more to protective rather than promotive offences. [126]

We can also see the effects that a loss has on the reference point. In international relations, states that have lost territories will generally continue to identify as status quo their previous territorial situation and will thus tend to become risk seeking in order to restore the former condition. If the state in question is able to go back to what it considers his status quo the situation will return to normal and it will not engage in risk seeing activities to gain ulterior territories but only to defend the ones they already have.[127] An example of this tendency is the Arab-Israeli war of 1967 and 1973. The Arab political leaders had suffered many losses in the 1967 war and thus they were wanted to restore what they perceived as a lost status quo even if this entailed the need of another war (the 1973 war) which could have been risky. Israel in fact had renormalized the situation around the new status quo and thus struggled very deeply to maintain the new territories. [128]

Sunk costs also have an important role in international relations. It has been observed that in an escalating conflict the loss of lives contributes to the continuation of the conflict itself. [129]In fact, for psychological reasons political leaders are lead to continue the war using even more risky strategies which increase casualties and costs in a twisted spiral, as happened during the American intervention in Vietnam and the Soviet Union in Afghanistan or even the Israel in Lebanon. It is then easier to avoid that an actor starts a conflict in the first place than to convince them to stop a conflict in which such actor is already a part. [130]At the same time though we must remember that sometimes actors perceive their current situation as a lost and not as the status quo. This means that they might think that not taking action would equal to a dead cost and thus will be more tempted to engage in a conflict. In other words, it is easier to compel an actor to not take action when this last one is not in the domain of losses. It can be done more easily when the only thing the actor wants is what is perceived as an ulterior gain. [131]

In the next section we will see that even though it is very difficult to understand the way in which individuals frame situations and it is difficult sometimes to understand if individuals use traditional cost/benefit calculations or if they use the prospect theory axioms to take decisions, there are cases in which these

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[125] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pp. 215-241 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents

[126] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pp. 215-241 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents

[127] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pp. 215-241 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents

[128] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pp. 215-241 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents

[129] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pp. 215-241 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents

[130] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pp. 215-241 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents

[131] Jack S. Levy. *Application of Prospect Theory to Political Science.* Kluwer Academic Publishers, Synthese 135, 2003 pp. 215-241 https://www.jstor.org/stable/20117364?seq=1#page_scan_tab_contents

mechanisms are rather straightforward. For example, in the Iran Hostage crisis the way in which President Carter and his advisors framed the situation and thus decided how to act has been analyzed thoroughly and became a case of general interest. I will analyze this case using the book written by Rose McDermott, "Risk-taking in International Politics- Prospect theory in American Foreign Policy".

3.2 The Iran hostage crisis and prospect theory

We have talked about risk in decision-making and the way in which individuals react to situations of risk. Most decisions we make every day have a certain percentage of risk, in that, differently from experiments made in the lab, in everyday life the probabilities of obtaining a certain outcome and the value of this outcome are very uncertain. We cannot know for sure what will be the effect of an investment nor the outcome of an exam, even though we can try to estimate it. When talking about war Clausewitz spoke about "friction", that is the impact of unforeseen events on the outcome of a conflict.[132] Just as in conflicts, decisions in everyday life are influenced by unforeseen events that may change the outcome of our decisions. We cannot alter or control this, we can only analyze determined situations and try to take our decisions on the basis of past events in order to avoid as much as possible risks. There is though, another factor influencing our decision-making process; our own brain. We have previously seen the interaction between the emotional part of our brain and the rational one. During decision-making these two parts work together and sometimes the outcome of this cooperation can produce decisions that may seem to be rather strange from a utility maximization point of view. This happens in everyday life to every individual, but also in the political field when politicians need to take decisions that may have long term effects on their carriers, their countries and their reputations.

The analysis of risk-taking decisions in the area of international politics is extremely interesting and can give some answers to why certain decisions were taken and why they produced a certain outcome. I choose to analyze the Iran rescue Crisis of 1979 because it is a situation in which the mechanisms that influenced the decisions of each actor involved are very straightforward and the analysis of the process that brought to certain decisions is very interesting. Moreover, it an episode of clear historic interest in that it is the event that changed USA-Iran relations and which brought to the downfall of President Jimmy Carter. I will thus start by giving a brief overview of the historical event, outlining the most salient phases of the crisis and then I will go on to analyze the situation using as a framework prospect theory.

[132] Kenneth Payne. *The psychology of strategy: exploring rationality in the Vietnam war.* University Press Scholarship Online, 2015 ch. 1-2; 4-8

I. The Iran Hostage crisis:

The historical framework in which the Iran hostage crisis occurs is that of the Iran Revolution of 1979. Iran was governed by an authoritarian regime which was supported by foreign states and in particular the USA. [133]The Shah, Mohammad Reza Shah Pahlavi, had absolute power even though Iran was formally a constitutional monarchy. In 1977 demonstrations against the Shah started in Tehran which brought to a campaign of civil resistance which intensified in 1978. In 1979 the Shah fled the country and Ayatollah Khomeini, who was a Shia religious leader and the leader of the revolution, came back to the country. The royal reign collapsed and on April 1, 1979, after a referendum was held, Iran became an Islamic republic. [134]

In the meantime, in the USA, James Earl Carter, Jr. had become the 39th president of the United States in 1977. He was a democrat and a new figure in the United Sates political scene, which was a strength in that the public opinion did not associate him with the various scandals which had shaken the democratic party in the 1960s, but some people were afraid that he was not experienced enough to overtake office in such a turbulent era. Nonetheless the Carter's administration did achieve some important goals in the international arena, such as the Camp David accords which led to the Egypt-Israel Peace Treaty of 1979 and the Panama Canal Treaties which guaranteed that the Panama Canal would be under the control of Panama after 1999. He is also remembered for having brought about the second round of the Strategic Arms limitation talks in which the USA discussed with the Soviet Union the issue of armament control. Unfortunately, the years of his presidency were also marked by intense events such as the energy crisis that hit the USA as a result of the Iran revolution, the Three Mile Island Nuclear accident which is sadly remembered as the worst accident involving a US commercial nuclear power plant, and the Soviet invasion of Afghanistan. This last event had major influences in the decisions that Carter and his advisors will take during the Hostage crisis in Iran. His administration had supported the Shah in Iran even though in light of the new events President Carter tried to mitigate the widespread anti-American feelings by recognizing the new Iran government. This did not work and the hatred for the USA intensified as, on October 22, 1979, the Shah which had been diagnosed with a Lymphoma was admitted to the New York Hospital-Cornell Medical center to receive treatments.[135]

A series of demonstrations followed until on February 14, 1979 after that Adolph Dubs, the US ambassador in Afghanistan was killed by Muslim extremists in Kabul, Iran students stormed inside the US embassy in Tehran and took as a hostage Kenneth Kraus, a marine. This was the first attempt to seize the USA embassy. The ambassador William Sullivan surrendered the embassy to avoid violence and the crisis was resolved within three hours. It was agreed that Krause would be released within 6 days. On November 4, 1979, though, another demonstration erupted outside the US embassy in Tehran. The students reunited in the so called Muslim Student Followers of the Imam's line group, planned another seizure of the embassy. The

