The Effect of Accountability on Loss Aversion

Ferdinand M. Vieider[1]

Laboratoire GATE, Université de Lyon

22 May 2009

Abstract

This paper investigates the effect of accountability—the expectation on the side of the decision maker of having to justify her decisions to somebody else—on loss aversion. Loss aversion is commonly thought to be the strongest component of risk aversion. Accountability is found to reduce the bias of loss aversion. This effect is explained by the higher cognitive effort induced by accountability, which triggers a rational check on emotional reactions at the base of loss aversion, leading to a reduction of the latter. Connections to dual process theory are discussed.

Keywords: Justification, Risk, Accountability, Loss Aversion, Dual-processing models

PsycINFO Classification Code: 2340, 2360, 3040

[1] Current contact details: Laboratoir GATE, Université de Lyon, 93 chemin de Mouilles, 69130 Ecully, France. Email: vieider@gate.cnrs.fr; Tel. +33-(0)472-866089. I would like to thank Barbara Mellers, Philip E. Tetlock, and Peter P. Wakker for helpful comments.

1. Introduction

Social factors affect many types of human behavior. Possible evaluation by others has been found to be relevant for racist attitudes (Warner & DeFleur, 1969) and for alleged aggression differences by gender (Lightdale & Prentice, 1994). According to Tetlock (1985), the potential evaluation by others is one of the most important factors influencing human decision making processes. Curley, Yates & Abrams (1986) found that other-evaluation can increase ambiguity aversion when several people observe the decision maker's choice. Trautmann, Vieider, & Wakker (2008) found that eliminating the possibility of other-evaluation by making the subject's preferences her own private knowledge causes ambiguity aversion to disappear. McFadden (2006) calls for a more general role of social influences in the explanation of economic behavior.

A substantial literature in social psychology shows the effects that *accountability*, the expectation by a decision maker that she may be called upon to justify her behavior in front of others, has on human decision making processes. Accountability in front of an audience with unknown views generally results in more cognitive effort. This phenomenon has been called pre-emptive self-criticism (Lerner & Tetlock, 1999; Tetlock, 1983; Tetlock & Kim, 1987), consisting in more options being considered more in depth, thereby anticipating possible criticisms others might bring against one's choice.

An interesting question is whether accountability may affect risk attitude. Indeed, risk attitude is important for many decision problems we encounter in our everyday lives, ranging from insurance take-up to investment choices and medical decisions. Weigold & Schlenker (1991) found that accountability accentuated pre-existing risk attitudes, thus making risk averters more risk averse and risk-seekers more risk seeking. Lion & Meertens (2001) found that accountability lead participants to more elaborate information search about the risks they confronted. Huber *et al.* (2009) found that accountability increases the search for risk diffusing operators, a result in accordance with the finding that subjects use more information under accountability (Huber & Seiser, 2001). No studies exist however to the best of the author's knowledge about the effect that accountability may have on loss aversion.

Loss aversion is generally thought to be responsible for the greatest part of risk aversion (Köbberling & Wakker, 2005). It thus seems particularly interesting to see whether accountability has an effect on loss aversion. Loss aversion reflects the fact that people weigh losses more heavily than gains of the same size. In *prospect theory* (Tversky & Kahneman, 1992) this is modeled through a utility function that presents a kink at the status quo, resulting in a steeper utility function for losses than for gains (see figure 1). Loss aversion can thus be estimated by means of simple two-outcome prospects involving a gain and a loss. A subject is thereby asked to indicate a positive amount such as to make her indifferent between the prospect and the status quo (not playing). The loss aversion parameter is generally found to be between 1 and 2.5[*] (Abdellaoui *et al.*, 2007, Booij & van de Kuilen, 2006; Tversky & Kahneman, 1992).

Loss aversion is frequently used to explain phenomena that had long been known empirically but for which sound explanations were still missing (Camerer, 2000). Loss aversion is generally thought to be the cause of the endowment effect and of the status

[*]The prospect theory utility functions over monetary *outcomes* $z \in \mathbb{R}$ can be characterized as $U(z)=z^{\alpha}$ if $z \geq 0$ and $U(z)=-\lambda z^{\alpha}$ if $z < 0$, where $U: \mathbb{R} \to \mathbb{R}$ is a strictly increasing utility function, λ is the loss aversion index, and α determines the curvature of utility.

quo bias (Kahneman *et al.*, 1991; Thaler, 1980; Tversky & Kahneman, 1991), or in any case the WTA-WTP gap (Brown, 2005). It has also been employed to explain the equity premium puzzle (Benartzi & Thaler, 1995; Thaler *et al*., 1997), disposition effects (Shefrin & Statman, 1985; Weber & Camerer, 1998) and the labor supply of cab drivers (Camerer *et al.*, 2000). Sugden (2003) and Schmidt *et al.* (2008) use loss aversion in relation to a reference point that is itself a prospect to explain preference reversals. Trautmann, Vieider, & Wakker (2009) use the same principle to explain preference reversals under ambiguity. Loss aversion is also increasingly employed to explain phenomena in the larger social science realm, ranging from international relations (Levy, 1996) to explanations of differential perception of the progress made by racial minorities dependent on group membership (Eibach & Keegan, 2006).

