

# SELF-FULFILLING PROPHECY AND FEEDBACK IN DECISION MAKING UNDER RISK\*

Orfelio G. LEON GARCIA y Hilda GAMBARA D'ERRICO

Universidad Autónoma de Madrid. Spain.

## RESUMEN

*Profecía autocumplida y feedback en decisión con riesgo.*- El presente trabajo, enmarcado en el modelo de los dos factores de Lopes (1987), parte del hecho de que los sujetos pueden ser clasificados por su actitud al riesgo y analiza porqué algunos sujetos no modifican sus preferencias cuando reciben feedback. Se ha utilizado como tarea experimental la elección entre loterías multiatributivas, tal y como se había probado en León y Lopes (1988) y Lopes y Schneider (1987). Se plantea la hipótesis de que la profecía autocumplida puede explicar el mantenimiento de las preferencias de los sujetos, ya sean aversos al riesgo o arriesgados.

Nuestros datos permiten mantener la hipótesis para ambos grupos de sujetos. Parece que se "usa" la información derivada del feedback de tal manera que se justifica las estrategias previas en la elección de las loterías; en consecuencia el feedback no sería siempre una variable relevante para los sujetos, si lo que deseamos es cambiar las ideas sobre el riesgo asociado a un conjunto de estímulos.

**Palabras Clave:** Decisión con riesgo, aversión al riesgo, feedback y riesgo, profecía autocumplida.

## ABSTRACT

Within the two factor model of Lopes (1987), and considering that subjects can be classified according to their attitudes towards risk, we focused our work in analysing why some subjects do not change their preferences towards risk after receiving outcome feedback. We developed our work using as experimental task, choices between lotteries, used in previous researches (i.e., Lopes and Schneider, 1987; León and Lopes, 1988). We hypothesized that the **self fulfilling prophecy** can explain the maintenance of preferences of risk seeking and risk averse subjects, regardless of experimental manipulation. Our data support our hypothesis for both groups of subjects. It seems as if people "treat" the information derived from feedback in a manner making them maintain their previous strategies in choosing the different lotteries. In consequence, outcome feedback is not always a relevant variable for subjects for changing their behavior in risky choice.

**Key Words:** Decision making under risk, risk aversion, risk and feedback, selffulfilling prophecy.

## INTRODUCTION

The present study tries to clarify why some subjects do not change their preference towards risk when relevant variables concerning decision making theory under risk are manipulated (for instance feedback and aspiration level as we will see below).

Recently, Lopes (1987) developed a model explaining subjects' attitudes towards risk. Because our work is related to this model let us briefly summarise it. Along her paper, Lopes (1987) analysed carefully two different approaches concerning the psychology of risk: The experimentalists' view and the personologists' view. Being aware of the advantages and disadvantages of both positions, she proposed a theory which takes in account dispositional and situational factors to explain risky choice; factors that generally have been treated independently for the mentioned positions.

The dispositional factor "describes the underlying motives that dispose people to be generally oriented to achieving security (i.e., risk averse in conventional terminology) or to exploiting potential (i.e., risk seeking in conventional terminology). The situational factor describes people's responses to immediate needs and opportunities". (Lopes 1987; p. 275).

The first factor presents two poles: security versus potential. Risk averse subjects show more preference for security whereas risk seekers seem more motivated for potential. In other words, the former group values safety and the latter opportunity.

A consequence of this is that risk averse people weight more heavily the worst outcomes in a lottery than the best outcomes. Thus they will choose the lotteries with few zero or low outcomes. On the other hand, risk seekers weight the best outcomes more heavily.

The second factor corresponds to aspiration level. This factor reflects not only the opportunities a person has, but also the constraints imposed by the environment.

While these factors are sometimes in conflict other times are in concert. By means of the relations among these factors and depending on how the possible conflicts between them get resolved, one can explain subjects' behavior when facing risky decisions.

The main point for the present work is that risk avoiders value safety and risk seekers value opportunity. We think that this aspect is reflected, for instance, in the subjects' choices between lotteries.