[133] General article. *The Iran Hostage crisis*. American Experience
http://www.pbs.org/wgbh/americanexperience/features/general-article/carter-hostage-crisis/
[134] General article. *The Iran Hostage crisis*. American Experience
http://www.pbs.org/wgbh/americanexperience/features/general-article/carter-hostage-crisis/
[135] General article. *The Iran Hostage crisis*. American Experience
http://www.pbs.org/wgbh/americanexperience/features/general-article/carter-hostage-crisis/

students analyzed the situation thoroughly by observing the Marine Security Guards and their procedures, by studying recent revolutions in which the embassy had been occupied and by trying to gain the support of the police officers in charge. Ayatollah Khomeini was not warned about the plan because there was the fear that for the purpose of maintaining order he would have supported the government's decision of using the police forces to disperse the demonstration but if he found himself in front of a multitude of students and pious Muslims who supported him, it would be difficult not to support the demonstration. So the plan was to bring about a symbolic occupation, but when the students realized the huge amount of support they had and the fact that the guards were not ready to use deadly force, the plan changed. Ayatollah Khomeini supported the takeover even if he had not been consulted previously. Some of the staff members at the embassy were able to take refuge in the British, the Canadian and the Swedish embassies of the city but the vast majority of the people who were present in the US embassy at the time of the takeover were held as hostages. [136]

The students asked for the immediate return of the Shah to Iran in order to bring him to trial and eventually execute him. They also asked the US to apologize for their interferences in Iran affairs in the 1953 overthrow of the then Prime Minister and the subsequent raise of the Shah. Some Afro-American hostages and 13 women were released in November 1979 and then a man who had become seriously ill was released in July 1980. The rest of the hostages were held captive for 444 days and released in January 1981. [137]

Negotiation for the release of the 52 hostages started in 1980 but failed after that the US rejected the Iranian demands. Operation Eagle Claw was then approved by President Carter. The plan entailed the use of eight helicopters. The aircrafts flew from the aircraft carrier to a road which served as airstrip, near Tabas on April 24, 1980. The bad atmospheric conditions, which included sand storms, disabled two helicopters. As the remaining vehicles met the next day, a third helicopter was found to be unusable and thus the commander of the operation recommended the abrogation of the mission. President Crater approved the recommendation, but as the helicopters were refueling one crashed into a C-130 tanker killing eight US servicemen and injuring others. A second attempt was planned but never carried out. In the aftermath the reasons for the failure of the mission were found in the poor planning, the poor training of the pilots, and the extreme weather conditions.[138]

II. Decision-making mechanisms in military strategy:

The failure of the mission brought to the end of the Carter's presidency and was a big blow to the US reputation; so why did Carter take the decision of engaging in such a troublesome mission? In order to answer this question, we must first understand the underlying mechanisms of decision making during military strategy and the importance that the unconscious has in these mechanisms. As we have seen the

[136] General article. *The Iran Hostage crisis*. American Experience
http://www.pbs.org/wgbh/americanexperience/features/general-article/carter-hostage-crisis/
[137] General article. *The Iran Hostage crisis*. American Experience
http://www.pbs.org/wgbh/americanexperience/features/general-article/carter-hostage-crisis/
[138] General article. *The Iran Hostage crisis*. American Experience
http://www.pbs.org/wgbh/americanexperience/features/general-article/carter-hostage-crisis/

emotional and rational systems of our brain cannot be separated and thus even during military operations, there is always an emotional part at play. Moreover, by analyzing prospect theory we saw that individuals tend to be risk seeking in the domain of losses and risk adverse in situations of gain. Let's remember that the endowment effect principle states that people tend to overvalue things they already have than ones they might achieve. As a consequence, individuals have the propensity of fighting to maintain their status quo and when they feel that their status quo has lowered then they will be more risk seeking in order to regain the previous status quo. All of these factors surely influenced President's Carter's decision, but let's analyze them more deeply.

Clausewitz wrote:" from his institutions, the state of his affairs and his general situation, each side, using the laws of probability, forms an estimate of its opponent's likely course and acts accordingly." [139]People in everyday life as in politics, analyze the different options they have and estimate what the outcome of each would be. We have seen that according to expected utility theory, the rational actor should always choose the option that will provide the highest utility. In prospect theory instead we have analyzed the concept of decision weights, the framing of each situation and the decision of a reference point which determines if the individual will be more risk seeking or more risk adverse. Kahnemann and Tversky have also observed the tendency of decision makers to be risk adverse in that we tend to overvalue losses in respect to gains. In real life though, we do not know for sure the probabilities of a certain outcome. Probabilities are not that easy to quantify and in addition we tend to fall pray of emotions which change the way we estimate the probabilities of a certain outcome. [140]

We have also seen how the brain functions when it comes to decision making. As in other spheres of life, political decisions are influenced by these mechanisms of the brain. Strategy in military terms is a highly unconscious act, which involves rationality as well as emotions, in that these two cannot be separated. Emotions tend to serve the cause of helping our brain take decisions in a faster way by using short-cuts; heuristics. [141] For example, one of the biases that we might encounter is the optimism bias. We tend to have overwhelming faith that the outcome of our choice will be favorable. Optimism is not always bad, it allows us to deal with stress and uncertainty and sometimes it can become a self-fulfilling prophecy. We must not forget though that chance always plays its part.[142] This is the very essence of situations of risk; we can never know what the outcome will be until it manifests itself. In simple words, the brain works thanks to associations that it makes usually not because they are objectively correct but because they are easy. Most of our decisions are made on the basis of the feeling they provoke in us and thus of the emotions that are

[139] Kenneth Payne. *The psychology of strategy: exploring rationality in the Vietnam war.* University Press Scholarship Online, 2015 ch. 1-2; 4-8

[140] Kenneth Payne. *The psychology of strategy: exploring rationality in the Vietnam war.* University Press Scholarship Online, 2015 ch. 1-2; 4-8

[141] Kenneth Payne. *The psychology of strategy: exploring rationality in the Vietnam war.* University Press Scholarship Online, 2015 ch. 1-2; 4-8

[142] Kenneth Payne. *The psychology of strategy: exploring rationality in the Vietnam war.* University Press Scholarship Online, 2015 ch. 1-2; 4-8

prevalent in that moment. This is why we tend to recall to the mind past events thanks to the emotions they have provoked. In this way though memories become mental constructs which are built thanks to feelings and that influence in this way the decisions we take in the present and the perception we have of the future. In strategic mechanisms emotions serve the aim of prioritizing between different stimuli and reach a decision as soon as possible. In fact, this emotional mechanism is much faster than the rational and conscious decision making process. According to Damasio, individuals which present sever brain damages are unable to make fast decisions in that they present emotional impairments that make it difficult for them to use short-cuts to make decisions.

In a military situation, one of the prevailing emotions is the research for esteem, which is tightly linked to the concept of social group.[143] People tend to seek esteem or status and as Thucydides observed, the pursuit of "honor" can explain why many conflicts break out.[144] When we perceive that we have been dishonored in some way we tend to react in order to regain our status and to send a message to our enemies. "Without identity there is no 'national interest' to defend, and with identity comes, indissolubly, a set of values and ideas that shape how we behave and why".[145] Social groups are the result of a feeling of connection with other people. When we start to perceive a certain aggregation of individuals as constituting a group it is likely that this group will be distinguished by the others by a process of stereotyping of the others.[146] A social stereotype is a "cognitive structure containing the perceiver's knowledge, beliefs and expectancies about some human social group". [147] Stereotypes are thus creations of an individual's mind, but why is there a tendency of categorizing others into groups instead of taking into consideration the uniqueness of each individual? This is because in a world in which we are overloaded with stimuli it is more efficient for our cognitive mechanisms to identify the similarities and differences among groups rather than among singular entities. Moreover, there is a motive of self-enhancement. Categorizing others into groups helps in the positive evaluation of one-self according to social identity theory.[148] This has the effect of motivating the individuals to achieve and preserve a positive social identity from the groups of which they are members of. [149]