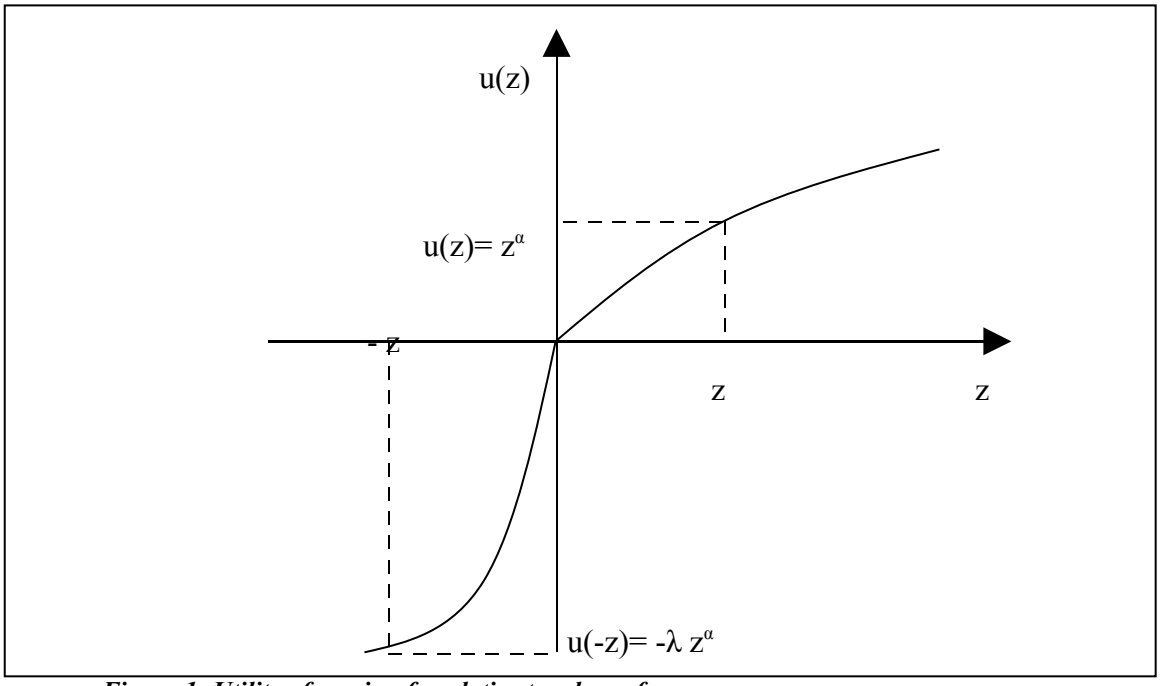


Figure 1: Utility of a gain of z relative to a loss of z

No studies exist to the best of the author's knowledge about the effect that accountability may have on loss aversion. Finding such an effect may lead to differential predictions about the phenomena listed above according to whether a decision is observable or not.

2. Accountability and Loss Aversion

Accountability to an unknown audience has been found to lead to less biased decisions in cases where the normatively correct decision was either known to the subjects, or could be arrived at by higher cognitive effort (Simonson & Nye, 1992). When on the other hand no solution is easily arrived at, people tend to choose the option that appears more easily justifiable. This may be explained by the fact that people have been found to often rely on reasons instead of indices such as expected value when making choices (Shafir *et al.*, 1993). When called upon to make a risky choice they may need to justify in front of

an audience with unknown views, we would thus expect that the decision maker picks the decision which she will deem most easily justifiable (Simonson, 1989).

Accountability has thus been found to have differential effects on some biases depending on subjects' views of the bias. For instance, the sunk cost fallacy (see Wilson & Zhang, 1997, for a review) may be accentuated or attenuated by accountability depending on whether subjects do or do not recognize the commitment to a failing course of action as a bias (Fennema & Perkins, 2008; Simonson & Nye, 1992). Such differential effects are best explained using a flexible correction approach (Wegener & Petty, 1995; Wilson & Brekke, 1994), according to which subjects try to adjust for bias according to their naive theory of what the bias might be. Accountability is thereby thought to act as a motivational activator of the flexible correction process.

Loss aversion is commonly recognized to be empirically strong (Abdellaoui *et al.*, 2007; Bleichrodt *et al.*, 2001; Booij & van de Kuilen 2006; Fishburn & Kochenberger, 1979; Johnson *et al.*, 2006), though it has also been found to be subject to subtle framing effects and to be dependent on subjects' experience (List, 2004; Plott & Zeiler, 2005a; Plott & Zeiler 2005b). Previous evidence on effects of accountability on risk aversion is scant. Weigold & Schlenker (1991) find that risk averters generally become more risk averse under accountability. Since loss aversion is almost universal, this would lead one to expect an increase of loss aversion under accountability.