The experimental paradigm used to test this model is based on a set of lotteries with different levels of risk. Lopes (1984) developed a set of lotteries with the same expected value but with unequal distributions of outcomes which show the differences in preferences towards risk, depending on the subjects' attitudes towards risk (see figure 1). As Lopes (1984) and Schneider and Lopes (1986) found, a risk averse person typically prefers the lotteries in the following order: Riskless > Short Shot > Peaked > Rectangular > Bimodal > Long Shot. (See figure 1).

Each of the lotteries has 100 lottery tickets (represented by tally marks) and each has an expected value of approximately 100\$ (1,000 pts; Spanish currency), but they differ in how the prizes are distributed.

The lottery named Long Shot (LS) is the one that best represents the attitude towards risk. As we can see in fig. 1, the LS lottery is one with high variance and is positively skewed; although it has a lot of tickets with zero prizes, it has very good outcomes with 4,390 pts being the maximum prize. Although people are usually risk averse while considering gains, there are subjects who seem to be risk seekers.



guish between the impact of experience per se and the outcomes of experience, nor do they differentiate between baseline preferences and preferences in the first block of trials, León and Lopes (1988), developed a research in order to resolve these points, using the experimental paradigm referred above.

León and Lopes (1988) measured the number of times a subject chose each of Lopes's lotteries before and after a feedback phase (this feedback phase was similar to the one that we have developed in our experiment and it is described in the method section). The pre-feedback task required from subjects to judge and to show their preferences between pairs of stimuli. In that way the task was similar to those used, between others, by Tversky and Kahneman (p.e. 1979) (for a general review see Slovic, Lichtenstein and Fischhoff, 1988). In the feedback phase, the same stimuli were presented, but, after each trial subjects knew the consequences of their choices. In addition and in order to increase subjects' involvement in the experiment, a 10\$ prize was offered to the subject who got the largest outcome. The above experimental manipulations correspond to situational changes in the task; thus, under the two factor model, concretely concerning aspiration level factor, some changes in subjects' behavior were expected. Most of the subjects showed a risk averse pattern in the prefeedback assesment. After feedback, a group of subjects reversed their preferences and became risk seeking but another group did not change their preferences towards risk (about half of them). Those subjects maintained and even, in some cases, increased their risk aversion. The reasons why some people change preferences and others do not change are not clear, although this result seems to be similar to those found previously by Lopes & Casey (1987) and Lopes & Schneider (1987). Our present studie will try to clarify this question.

In Lopes and Schneider's (1987) experiment the same set of stimuli (lotteries) was used. The authors manipulated the aspiration level conditions in order to find out whether or not the subjects changed their risk preferences under different aspiration situations (high, low and neutral). They found a group of subjects who clearly responded to the experimental manipulation. In Lopes and Schneider words, only some of the subjects were 'responsive' while some were not maintaining their risk aversion in all conditions. Here again, it was possible to explain subject changes in preferences, but it could not be explained completely why some individuals did not modify their preferences towards risk.

What are the reasons for maintaining preferences regardless of experimental manipulations? In order to answer this question let us refer to the *self fulfilling prophecy* as a cognitive frame explaining why some people stay with their original preferences towards risk.

The self fulfilling prophecy has been studied mainly from a social approach (i.e.: Brophy and Good, 1974; Brophy, 1983; Darley, 1983; Jussim, 1986). This prophecy is related to a false definition of a situation that leads people to behave in such a way that makes that situation true. In that way, this prophecy would be related to a set of well known biases concerning judgment and choice, for instance, verification bias, overconfidence and the basic biases related to judgment of covariation (see, i.e., Hogarth, 1980). In that sense, feedback could not affect decision making, because subjects will have information derived from only the way they behave. If people behave in such a way that tends to use only confirmatory instances, they will have no motives for changing their performance. Hogarth (1980) discusses several cases where outcome feedback can be irrelevant for cor-

recting poor heuristics, above all if there is a lack of knowledge about task structure. It is also well known (Wason, 1960) that there is a tendency towards not testing hypotheses by disconfirmatory evidence (although this tendency is context dependent). Therefore and in Hogarth words, "...large amounts of positive feedback can lead to reinforcement of a nonvalid rule" (Hogarth, 1980; p. 12). Moreover, "when judgments are made for the purpose of deciding between actions, outcome information may be irrelevant for providing self-correcting feedback" (Hogarth, 1980; p. 17).