Not always people choose the social groups to which they become members. Sometimes individuals are assigned to groups in an arbitrary way, but even when this is the case, people will tend to assign positive features to their group and negative ones to the groups of which they are not a part of. Correspondence bias, which indicates an actor's tendency to overestimate factors which are internal to certain mechanisms and

[143] Kenneth Payne. *The psychology of strategy: exploring rationality in the Vietnam war.* University Press Scholarship Online, 2015 ch. 1-2; 4-8

[144] Kenneth Payne. *The psychology of strategy: exploring rationality in the Vietnam war.* University Press Scholarship Online, 2015 ch. 1-2; 4-8

[145] Kenneth Payne. *The psychology of strategy: exploring rationality in the Vietnam war.* University Press Scholarship Online, 2015 ch. 1-2; 4-8

[146] C. Neil Macrae; Charles Stangor; Miles Hewstone, *Stereotype and stereotyping*, The Guilford Press, New York, 1996

[147] C. Neil Macrae; Charles Stangor; Miles Hewstone, *Stereotype and stereotyping*, The Guilford Press, New York, 1996 pg. 42

[148] C. Neil Macrae; Charles Stangor; Miles Hewstone, *Stereotype and stereotyping*, The Guilford Press, New York, 1996

[149] C. Neil Macrae; Charles Stangor; Miles Hewstone, *Stereotype and stereotyping*, The Guilford Press, New York, 1996

underestimate situational factors, has the effect of making individuals perceive negative outcomes as coming from situational factors when it hits their group, while they perceive them as due to internal dispositions when they strike other groups. The other way round when talking about positive outcomes.[150] In the Iran Hostage crisis then it might be thought that Carter's administration saw the crisis as a result of a series of unfortunate events. The decision to proceed with the rescue mission probably has to do with the fact that the Americans were sure about their military superiority and thus the mission could not possibly have a negative outcome. An ulterior indicator of this idea was that when the rescue mission did fail, the prevailing idea was that it had been a failure due to the atmospheric conditions and not because of a lack of appropriate organization.

Another tendency displayed by individuals is that of justifying the differences between groups on the basis of the widespread idea that these differences are naturally set and thus acceptable.[151] This is seen both for roles within a single group, such as the different roles attributed to men and women, and for the hierarchical relationship between different groups. The belief that there must be a superior reason to the fact that some groups are more disadvantaged than others, has the effect of limiting the examination of one's own privileged situation. The result of this can be seen in the American reaction. They perceived themselves as being the stronger actor for natural reasons, and thus they could not accept to be beaten by an inferior group. This is why they did not even take into consideration the requests of the Iranians even though they did engage in multiple diplomatic meetings.

Certainly the quest for honor and prestige also plays a major role in strategic decision-making. As we have seen the belonging to a certain group, enhances self-esteem. Within a social group though, an individual will always try to seek prestige and honor in that this served the unconscious aim of having access to scarce resources.[152] President Carter saw in the success of the rescue mission a way to recover his honor which was threatened by the Soviet invasion of Afghanistan. He knew that if he was able to save the hostages keeping casualties low, his political prestige would highly increase and he would avoid the loss of the presidency in the upcoming elections.

III. Framing:

In the case of the Iran Hostage crisis many of these factors played a predominant role in the decision that was taken. To better understand the situation lets analyze the domain in which President Carter and his advisors perceived to find themselves.

According to President Carte it was obviously a situation of loss. The situation had been bad since the very beginning of the demonstrations in 1979 and got obviously worse with the siege of the embassy and the capture of the hostages that same year. Moreover, Carter had to face a hostile American public opinion, a

[150] C. Neil Macrae; Charles Stangor; Miles Hewstone, Stereotype and stereotyping, The Guilford Press, New York, 1996
[151] C. Neil Macrae; Charles Stangor; Miles Hewstone, Stereotype and stereotyping, The Guilford Press, New York, 1996
[152] C. Neil Macrae; Charles Stangor; Miles Hewstone, Stereotype and stereotyping, The Guilford Press, New York, 1996

sense of defeat in Congress and amongst the other governmental officials and finally the declining prestige of the USA on the international scene. In the domestic scene the popularity of the president was declining and the slow pace in which decisions were taken did not help. Congress and the public opinion pushed for a decision to be taken quickly and for actions to be taken against the Iran militants. It was also time for reelection and due to these problematic the campaign of the president was not going very well and his relationship with Congress was weakening as well. More simply when the hostages were taken Carter was already in a domain of losses in that he had already lost popular support, international credibility and national honor. For these reasons he saw in the hostage crisis a way to redeem himself. If the rescue mission had worked in fact, he would have certainly regained popularity and prestige. In terms of prospect theory President Carter wanted to return to his precedent status quo which was higher and better than the one he had in that moment. His reference point was that of the precedent status quo and he saw in the success of the hostage crisis the only way to go back to that status quo. [153]

President Carter had three main advisors. The Secretary of State Cyrus Vance, National Security Advisor, Zbigniew Brzezinski and White House Chief of Staff Hamilton Jordan. Each actor framed the situation in a different way and thus advised the president in different manners.[154]

Vance was against the rescue mission in that he perceived it to be too risky both from a political and a military perspective. He was afraid that even if the mission was successful it would only have the effect of angering the Iranians that could get other hostages from journalists that were still present in the country. Moreover, the mission could trigger an Islamic-Western war and this could push Iran to seek help from the soviets. In his view patience and negotiation were the safer ways to obtain the release of the hostages. He was very concerned with the security of the American soldiers and of the hostages. Put it simply, he framed the whole situation in terms of mortality and he made up his own idea on what was the best option by referring always to the probabilities of losing lives. [155]He was also concerned with the cooperation with Europe, more than the other advisors. Vance preferred option, as we will see, was the first one, that is the one entailing only the use of political pressure to obtain the desired result. For Vance the new status quo that had been created after the hostage crisis was not optimal but it wasn't so dramatic to need a fast intervention. It was acceptable to wait and see. The only thing he could not tolerate was the loss of lives. If we take into consideration prospect theory, Vance was not considering himself to be in a dominion of loss as President Carter did, and thus he was not as risk seeking as the president was. Vance knew that things were not good but still he was able to accept the new status quo, at least for the moment. This was probably because having framed the whole situation in terms of mortality, and because no lives had been lost until that moment he

[153] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[154] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[155] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

still did not perceive the situation as deteriorating. He would probably change idea if the Iranians killed one or more hostages. When President Carter decided to go on with the rescue mission, Vance resigned from office stating that he could absolutely not support the mission and thus he could not serve well the country.[156]

Brzezinski opinion was the opposite of Vance's. He was the most powerful sustainer of the rescue mission in that he framed the situation in terms of national power and prestige.[157] Of course he was also interested in the hostage's security but this came from the idea that the did not want to replicate the Bay of Pigs incident, which he saw as an unbearable American humiliation. For this reason, he was more willing to accept the loss of lives than Vance was. He was the one in the advisor's team that accepted the highest threshold of risk. In fact, he was one of the few to support a military raid against Iran. Brzezinski unlike Vance saw himself in a dominion of extreme loss. In fact, lives had not been lost and thus Vance did not perceive the situation as a complete disaster but the American credibility in the international scene and the honor and prestige of the Americans were deeply compromised. In this view, Brzezinski was willing to take a lot of risks in order to go back to the ex-ante status quo and he was willing to do that without waiting any further, in order to avoid worsening the situation even more. President Carter had traditionally taken Vance suggestions more carefully, in that they were personally and ideologically close. In the early stages of the foreign policy of Carter's presidency, it had been Vance his closest advisor. However, things started to change with the Soviet invasion of Afghanistan, according to Gary Sick.[158] This event shocked and offended the president who started to see himself in a domain of losses in the international front and thus to be more risk seeking in order to reestablish his and his country's honor.[159]