Considering risky tasks, people could "treat" information derived from outcome feedback in a manner that making them maintain their previous strategies when facing risky situations. In our case (and considering the LS lottery, just because is the one that best represent risky attitudes, as we have said before), if a risk seeker choose this lottery because s/he considers it to be the best way of making a large amount of money when several draws are possible, this lottery will fullfill his/her prophecy within a set of reasonably lucky draws. In the same way, if a risk averse individual does not choose this lottery because s/he thinks it is the worst one to obtain prizes, s/he will not get any disconfirmatory evidence.

In general terms, we hypothesize that, in some cases, subjects' attitudes/strategies should lead them to behave in such a way that they will obtain data confirming their previous attitudes/strategies. We will develop our hypothesis considering the LS lottery, because as we have said before it is the one that best differentiates people with regard to attitudes towards risk.

More concretely, if subjects, when facing the *Long Shot* lottery, pay more attention to some outcomes and ignore others, they would find reasons to confirm/verify their previous attitudes towards risk. We

propose that, in that lottery, the outcomes having received the most attention will be the highest ones (specifically we will consider prizes above 1,950 pts of LS lottery<sup>1</sup>). We suppose that when the LS lottery is chosen it is because subjects look forward to winning the high prizes of the lottery (see figure 1). That was supported by previous verbal reports and it seems very reasonable. In that way, both groups of subjects will choose the LS lottery hoping to obtain the high possible outcomes, in other words, they prefer "to open the door to opportunity" as Lopes says. Obviously, the difference between risk averses and risk seekers is the number of times each group choose this lottery.

Futhermore, if high prizes are overweighted and the rest are underweighted (in the LS lottery) subjects will obtain data confirming their previous attitudes; in particular, and if we consider subjects with extreme patterns in preferences towards risk, we hypothesize that:

Because risk averse subjects choose the LS lottery more infrequently most of them will obtain a distribution of good outcomes which would fit with their attitudes (few high prizes). Hence, most risk averse individuals will not change their patterns towards the lotteries.

In the same way and concerning risk seeking subjects, the number of times that the LS lottery is choosen should be higher than for risk aversive subjects as this would give them a greater probability to find some case confirming their previous ideas about the good prizes which could be obtained in this lottery. Therefore, the riskiest subjects will obtain data leading them to keep on playing in a risky way. Being more concrete, *risk seekers will obtain a higher number of "good outcomes" than risk averse subjects and, this fact, will lead subjects to a maintenance of their attitudes.*

Variance is considered to be a good statistical moment of risk. Prospects with high amount of variance will be perceived riskier than those with a low amount. That is the point of view of risk preference theories (i.e., Allais, 1953; Coombs, 1975; Hagen, 1969; Markowitz, 1959). In addition to our previous reasoning, if the variance of prizes gained by risk avoiders is larger than the one related to risk seekers, then the risk perceived by the former subjects will be higher than the risk perceived by the last ones.

We can predict that risk avoiders, who choose the LS lottery less frequently, perceive it as riskier than risk seekers do. Though it is reasonable to think that the variance of prizes gained with this lottery will be higher for risk averse subjects than for risk seekers.

## METHOD

### *Subjects*

Subjects were students of Psychology of the Universidad Autónoma de Madrid; 110 subjects for the pre feedback and 27 subjects for the following phases.

### *Stimuli*

The stimuli were six multi-outcomes lotteries (adapted from Lopes' lotteries). Each lottery had an expected value of 1,000 pts, and each had 100 tickets. Each of these tickets was equal in value to the pts amount listed at the left of its row.

We used the same names of the lotteries as in Lopes' experiments: RL or Riskless lottery, SS or Short Shot lottery, PK or Peaked, RC or Rectangular lottery, BM or Bimodal and LS or Long Shot lottery.

### *Design and Procedure*

Independent variables: (1) The lotteries (six different lotteries as we specified above), (2) risk seeking and risk averse sub-

jects and (3) treatment (pre-Feedback, Feedback and post Feedback).

Subjects' classification concerning risk, was made in a similar way than in previous studies (i.e., Lopes and Schneider, 1987, León and Lopes, 1988)

Dependent variable: the number of times subjects choose each of the lotteries in a complete pair-comparison design. Lotteries were combined in all possible pairs so 15 pairs were obtained. Each pair of lotteries were presented to the subjects before and after Feedback.

Basically, the procedure consisted in a pre-test (which served in selecting a subset of subjects), a Feedback phase and a post-test.

### *Pre-test or Pre-feedback*

In a psychology classroom we presented to the students (110 subjects) the 15 possible pairs of lotteries using transparencies. We showed the transparencies on a screen, one after another and with enough time to respond about preferences. The pair of lotteries were printed vertically, one above the other.

Subjects should indicate, in their correspondent response sheet their preferences for each pair by circling either S (for top, "superior") or I (for bottom, "inferior").

At the beginning of the session we told to the subjects that the task was about their preferences for different kinds of lotteries. We instructed them to indicate on their response sheet which of the lotteries in a pair they would choose if they were allowed to play either of the lotteries once. We also told them that each play of the lotteries was completely independent of the other plays, as after each play the ticket would be replaced and could be drawn again from the set of 100 tickets<sup>2</sup>.

This phase lasted approximately 15 minutes.

*Feedback phase*

As in previous studies, most subjects were risk averse according to the pre-feedback assessment, so we could only select a group of 13 risk seekers. A group of risk averses (14 subjects) was also selected. We have to stress that we chose the most extreme subjects according to their preferences for the BM and LS lotteries. The criteria of classification were as follow. *Risk seeking*: Subjects choose the most risky lotteries equal or more than 5 times ( $LS + BM \geq 5$ ). *Risk averse*: Subjects choose the most risky lotteries equal or less than 4 times ( $LS + BM \leq 4$ ) and the LS lottery no more than 2 times.

Once the subjects were classified we called them in to perform the feedback phase individually. We ran this phase using an Apple II computer to display the choice pairs and to record the subjects' preferences. After each choice between the lotteries the computer gave the subjects the outcome of their draws (Feedback).

We displayed the lotteries on a poster positioned near the screen. Each lottery was labeled with a single letter code (from "A" to "F"). The computer program was designed to present each pair of lotteries (pair of letters) ten different times. The presentation was at random. Subjects indicated their preferences by pressing the keyboard letter corresponding to their choice. In all, 150 choices were necessary to complete this phase, with a feedback trial after each choice.

Once the subject chose a lottery, numbers between 1 and 100 were displayed at random at the center of the computer screen and on the same spot. The numbers appeared successively and rapidly. Whenever the subject was ready, s/he pushed the space bar to stop the number display. Then the number was translated into a prize amount.

After the subject finished reading the prize amount, s/he pressed another key and the next pair was presented.

Subjects were told that the person who obtained the greatest amount of theoretical prize money with the lotteries during the Feedback phase, would have the opportunity of making 3.000 pts (this was to assure the involvement of subjects).

The feedback phase lasted about 45 minutes.

From this phase the following data were obtained per each subject: (a) Number of times subjects chose each of the six lotteries; (b) Cumulative outcomes from all lotteries; (c) Number of times each of the LS lottery outcomes were obtained.

*Post-Feedback Phase*

In this last phase we measured subjects preferences towards the pairs of lotteries again. We used booklets which contained the stimulus pairs. The instructions were similar to the pre-test phase. The booklets presented the lotteries in a random order (4 different booklets).

The post-feedback phase took about 5 minutes. After all subjects were run, the winner was contacted and was notified about how to pick up his/her prize.

*Results*

Since we classified our subjects depending on the number of times they choose the BM and the LS lotteries in the prefeedback phase, we present a general result in Table 1, the number of times subjects chose BM+LS lotteries during pre Feedback, Feedback and post Feedback for both groups.

We test wether or not subjects changed their patterns after the feedback phase. We found more subjects who did not change

Subj	Risk Seekers			Subj	Risk Averses		
	BM+LS Pre-FB	BM+LS FB	BM+LS Post-FB		BM+LS Pre-FB	BM+LS FB	BM+LS post-FB
1	9	54	5	1	1	24	1
2	6	47	5	2	1	11	1
3	6	80	6	3	2	35	1
4	6	90	7	4	1	36	2
5	6	55	6	5	1	12	3
6	6	68	7	6	1	36	4
7	5	66	7	7	1	14	1
8	9	80	7	8	1	30	3
9	6	89	8	9	2	30	1
10*	5	31	2	10	3	23	3
11*	6	16	1	11	1	16	1
12*	5	29	4	12*	2	43	5
13*	5	26	2	13	1	35	1
				14	2	13	1

Tabla 1. Número de elecciones LS+BM durante las tres fases (Pre-FB, FB y Post-FB). Los asteriscos indican los sujetos que cambiaron sus preferencias en la fase de post Feedback.

their preferences pattern than people who changed after feedback. (table 2).