Hamilton Jordan, the White House Chief of Staff was a third influence on President Carter's decisions. He was the one which was mostly interest in the domestic situation, even because of his office. He framed the whole situation in terms of the reelection campaign. His interest was that of restoring the situation to normal and thus returning to what he perceived as the right status quo, the one that was present before the hostage crisis. The prospect of establishing domestic and international popularity all together was very appealing to him. He thus supported the rescue mission.[160]

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[156] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[157] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[158] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[159] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[160] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

IV. The options:

The opinions that were taken into consideration were principally five.[161] Each of them had a certain level of risk associated and each actor involved in the choice was influenced by its personal interpretation of the situation. In fact, we must remember that according to prospect theory the way in which the status quo is perceived and the way in which the options are presented have a deep impact on the subsequent choices that actors take. This is the framing process, which we have seen was very different from actor to actor in this situation. These differences came also from the different historical analogies with the case which each actor made. The Secretary of State Cyrus Vance saw in the World War II hostage crisis the case from which to take inspiration, while the National security advisor, Zbigniew Brzezinski, took inspiration from the Bay of Pigs analogy and thought that the hostage crisis would be the same as the Entebbe Israeli raid.[162] Carter shared Brzezinski view. The difference between the two rescue missions, the World War II mission had entailed an absence of military action while the Israeli Entebbe rescue mission entailed the use of a task force, had a deep influence on the choices the actors wanted to take and the options they came to prefer. Among the administration there was agreement on the level of risk of the various options but they disagreed on which option would be the most optimal to the needs of the USA and to the positive result of the mission. The option that presented the highest risk was the one in which the variance in the final outcome was also the highest. [163]

The first option required the need of being patient and waiting for the Iran internal situation to stabilize. The strategy was to press politically but not engage in any military action. Vance supported this option because of the analogy he saw with the World War II hostage crisis and as we have seen, because he framed the situation in terms of mortality and this option was the one that had the less risk of losing lives. The benefits were clear; this strategy would avoid risking upsetting the Iranians and it had a high degree of probability of protecting the hostages. The variance in outcomes was low in that bad reactions from the Iranians was highly improbable, and the failure of the release was also very improbable. From the domestic point of view though it was an option that went against the demand of the public opinion for action. Carter could be indicated as ineffective and of having ties with the Ayatollah, which was politically dangerous. Moreover, there was the risk of having to face international humiliation. The search for esteem and honor did the rest. The USA did not want to be indicated as the ones that had be pushed around by a weaker country. By following this option, the risks of triggering a war in Iran were kept very low and the percentage of chances of success was high. [164]

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[161] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[162] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[163] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

The second option was that of using diplomacy. It entailed the use of an embargo on Iranian goods, the expulsion of citizens of Iran from the USA and other measures. These measures were implemented even though it was deemed that it was not enough. On November 12, 1979 an embargo was placed on Iranian oil products and on November 14 Iranian assets in the country were frozen. (This was done by establishing the State of national emergency which made it possible for the president to use special powers under the Internal Emergency Economic Powers Act). On April, 7, 1980 diplomatic relations were broken with Iran and then several other financial and travel restrictions were imposed on Iran. This option was not very risky in that the variance of outcomes was low. The chances that the situation of the hostages was very low but so were the probabilities of resolving the crisis in the short-term. Here we must remember the notion of weighting from prospect theory. It was observed that people tend to consider more options which have a lower probability of success and because they overestimate this low probability, individuals will place particular emphasis in the struggle to reach to the desired outcome. In this case the amount of sanctions imposed on Iran was very high due to the psychological idea that the chances of resolving the crisis by this means were very low. [165]

The third option that was taken into consideration was the rescue mission itself. It entailed a medium risk in political terms but it was the riskiest option in military terms without taking into consideration the option of war itself. The plan was developed to bring home the hostages safely and with no loss of lives. Everyone though that the mission had been planned out very well, but they did not take into consideration the impact that unforeseen events could have on the mission. Sick and Brzezinski who can now turn back and analyze the event with a more critical eye, are both certain that the mission would have succeeded if the helicopters hadn't broken down. At the time most of the members of the Carter's administration agreed that this was the only way to bring home the hostages in a secure manner even though the probability of success was not certain. This option was seen as the option which presented the best balance between the military and the political risks. If everything worked out as planned the situation would be totally stabilized. The hostages would return home and in the domestic scene Carter would regain popularity and honor and in the international scene the USA would regain credibility.[166]

The fourth option entailed the mining of the Iran harbors. This could bring to an eruption of hostilities in that the Iranians could perceive this act as a declaration of war. Moreover, there was the risk of hitting non-Iranian targets. On the other side it would serve the purpose of blocking imports and exports without the need of a blockade. The administration though thought that it was not going to directly affect the hostage issue and in the contrary it could trigger a violent reaction by part of the Iranians.[167]

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[164] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[165] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[166] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[167] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

The fifth and last option was that of engaging in an all-out military attack. This option though was never seriously taken into consideration in that it was too risky both from a political and a military point of view.
As we have seen, the option that was chosen at last was the one of engaging in the rescue mission. The outcome was negative and in addition to the impossibility of rescuing the hostages, eight people died due to an accident. Presidents Carter honor and prestige was never recovered and he lost the subsequent elections. [168]

V. The expected value of the various options:

Trying to understand why certain decisions were taken in this context is very difficult. Prospect theory seems to provide a way of explaining such mechanism, but it might be argued that the decisions were not taken because of the aforementioned mental mechanisms, but because of a traditional cost/benefit calculation, which was entirely rational. In order to state that Carter's decision was irrational, one must first calculate the expected utility of the various options and indicate which one was the one which would bring to the highest expected value. Remember that a rational decision-maker will always choose the option with the highest expected value that is the option which presents the lowest variance in the outcomes and at the same time the highest probability of success. [169]

The first option, that is the one supported by Secretary of State Vance and which entailed the use of political pressure, had a very low variance. It was unlikely that the captors would release the hostages any time soon but at the same time it was also unlikely that the hostages would have been tried and eventually killed. In political terms then it was an option that might trigger the reaction of the American public opinion in that Carter's administration could be accused of immobility. In international terms the option could have the effect of sending a message of American weakness but the strategy would not irritate the Iranians. Moreover, as already said it had the lowest military risk in that there was a very low probability of the need for a military action. [170]

The second option, that is using economic and political sanctions, was very similar to the first one in terms of political and military riskiness. Of course the percentage of success and of obtaining a positive outcome were higher than the option of doing nothing as was presented in the first option. The difference rested in the fact that this time the reaction of the Iranians was not impossible. They could kill the hostages as a retort to the sanctions. The riskiness of this option then is higher than the one associated with the first option.[171]

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[168] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77
[169] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77
[170] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77
[171] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

The third option was that of the rescue mission. This option had the highest combination of political and military risks, in that the variance in the possible outcomes was the widest. In fact, in case of success the outcomes would be the best among all the five options. The crisis would be resolved, the strength of the Americans would be demonstrated and as a result the credibility and prestige of the USA would be restored and thus Carter would enhance his popularity. Nevertheless, the option did not present the highest expected value. This because we must remember that in order to calculate the true expected value of an option, we must take into consideration the probabilities that the option will result in a success. In this case the probabilities of a success were very low. Moreover, in case of a negative outcome the negative aspects were rather intense. The hostages could have been harmed as an Iranian reaction and as a result America would seem weak to the international community and Carter would lose his political support. This option then was the riskiest in that the variance in outcomes was the widest; it presented the most extreme positive results but also the most extreme negative ones. [172]