Analysing the overall results, concerning the number of times LS + BM lotteries were chosen (considering risk seekers and risk avoiders together), during the pre and post feedback phase, we found no change,  $F_{1,25}=0.72$ . That result is undistable because people who change and people who do not change are considered together. This fact produces a large MCE and thus the effect of changing is hidden.

We were also interested in analysing the difference between variances of prizes obtained for both groups in LS lot, due to the special significance of this lot in the present work. The variances were calculated from the total amount of prizes obtained by each group of subjects over the total amount of LS elections. (risk avoiders,  $S_2$

$= 168510.25$ ; risk seekers,  $S^2 = 34328.68$ ). 14 prizes were obtained by risk avoiders and 13 by risk seekers.

The test of homogeneity of variance analysis was also significant,  $F_{13,12} = 4.9087$ ,  $p < 0.01$ ; Thus, playing the LS lottery involved more risk for risk avoiders than for risk seekers, from the point of view of outcomes variance.

#### Discussion and Conclusions

As stated previously, there are subjects who maintain their preferences towards risk regardless of experimental manipulation, and it is for these individuals that we have proposed our working hypothesis. In contrast with the previous study about feedback with Lopes' lotteries, most of our subjects did not reverse their preferences. We can ex-



SELF-FULFILLING PROPHECY AND FEEDBACK IN DECISION MAKING UNDER RISK

	No change	Change
Risk-seekers	9	4
Risk averse subjects	13	1

Tabla 2.- Presenta el número de sujetos que cambian su patrón de preferencias después del feedback. La clasificación de sujetos se realizó según el número de loterías LS y BM elegidas durante la fase de feedback.

plain this maintenance of preferences for risk averse subjects from the criteria of classification. As our subjects were more extreme in their patterns of preferences, they were also more reluctant to abandon their risk attitudes regardless of possible disconfirmatory data. For risk averse subjects in León and Lopes's experiment, the mean score of LS+BM lotteries was 2.22 and in the present work it was 1.43. Note also that only one risk averse subject obtained a score of LS+BM=3, the rest of them obtained a lower score. (As a matter of fact we had to eliminate 9 risk averse subjects because during the feedback phase, they did not chose the LS lottery even one time, so we could not calculate any proportion of good outcomes for them). Because in León and Lopes's research there were only 2 subjects out of 30 who could be considered as risk seekers with the criteria we have applied here, it is quite difficult to compare them with our subjects.

Is it possible to explain why some subjects change their preferences under the same hypothesis? Although it is not possible to obtain a clear conclusion with so few subjects, let us focus on the subjects who changed after feedback.

On one hand, subject "12" (according table 2) became a risk seeker. This subject picked the LS and BM lotteries a great number of times (43 times) during the feedback phase (more than the average of this group,  $X=25.58$ ). On the other hand, risk seekers who changed their preferences were those

subjects who chose the LS and the BM lotteries fewer times, during the feedback phase, in comparison with the rest of the group (mean of LS+BM of subjects who changed was 25.5; mean score of the whole group was 56.23). In some sense, then, the subjects who changed were those whose choice in the feedback phase were more like the other group. What are the reasons they changed their minds during the feedback phase? We think the answer is the interaction between feedback and their previous ideas, but from this study we cannot explain how the interaction takes place; further research is necessary within this point.

What it seems clear, according to our hypothesis, is that both groups of subjects found reasons for maintaining their preferences towards risk. We think, that the fact that risk seekers obtained a big proportion of high prizes playing the LS lottery, made them to keep on being risk seekers afterwards. In the same way, risk averse subjects did not find any motive to change their preferences because, the few number of times that they decided to play LS, they did not gain so much as the other group. In both cases, subjects did not had any motive to abandon their previous hypothesis concerning the risk involved in the lotteries.