The strategy of mining or blockading the seas presented positive outcomes which were very similar to those of the sanctions option, but the negative outcomes were much worse. This in fact could be seen as an act of war and thus could bring to political and military escalation by inflating the fundamentalists in the region and triggering the Soviet involvement. In synthesis, the option had negative outcomes which were very close to those of the rescue mission but the positive outcomes were not as intense.[173]

The all-out punitive military strike option was the one which offered the most negative outcomes in political and military terms. It is true that in domestic politics it could be a means of responding appropriately at the anti-Iranian sentiments which were widespread in the country, but it had a nearly 100% probability of triggering the Iranian and the Islamic extremists' reaction and causing a Soviet intervention. Moreover, it would be difficult to release the hostages in a context of on-going war. In fact, for these reasons, this option was never really taken into consideration. [174]

In a nutshell, the rescue mission was the option presented the third highest risks, after the fourth and fifth options, in that it had a wide variance. At the same time, it did not present the highest expected value in that the probabilities of obtaining a positive outcome was very low and the negative results were very intense. In retrospect it was observed that the option which presented the highest expected value were the first two options, that is the use of economic and political sanctions alongside negotiations. At the end it was this strategy that brought to the release of the hostages 444 days after the seizure of the embassy.

To better understand why Carter started to take risk-seeking decisions even though personally he tended to have visions that were more close to those of Vance than of Brzezinski, we must remember the concept of

[172] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[173] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[174] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

framing. According to prospect theory in fact, decisions are taken not only in accordance to the traditional cost/benefit calculations but also and foremost to the way in which a certain situation is perceived or framed. We saw that Vance framed the entire situation in terms of loss of lives and because none of the hostages had been killed yet, he did not perceive the situation to be of complete loss. This brought him to be less risk-seeker than the other actors and thus to take into consideration as the best option the first one. Put it simply, he was aware of the fact that waiting that the Iranian situation stabilized could have a negative effect on the internal political situation in the United States, in that the public opinion required a strong and immediate response, but on the other side he was willing to be patient in order to avoid losing lives. He also knew that in the long-run the situation would be resolved, it was just a matter of waiting. Brzezinski was not of the same idea; in fact, he had a totally opposite view of the entire situation. He was willing to lose some lives in order to save the hostages and with them the American honor and dignity.[175] This also explains why he was one of the few to support not only the rescue mission but also the all-out military attack which presented the highest risks. Brzezinski framed everything in light of the American supremacy and in a situation in which not only there were problems in Iran but the Soviets ha also invaded Afghanistan, he perceived the American pride to be in the outmost danger. Moreover, we must not forget that the Americans had also lost in the Bay of Pigs invasion not long before in 1961. These incidents damaged the American honor and Brzezinski was not willing to make the nation look weak again. Hamilton Jordan in his turn, framed everything in terms of the internal political situation. He wanted to save the Presidents integrity and he wanted to make sure that the upcoming election campaign was not completely compromised by the situation. Both of them then supported the mission even if it did not entail the highest expected value, because if it ended with a success the positive outcomes would be the highest among all the options.[176]

President Carter followed Brzezinski and Jordan's advice and not Vance's as he would have done in another context, because he felt himself in a dramatic situation of loss. Not only were some of his citizens being kept captive in Iran but the Soviet invasion of Afghanistan and the defeat in the Bay of Pigs invasion, even though this last event occurred under the precedent president Dwight D. Eisenhower, had already inflicted a big injury to the American dignity. Moreover, the elections were upcoming and Carter knew that unless he was able to resolve the crisis he would never be able to win them. All of these aspects and the advices given by Brzezinski and Jordan caused the President to become risk-seeking and thus to bring forward the mission.[177]

If we should learn from this episode, probably the most important teaching would be that in some situations patenting is the best strategy. Once we understood why the decision of engaging in the rescue mission was

[175] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[176] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

[177] Rose McDermott. *Risk-taking in international politics- prospect theory in American foreign policy.* The university of Michigan Press, 1998. pp. 1-77

taken, one can also see that it was not the best strategy to adopt. In fact, as already said, at the end the situation was resolved through the use of the combination of the fist and the second options. Vance was right. What must be understood though is that the cognitive mechanisms that brought President Carter to take such decision, are inherent in the decision-making processes not only in international politics but also in everyday life. The only way to be able to overcome and not be controlled by these mechanisms, is understanding them through their study and analysis. The true value not only of prospect theory but of neuroeconomics, neuroscience and the overall study of all cognitive mechanisms, rests in the fact that these theories and areas of study were able to overcome the idea of the entirely rational men and by doing so they were able to understand at least partially, how we truly take decisions.

Conclusion:

The Iranian Hostage crisis is a perfect example of how the mechanisms of prospect theory can be used to explain a situation in which the decisions of the actors involved seem to be completely irrational. In fact, as we have seen President Carter and his administration decided to engage in a mission which had an expected value that was not optimal. The option that produced an optimal result, was the one that at the end did actually resolved the crisis, that is the use of political and economic pressure. The decision of President Crater can be understood if we take into consideration all the mechanisms not only of the principles of prospect theory but also of the brain. As we have seen in fact the reason why this decision was taken spaces from a research for honor to the need to go back to the status quo ex-ante. Moreover, the way in which the various actors framed the entire situation was very influential in the decisions they took. The question that arises then is: if the situation in which they found themselves had not been perceived as a situation of total loss, they would have taken a different choice? The answer to this question can be partially given by the behavior of the Secretary of State Vance who was the only one who framed the situation in terms of human losses and thus did not perceive himself in a situation of total loss in that none of the hostages had been killed. Vance was the only one who supported the idea of waiting that the Iranian situation stabilized by itself before engaging in political and eventually if needed economic pressures. It is probable that President Carter would have followed his advices, as he had done previously, instead of following Brzezinski's, if the context had been different. The problem was that President Crater found himself in a situation in which his personal prestige and the status of his country were threatened and thus, as theorized by prospect theory, he became a risk seeker.

The fact that individuals tend to engage in risky paths when they frame the situation in terms of losses rather than gains, is a central aspect in prospect theory as we have seen. Prospect theory thus seems to explain in an ideal way the decision-making processes, not only in economic terms but also in international politics. We must never forget though that there are limitations to this theory, involving both the internal and the external validity. It is my personal view that during decision making the traditional cost/benefit calculations are always brought forward. In fact, if this had not been the case in the Iran Hostage Crisis, the option that could have been chosen was that of the military intervention, which clearly entailed the highest risks but was the most immediate response and the one that could have satisfied the anti-Iranian sentiments in the American population. The reason why this option was not chosen was that the expected value of this option was very low, in that the percentage of a positive result was nearly non-existent and the intensity of the negative outcomes was very high. Among the various options then the rescue mission placed in the middle in terms of expected value; it was not the option with the highest expected value but neither it was the one with the lowest. Still the choice of the mission reflected an irrational behavior in that, as already said, the rational individual will always choose the option with the highest expected value. Prospect theory explains why individuals do not always choose the option with those characteristics. To surpass the various problems of

internal and external limitations which the theory presents it is important to really understand the cognitive mechanisms that bring individuals to become risk seekers in certain domains and how heuristics influence choices. I am positive that the advent of neuroeconomics and the new discoveries in the neurosciences will help in this aspect. However, to truly appreciate the extent to which these mechanisms function we must surpass the concept of the rational men and we must accept the fact that there really are unconscious mechanisms at play. Emotions and rationality are intertwined; it is our nature as human beings.