The above is consistent with Lopes' two factor model concerning the fact that risk averse subjects would pay primary attention to worst outcomes while risk seekers would pay primary attention to best-case outcomes.

Such conclusion is confirmed with the variance of prizes for both groups. During the feedback phase, the variance of outcomes was higher for risk averters than for risk seekers, in that way it seems that risk averters look at the LS lottery as riskier than the other group, in consequence they play less times that lottery, obtaining less high prizes and thus, they maintain their previous preferences towards the lotteries. On the contrary, risk seekers perceive LS lottery no so risky, so they play it a great number of times gaining more high outcomes and thus, they did keep on being risk seekers. In any case, the fulfilling prophecy seems to play an important role in the performance of the subjects; both groups may find data to reinforce their attitudes towards risk because they behave in such a way that they fulfill their previous ideas about risky stimuli.

The present work opens the door to a future research where subjects' attitudes towards risk would be changed through experimental manipulation, forcing the subjects to choose a different number of times the riskiest lotteries. In this way, both group of subjects would receive the same information. Of course, we are not saying that people (specially those with more extreme preferences) will switch their attitudes, only

that some of them, would have the chance to modify their previous ideas, in a kind of situation where there is not any advantage in any of the patterns.

Finally, we would like to stress the following points:

(a) Assuming that subjects could be considered as different in their attitudes towards risk and furthermore, that these attitudes would be explained under the two factor model of Lopes (1987) we have tried to propose a hypothesis to explain why some subjects, who are not responsive to the manipulations of aspiration level (Lopes and Schneider, 1987) or why some individuals do not shift their preferences when they receive feedback and, therefore, the opportunity to change (León and Lopes, 1988).

(b) Our explanation has been formulated from the general idea of the self fulfilling prophecy (which had a clear application to decision making and feedback in the work of Hogarth -1980-). Hogarth proposed that individuals tend to confirm their heuristics looking at the data in such a way that if only a part of that data is considered, and the rest of them are ignored, then feedback will be irrelevant. We have developed a similar hypothesis about why people do not change their preferences towards a set of lotteries.

#### NOTES

- 1 In fig. 1, we can see that 1.950 prize is the closest LS prize to the best outcomes in other lotteries. This is the reason why we will consider prizes above that one.
- 2 Instructions given to the subjects along the different phases are showed in the appendix.