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Prospect Theory, Neuroeconomics and Political Choice

Decision-making theories for international politics

Riassunto Tesi

Il nostro cervello è una macchina estremamente complessa ed interessante. Le reazioni istintuali, emozionali e razionali, interagiscono in modo continuo all'interno dei suoi vari sistemi. Questo ci permette non solo di analizzare il mondo che ci circonda ma anche di porci domande sui meccanismi cerebrali stessi. Tra gli argomenti che hanno attirato più attenzione da parte degli studiosi negli ultimi anni in quest'area di studio, ci sono sicuramente i processi decisionali. Le decisioni sono un punto cardine della nostra esistenza. Prendiamo decisioni ogni giorno, da quelle semplici, per esempio come vestirsi al mattino, a quelle più complesse come quelle che hanno a che fare con investimenti e scelte di vita. Molte delle nostre scelte sono rischiose per natura. Questo significa che non possiamo sapere in precedenza quali sono le reali possibilità che le nostre decisioni portino a un risultato positivo, e dunque non possiamo sapere quali saranno i reali risultati delle scelte che facciamo.

Nel 1654 Pascal e Fermat teorizzarono una teoria secondo la quale le persone prendono le proprie decisioni basandosi sul valore atteso di queste ultime. Secondo la teoria, le persone sono neutrali al rischio. Questo vuole dire che l'opzione che viene scelta è sempre quella con il valore maggiore. In realtà si è osservato che il comportamento umano è molto differente. Le persone hanno la tendenza a scegliere le opzioni che sono sicure o che comunque hanno una più altra probabilità di riuscita a quelle con un valore uguale o superiore. Questo comportamento noto come avversione al rischio, non era stato preso in considerazione dalla teoria di Pascal e Fermat. Per superare questa difficoltà nel 1738 Daniel Bernoulli teorizzò la cosiddetta Teoria dell'Utilità Attesa e nel 1947 Von Neumann e Morgenstern furono in grado di provvedere ad una base assiomatica per la suddetta teoria. Essi formularono 6 principi, che secondo loro, erano alla base dei processi decisionali negli essere umani e furono capaci di dimostrare in modo matematico che se questi principi venivano violati il risultato era una decisione che non portava alla maggiore utilità possibile. Nel 1953 però Maurice Allais, provò che nonostante ciò le persone violano in modo sistematico questi principi. L'esperimento, il cui risultato divenne noto come il Paradosso di Allais, si basava sulle seguenti scommesse.

1) Scelga tra (A) $1,000,000 sicuramente or (B) 10% di vincere $2,500,000, 89% di vincere $1,000,000 and %1 di vincere $0
2) Scelga tra (C) 11% di vincere $1,000,000 e 89% di vincere $0 or (D) 10% di vincere $2,500,000 e 90% odi vincere $0

Se gli individui avessero seguito i principi della teoria dell'utilità attesa, e in particolare il principio di cancellazione[178], avrebbero scelto la prima opzione o la seconda in entrambe le scommesse. In realtà fu osservato che la gente aveva la tendenza a scegliere la prima opzione nella prima scommessa e la seconda opzione nella seconda. Questo perché nella prima scommessa era presente un'opzione sicura. Anche se il valore della vincita di tale opzione era molto minore del valore della vincita nell'altra opzione, seguendo i dettami dell'aversione al rischio, la maggior parte delle persone scelsero l'opzione sicura. Nella seconda scommessa invece, non era presente un'opzione sicura e soprattutto le differenze nella probabilità di vittoria o di perdita tra le due opzioni erano minime. I partecipanti al test in questo caso scelsero l'opzione più rischiosa. Facendo un calcolo dell'utilità si osserva però che nonostante queste differenze l'opzione con l'utilità maggiore è la prima, in entrambe le scommesse. Dunque si osservò una marcata violazione del principio di cancellazione, in quanto gli individui non furono neutrali al contesto e dunque non scelsero le opzioni che prevedevano la stessa utilità. Dopo il paradosso di Allais, altri esperimenti portarono alla luce le sistematiche violazioni di tutti i principi della teoria dell'utilità attesa.

Nel 1979 Amos Tversky e Daniel Kahnemann, pubblicarono su Econometrica un trattato intitolato "*Prospect theory: an analysis of decision making under risk*" nel quale dimostravano le violazioni dei principi della teoria dell'utilità attesa e nel frattempo provavano ad ipotizzare una teoria alternativa che si basava anche su influenze dal mondo della psicologia. Negli anni seguenti questa teoria divenne estremamente rilevante e influenzò molti studi in economia e non solo. Divenne famosa come la Teoria del Prospetto e si basa su un concetto preso dalla psicologia detto *framing*. Secondo il *"framing"* gli individui tendono a prendere le decisioni basandosi, non solamente sul calcolo tradizionale di costo/beneficio, ma soprattutto a seconda di come il problema gli viene presentato e di come loro interpretano la propria posizione in quel momento. Quello che fu osservato è che se un individuo si trova in una situazione da lui percepita come di perdita sarà più portato a prendere decisioni rischiose; in caso contrario non prenderanno rischi. Infatti a causa di quello che viene chiamato "effetto dotazione", si tende a valutare molto di più ciò che già si possiede a ciò che potrebbe essere posseduto. Come risultato le persone tendono ad avere paura di perdere ciò che è già in loro possesso e tendono a non intraprendere percorsi rischiosi, anche se questi hanno un'alta probabilità di risultare in vincite.

Questi comportamenti sono dovuti ai meccanismi cognitivi del nostro cervello che però vengono inevitabilmente influenzati in gran parte dalle emozioni. Antonio Damasio studiò questi comportamenti e teorizzò quella che divenne famosa come la *"Somatic Marker theory"*. I *"somatic markers"* sono un tipo speciale di emozione, che Damasio indica con questo nome in quanto sono il risultato di un'immagine mentale che produce un determinato stato corporale associato ad un'emozione. Per capire meglio questo concetto bisogna analizzare quelle che Damasio definisce emozioni primarie e quelle indicate come

[178] Secondo questo principio le persone dovrebbero prendere in considerazione solo le caratteristiche che rendono due opzioni diverse e non le caratteristiche uguali quando fanno delle scelte e dovrebbero rimanere indifferenti tra due opzioni che presentano la stessa utilità attesa.

emozioni secondarie. Le prime sono proprie del periodo dell'infanzia e sono regolate dal sistema limbico. Gli esseri umani, come gli animali, sono portati in modo totalmente istintivo ad associare determinate emozioni a determinate caratteristiche del mondo che ci circonda. Queste caratteristiche vengono rilevate dai componenti del sistema limbico. Dopo i nuclei neuronali creano un'immagine mentale con queste caratteristiche e tale immagine suscita nell'individuo una serie di reazioni corporali associate a determinate emozioni. Per esempio quando sperimentiamo una forte paura, le reazioni corporali saranno un aumento del ritmo cardiaco ed un tremolio generale nel corpo. L'importanza di queste reazioni innate ed istintuali è da trovarsi nel fatto che sono veloci e possono servire a salvarci la vita. Allora a cosa serve la coscienza? La coscienza serve ad analizzare le proprie emozioni in modo razionale. Mentre gli animali reagiscono sempre in modo istintivo agli stimoli del mondo esterno, noi grazie allo sviluppo della corteccia cerebrale, siamo in grado di analizzare queste reazioni e dunque a non essere governate da esse. Secondo Damasio, questa è la differenza tra un'emozione e un sentimento. Sentire un'emozione significa dunque diventare consapevoli di questa emozione per evitare di essere controllati da essa. Una volta che cominciamo a provare sentimenti oltre che emozioni, i meccanismi che portano alle emozioni primarie vengono seguiti da quelli che portano alle emozioni secondarie. Per questo tipo di emozioni il sistema limbico non è sufficiente e vi è il bisogno di un network maggiore che comprende anche la corteccia somatosensoriale e quella prefrontale. Le emozioni secondarie non sono più inconsce come quelle primarie ma sono il risultato di deliberazioni razionali. Queste deliberazioni prendono il via dalle esperienze personali della singola persona e questo spiega il perché non tutti hanno le stesse reazioni a stimoli uguali. Per esempio proprio perché ognuno ha avuto esperienze diverse, alcuni non presentano paura per i serpenti e altri ne hanno una vera e propria fobia. I *"somatic markers"* sono risultati di questo secondo tipo di emozioni.

L'importanza delle emozioni è universalmente accettata, quello su cui gli studiosi non sono d'accordo e come la parte razionale del nostro cervello e quella emozionale, interagiscono. Attualmente vi sono due teorie. La prima sostiene l'esistenza di due sistemi separati, uno che regola le reazioni di natura emozionale e uno che ha a che fare con il controllo cognitivo, cioè con la parte razionale. La seconda teoria supporta l'esistenza di un unico sistema che mette in funzione parti diverse a seconda dello stimolo che riceve. Le nuove scoperte in neuroscienza però tendono a supportare la prima teoria.

Le nuove scoperte che sono state fatte nel campo delle neuroscienze e l'avvento dell'economia comportamentale, di cui fa parte la teoria del prospetto, portarono alla formazione della cosiddetta neuroeconomia. Questa, come nel caso dell'economia comportamentale, viene influenzata dalla psicologia ma usa come strumenti di studio anche le varie macchine per osservare l'attivazione delle diverse parti del cervello a seconda degli stimoli che vengono dati all'individuo. Uno di questi meccanismi e probabilmente il più famoso è la risonanza magnetica funzionale, grazie alla quale è stato possibile osservare il funzionamento del cervello in modo non invasivo.

Come già detto, la Teoria del Prospetto è diventata in poco tempo estremamente importante. Anche se nasce come teoria economica, Kahnemann e Tversky stessi ammettono che può essere applicata a tutti i contesti in

cui vi sono delle decisioni da prendere; come per esempio nella politica internazionale. Questa applicazione è stata studiata da Jack Levy in molti suoi trattati. Il concetto di *"framing"* che abbiamo analizzato prima rimane fondamentale. Tutti gli individui infatti, compresi capi di stato, ministri degli affari esteri e primi ministri, tendono ad individuare un punto di riferimento da cui quantificare le proprie perdite o le proprie vincite. Il punto di riferimento coincide spesso con lo status quo. Attraverso vari studi si è osservato che le persone tendono a non volersi allontanare troppo dal proprio status quo; questo comportamento è conosciuto come il bias dello status quo. Va tenuto a mente però che non sempre lo status quo e il punto di riferimento coincidono. Per esempio, le aspirazioni e le aspettative personali portano l'individuo a porre il punto di riferimento ad un livello superiore allo status quo. Un altro caso in cui questo accade, è quando l'individuo soffre delle perdite e dunque tende a considerare come status quo la situazione precedente. In questi casi è meglio parlare di bias del punto di riferimento, invece che di bias dello status quo.

Molte decisioni che sono state prese in politica internazionale e non solo, possono essere spiegate attraverso il modo in cui i vari attori posero il proprio punto di riferimento e inquadrarono la situazione generale. Il bias dello status quo può essere usato per spiegare l'attitudine nelle nazioni a fare maggiori sforzi per proteggere il proprio territorio che per guadagnarne altri. Inoltre l'importanza dell'opinione pubblica in politica internazionale è risaputa. Ninic durante uno studio su 18 interventi americani osservò che tali interventi venivano supportati maggiormente se si trattava di interventi di difesa che offensivi.

Anche l'effetto che può avere una perdita sul punto di riferimento può essere osservato grazie alle decisioni prese in politica internazionale. Gli stati che hanno subito perdite generalmente continueranno ad individuare come status quo la loro precedente condizione territoriale e dunque tenderanno ad intraprendere percorsi rischiosi pur di tornare alla loro situazione precedente. Se dovessero riuscirci, la situazione tornerà alla normalità e quindi il governo prenderà decisioni rischiose solo per la difesa del proprio territorio. Questo comportamento può essere osservato nella guerra Arabo-Israeliana del 1967 e del 1973. Nel 1967 i leader arabi soffrirono molte perdite e dunque per provare a tornare al precedente status quo, intrapresero un'altra rischiosa guerra nel 1973. Israele, che nel frattempo aveva rinormalizzato la situazione intorno alla sua nuova situazione territoriale, usò tutta la propria forza per difendere i territori che ora percepiva come suoi.

Anche i costi irrecuperabili, come ad esempio la perdita di vite umane, giocano un ruolo importante nella politica internazionale. Così successe nel intervento americano in Vietnam e nell'invasione sovietica dell'Afghanistan. L'enorme quantità di vite umane perse, e di costi monetari irrecuperabili fecero continuare i conflitti anche se la prospettiva di una vittoria si allontanava sempre di più.

Oltre a tutti questi meccanismi, come abbiamo detto in precedenza, le emozioni giocano un ruolo fondamentale. In una situazione in cui il calcolo preciso del valore di ogni opzione è difficile, le emozioni rendono questo calcolo ancora più complicato. Infatti cadiamo vittima spesso di quelli che vengono definiti *"heuristics"*, cioè delle scorciatoie che il nostro cervello usa per prendere decisioni in modo più veloce ma che a volte ci fanno fare errori di valutazione. Per esempio il bias dell'ottimismo ci porta a pensare che le nostre decisioni porteranno a risultati positivi. L'ottimismo non è sempre negativo in quanto ci aiuta ad

affrontare lo stress e le incertezze, però ci porta anche a prendere decisioni molto rischiose per il solo motivo che siamo sicuri che porteranno a delle vincite. Anche perché non dobbiamo mai dimenticare che il caso gioca la sua parte e dunque non possiamo mai essere sicuri del reale risultato delle nostre decisioni. In un contesto militare, le emozioni prevalenti sono sicuramente la ricerca del prestigio e dell'onore, che è legata al concetto del gruppo sociale.

Uno dei casi storici in cui questi meccanismi sono più facili da capire è la Crisi degli Ostaggi del 1979. La crisi prende piede nel contesto delle rivolte studentesche Iraniane del 1979. Gli studenti presero d'assalto l'ambasciata americana a Teheran e presero in ostaggio 52 persone, tenendole prigioniere per 444 giorni, fino al aprile 1980. Per cercare di liberare gli ostaggi, varie opzioni furono prese in considerazione dal Presidente americano Jimmy Carter e dai suoi collaboratori.

Analizziamo le varie opzioni da un punto di vista di valore atteso. Va tenuto a mente che secondo la teoria dell'utilità attesa, l'uomo razionale sceglierà sempre l'opzione che presenta il valore più elevato. Il valore atteso si calcola attraverso a percentuale di probabilità che tale risultato si concretizzi e il valore di tale risultato. Come vedremo, la strategia che fu scelta non presentava il valore atteso più elevato e dunque si trattò di una decisione in parte irrazionale.

La prima opzione prendeva in considerazione la possibilità di attendere che la situazione iraniana si stabilizzasse da sola prima di intervenire. Questa opzione era la più sicura in quanto era inverosimile che la strategia potesse portare gli iraniani ad uccidere gli ostaggi, però dall'altro punto di vista avrebbe potuto far infuriare l'opinione pubblica americana che richiedeva una risposta forte ed immediata alla crisi. Le probabilità che alla fine si arrivasse ad un risultato positivo e cioè alla liberazione degli ostaggi erano alte, anche se sicuramente ci sarebbe voluto tempo e pazienza.