## REFERENCES

- Allais, M. (1953). Le comportement de l'homme rationnel devant le risque: Critique des postulats et axiomes de l'école américaine. *Econometrica*, 21, 503-546.
- Brophy, J. (1983). Research on the self fulfilling prophecy and teacher expectations. *Journal of Educational Psychology*, 75, 631-661.
- Brophy, J and Good, T. (1974). *Teacher-student relationships: causes and consequences*. New York: Holt, Rinehart & Winston.
- Coombs, C.H. (1975). Portfolio Theory and the measurement of risk. En M.F. Kaplan & S. Schwartz (Eds). *Human Judgment and Decision Processes*. New York: Academic Press.
- Crozier, W.R. (1978). Evaluating the worth of gambles. *British Journal of Psychology*, 69, 179-181.
- Darley, J.M. and Gross, P.H. (1983). A hypothesis confirming bias in labeling effects. *Journal of Personality and Social Psychology*, 44, 20-33.
- Edwards, W. (1954). Variance preference in gambling. *American Journal of Psychology*, 67, 441-452.
- Einhorn, R. and Hogarth, H. (1981). Behavioral decision Theory: Processes of judgment and choice. *Annual Review of Psychology*, 32, 53-88.
- Greenberg, M.G. and Weiner, B. (1966). Effects of reinforcement history upon risk-taking behavior. *Journal of Experimental Psychology*, 71, 587-592.
- Hagen, O. (1979). Towards a positive theory of preferences under risk. En M. Allais & O. Hagen (Eds). *Expected utility hypotheses and the Allais paradox* (PP 271-302). Dordrecht: Reidel.
- Hogarth, H. (1980). Learning from experience and suboptimal rules in decision making. En Wallsten, T. (ed). *Cognitive processes in choice and behavior*. Hillsdale, N.J.: Erlbaum.
- Jussim, L. (1986). Self-fulfilling prophecies: A theoretical and integrative review. *Psychological Review*, 93 (4), 429-445.
- Kanneman, D and Tversky, A. (1979). Prospect Theory. *Econometrica*, 47, 263, 292.
- Leon, O.G. and Gambará, H. (1985). "Relevancia de la valoración de las consecuencias en la toma de decisiones". *Revista de Psicología General y Aplicada*, 40, 1079-1096.
- Leon, O.G. and Lopes, L. (1988). Risk preference and feedback. *Bulletin of the Psychonomic Society*, 26 (4), 343-346.
- Leopard, A. (1978). Risk preferences in consecutive gambling. *Journal of Experimental Psychology: Human Perception and Performance*, 4, 521-528.
- Lopes, L. (1987). Between hope and fear: the psychology of risk. *Advances in Experimental Social Psychology*, 20, 255-295.
- Lopes, L. and Casey, J.T. (1987). Tactical and strategic responsiveness in a competitive risk-taking game. *Wisconsin Human Information Processing Program Technical Report, WHIPP*, 28.
- Lopes, L. and Schneider, S. (1987). Risk Preference and Aspiration Level. *Journal of Experimental Psychology: Human Perception and Performance*, 12 (4), 535-548.
- McGlothlin, W.H. (1956). Stability of choices among uncertain alternatives. *American Journal of Psychology*, 69, 604-615.
- Markowitz, H.M. (1959). *Portfolio selection: efficient diversification of investments*. New York: Wiley.
- Morgan, R.L. (1983). Risk preference as a function of the number of wins and the amount of won. *American Journal of Psychology*, 96, 469-475.
- Schneider, S and Lopes, L. (1986). Reflection in preferences under risk: Who and when may suggest why. *Journal of Experimental Psychology: Human Perception and Performance*, 12, 535-548.
- Slovic, P; Lichtenstein, S and Fischhoff, B. (1988). Decision Making, pp 673-738. En *Stevens' Handbook of Experimental Psychology*.
- Wason, P.C. (1960). On the failure to eliminate hypotheses in conceptual task. *Quarterly Journal of Experimental Psychology*, 12, 129-140.

## APPENDIX

Intructions given to the subjects:

### *Pre-feedback phase:*

"What I want you to do is to tell me wich of these lotteries you would choose if you were allowed to play eihter of the lotteries once. But before you choose, let me emphasize that are no right or wrong answers in the task. We are interested in your preference, whatever it is. Now, which would you prefer? (Wait) OK. Please indicate this preference on the response sheet by circling "I" if you prefer the top lottery or "B" if you prefer the bottom one.

OK. On the screen, we are going to present you a total of 15 lottery pairs, after each presentation choose the lottery you prefer and remember that there are no right or wrong answers."

### *Feedback phase:*

1.- The expression "PRESS (Y) WHEN READY" is on the screen of the computer. So, when you are ready to start press Y key.

2.- OK. A pair of lotteries represented by their letters has appeared on the screen. Now you will indicate which of the pair you would prefer if you were allowed to have a free ticket in either. You can indicate your preference by pressing the letter of the lottery you choose. Now just press the key for the lottery you prefer.

3.- OK. After each election you will see a number changing very quickly in the center of the screen. These are numbers 1 through 100, that appear at random. When you press the space-bar a number will stay on the screen. This is your draw on the lottery and will be used by the computer to assign your prize according to which lottery you have chosen. The best prize is assigned to ticket # 1 and the worst prize to ticket #100. Press the space-bar. You can see that your number is (. If you look at the sheet you can find, in the lottery you have chosen, the prize won by number (. The prize amount also appears on the screen, here (point).

4.- At the same time you see at the botton of the screen the expression "PRESS (Y) WHEN READY". When you press Y a new pair of lotteries will be presented. Press now. OK. That is a new trial and it is exactly the same.

5.- As you proceed through this task, do not worry about previous preferences. Just take each pair as the one. the task will be over when a question mark appears on the screen.

6.- During the task you will see on the screen which key you should press to do every operation.

### *Post-feedback phase:*

Intructions were the same, except that lottery pairs appeared now in a booklet.

\* Los autores quieren agradecer los comentarios realizados por Lola Lopes sobre un borrador de este trabajo.