La seconda opzione era molto simile alla prima ma prendeva in considerazione anche a possibilità di usare pressioni politiche ed economiche. In realtà questa opzione fu parzialmente usate in quanto furono attuate delle misure di pressione economica. I rischi di scatenare una reazione iraniana erano sicuramente più elevati che nella prima strategia, però non di tanto. Inoltre i tempi di riuscita della liberazione avrebbero potuto accorciarsi un po'. Il valore di questa opzione era dunque più o meno simile a quello della prima.

In termini di valore atteso, l'opzione di intraprendere una missione di salvataggio si posiziona al terzo posto. Questa strategia, se fosse riuscita, avrebbe avuto gli effetti positivi maggiori. Infatti l'opinione pubblica sarebbe stata soddisfatta, gli ostaggi sarebbero stati liberati e in politica internazionale Carter sarebbe riuscito a riguadagnare l'onore degli Stati Uniti. Però, in caso di sconfitta, gli effetti sarebbero stati gli stessi delle prime due strategie cioè un crollo della popolarità di Carter in politica interna e una ferita all'orgoglio americano, ed in aggiunta i rischi includevano la perdita di vite umane, tra gli ostaggi come ripicca da parte deli Iraniani e tra i marine implicati nella missione. In oltre, le probabilità che la missione potesse riuscire erano molto basse. Per queste ragioni il valore atteso della strategia non era dei più elevati.

La quarta e la quinta opzione erano le più rischiose in quanto implicavano l'uso dell'esercito. La quarta portava avanti l'idea di minare le acque territoriali iraniane mentre la quinta era un vero e proprio attacco

armato. Entrambe presentavano più o meno lo stesso valore atteso che era particolarmente basso. Infatti le probabilità di riuscire a salvare gli ostaggi erano quasi nulle e la probabilità di una reazione degli Iraniani era molto elevata. La quinta opzione non fu mai resa davvero in considerazione.

La decisione che fu presa fu quella di tentare la rischiosa missione di salvataggio. La missione fallì disastrosamente, senza il salvataggio degli ostaggi e con la morte di marine a causa di un incidente. Conseguentemente, Carter perse le elezioni successive e il fallimento inferse una brutta ferita all'orgoglio americano; ma perché il Presidente Carter prese una decisione così drastica?

Usando la teoria del prospetto e in particolare il concetto di *"framing",* la ragione di tale scelta è da trovarsi nel modo in cui Carter e i suoi collaboratori, inquadrarono l'intera situazione. Il Presidente percepiva sé stesso in una situazione di perdita. Infatti non solo doveva occuparsi della liberazione degli ostaggi, ma si trovava davanti ad un'opinione pubblica avversa, sentiva un senso di sconfitta in parlamento e doveva affrontare la decadenza del prestigio Americano sulla scena politica internazionale. In più il parlamento e l'opinione pubblica premevano per una risposta immediata alla crisi che rendevano la scelta della prima opzione, cioè quella di attendere che la situazione politica iraniana si stabilizzasse e di usare pressioni politiche ed eventualmente economiche se necessario, molto difficile.

Il presidente aveva tre consiglieri principali. Il segretario di stato Cyrus Vance, il consigliere par la sicurezza nazionale Zbigniew Brzezinski e il capo dello staff della casa bianca Hamilton Jordan. Tutti e tre inquadrarono la situazione in modo diverso e dunque diedero consigli differenti al presidente. Vance inquadrò la situazione in termini di perdita di vite umane e quindi sostenne la necessità di scegliere le uniche due opzioni che non comportavano il rischio di perdere uomini, cioè le prime due. In più proprio perché nessun ostaggio era stato ancora ucciso, egli non percepiva la situazione come totalmente disastrosa e quindi era pronto ad aspettare e ad avere pazienza.

Brzezinski invece era il sostenitore maggiore della missione di salvataggio in quanto aveva inquadrato la situazione in termini di potere statunitense e di prestigio nazionale. Era ovviamente anche interessato a benessere degli ostaggi ma questo era dovuto al fatto che trovava inconcepibile rischiare un'altra volta di fallire come era successo nel caso del incidente della Baia dei Porci. Per questa ragione percepiva l'intera situazione come di estrema perdita e come dice la teoria del prospetto era dunque intenzionato a rischiare molto per risolvere tale crisi.

Jordan era molto interessato la situazione politica interna ed inquadrò tutto in relazione alle elezioni imminenti. Voleva ritornare allo status quo precedente e sapendo che l'opinion pubblica premeva per una risposta immediata, sostenne anche lui la missione di salvataggio.

Il Presidente seguì i consigli di Brzezinski e di Jordan anche se in una situazione diversa avrebbe probabilmente ascoltato Vance come aveva già fatto in precedenza. Alla fine la storia diede ragione a Vance in quanto la situazione si risolse 444 giorni dopo la presa degli ostaggi grazie a una rinormalizzatone della situazione politica iraniana e grazie alle pressioni politiche ed economiche portate avanti dagli stati uniti.

La teoria del prospetto dunque sembrerebbe in grado di spiegare il perché tale scelta non fu presa e perché le decisioni fatte sembrano essere così irrazionali. Bisogna però tenere in considerazione il fatto che è molto difficile capire esattamente i vari meccanismi che portarono a determinate scelte. La teoria del prospetto sembra poter spiegare bene certi meccanismi, ma vanno tenuti in considerazione i vari limiti di tale teoria. La teoria del prospetto infatti presenta problemi di validità sia interna che esterna. I problemi di validità interna sono legati principalmente al fatto che i vari esperimenti che servirono a teorizzare la teoria, furono eseguiti in laboratorio. Secondo il cosiddetto *"elicitation bias"*, se il problema viene posto all'individuo in modi diversi esso darà risposte diverse. In poche parole gli stimoli a cui sono sottoposti gli individui in laboratorio sono diversi da quelli della vita reale e dunque i risultati degli esperimenti potrebbero non corrispondere al vero comportamento umano. In realtà molti studi che furono fatti dopo usando design diversi e osservando il comportamento umano nella vita di tutti i giorni, portarono alla conclusione che i problemi di validità interna non sono così rilevanti come si potrebbe pensare.

Nel caso della validità esterna invece ci sono due difetti che rendono alla teoria difficile da applicare alle relazioni internazionali, anche se, come abbiamo visto, non è impossibile. La prima di queste problematiche, è legata al fatto che la teoria del prospetto è stata creata come teoria che spiega i comportamenti individuali e non collettivi. In politica internazionale, difficilmente le decisioni vengono prese individualmente. In certi casi però, come nel caso della crisi degli ostaggi, è sufficiente prendere in considerazione il pensiero di tutti gli attori implicati e poi capire come questi vari stimoli abbiamo influenzato il pensiero dell'attore più forte, cioè il Presidente Carter, per superare tale limite.

Il secondo problema si riferisce al problema che in politica internazionale molte volte ci si trova davanti a problemi di natura strategica e la teoria del prospetto non fu creata per rispondere a queste questioni. La teoria dei giochi e della scelta razionale sembrano più appropriate.

A prescindere da queste problematiche la teoria del prospetto è comunque una teoria estremamente importante. Per renderla una teoria completa c'è sicuramente bisogno di superare tali limitazioni ma è mia personale opinione che le nuove scoperte che sono state fatte in neuroscienza e l'avvento della neuroeconomia aiuteranno sicuramente. Bisogna però prima superare l'idea che l'uomo sia interamente razionale ed accettare l'idea che esiste una parte inconscia in tutto quello che facciamo. Le emozioni e la razionalità sono inscindibili; è la nostra natura come essere umani.