The value of this evidence is however limited by the fact that Weigold & Schlenker employ complicated multi-outcome lotteries with equal expected value, so that actual risk in terms of expected value does not vary across lotteries. Typical tasks employed to elicit loss aversion on the other hand have clearly detectable and significant differences in expected value. Also, Weigold and Schlenker's lotteries do not involve any losses, and it is known in the literature that findings from one domain of risk attitude do generally not carry over into another (Cohen *et al.*, 1985; Schoemaker, 1990). Furthermore, recent evidence on learning (Plott & Zeiler, 2005a) and market experience (List, 2004) reducing loss aversion makes it likely that loss aversion is indeed perceived as a bias. Such a bias may spring from emotional reactions rather than from rational consideration such as the ones we expect to be activated by accountability. We thus hypothesize that accountability will reduce loss aversion.

3. The Experiment

Method

Subjects. 109 subjects were recruited from a mailing list at Erasmus University Rotterdam, the Netherlands. The average age of the subjects was 21.6 years, and 56% were male. The subjects completed several experimental tasks and were compensated for their participation with a flat payment of €15. Subjects were run in groups of approximately 15 people.

Stimuli. The stimuli from Tversky & Kahneman (1992) were used employing a straight matching task (instructions in appendix). This methodology involves eliciting indifference between the status quo (an outcome of 0) and a two-outcome prospect. The prospect involved a given loss that would obtain with a .5 probability and a gain with a .5

probability that subjects were supposed to fill in so as to make them indifferent between the status quo and the prospect itself (*simple prospects*). These simple prospects were then used to elicit the loss attitude of subjects, and some additional prospects were included to test for consistency and for curvature of utility for gains. The loss aversion index λ for such simple prospects is given by the gain divided by the loss it needs to compensate (Tversky & Kahneman, 1992).

Since no complete utility functions are elicited and probability weighting is not considered in the calculations described above, only an approximation of the loss aversion index is obtained (Abdellaoui *et al*., 2007, Schmidt & Zank, 2005). To the extent that the probability weighting function for gains and losses is however generally found to be very similar (Tversky & Kahneman, 1992), this definition seems good enough, and does not influence the main issue at stake—the comparison of the index between treatments.

Manipulation. The manipulation between the two treatments consisted in varying the explicit accountability level of the subjects. In the no accountability treatment, subjects were told that their answers were confidential and could not be traced back to them. They were told that after the experiment they should put their completed questionnaire in a cardboard box by the exit of the room upon which they would be paid and could leave. In the explicit accountability treatment subjects were asked to write down their name and email address at the beginning of the sheet. They were told that upon completion of the task they would be asked to take their questionnaire with them to another room, where an experimenter would interview them about their choices. Several subjects participated at the same time, so as to give an additional impression of anonymity in the low accountability condition.

Results

Of the 109 subjects that participated, 7 were excluded from the analysis for violation of stochastic dominance. Of the remaining 102 subjects, 5 were classified as gain seeking and the remainder as loss neutral or loss averse. Preliminary tests strongly rejected a normal distribution of the data ($p=0.000$, skewness-kurtosis test for normality), hence two-sided non-parametric tests are used throughout.

A two-sample Wilcoxon rank-sum test rejected the hypothesis that the two samples were drawn from the same population ($p=0.030$, $r=0.19$[2]). Loss aversion was found to be significantly lower under conditions of accountability pressure. The median value of the average lambda from the simple gambles was 1.95 under accountability and 2.38 under no accountability. Table 1 shows the different medians of lambda for the different prospects (means are given in parentheses). Testing on the other hand for effects on curvature of utility for gains, no difference between treatments was found. This indicates that accountability does indeed influence loss aversion and not curvature of the utility function for gains.

[2]Pearson's r is used as a measure of effect size throughout the paper. Effect sizes have the advantage to permit immediate comparison between findings from different studies independently of sample sizes or test statistics used, and thus facilitate comparison and integration of findings from different studies (Rosenthal, 1991).

	no accountability	explicit accountability
lambda 1	2 (2.51)	1.8 (2.10)
lambda 2	2 (3.18)	2 (2.31)
lambda 3	2.5 (3.59)	2 (2.98)
lambda 4	2.67 (3.80)	2 (2.86)
average lambda	2.38 (3.27)	1.95 (2.56)

Table 1: median values of lambda (means in parentheses)

Discussion

Accountability is found to reduce loss aversion and, thus, to enhance rationality and the quality of decisions. Accountability theory can explain this if one accepts that loss aversion is recognized as a bias, and thus reduced when subjects have to justify their behavior (Simonson & Nye, 1992). Equivalently the finding can be explained using a flexible correction approach (Wegener & Petty, 1995; Wilson & Brekke, 1994), according to which subjects try to adjust for bias according to their naive theory of what the bias might be, whereby accountability acts as a motivational activator of the correction process. The results are also consistent with the results of List *et al.* (2004), who find that accountable subjects are more willing to pay for a non-marketed good than are unaccountable subjects.

Given that the great majority of subjects (94%) were students of either economics or business and had had some courses in mathematics and statistics as well as basic economics, it seems particularly plausible that they would have recognized loss aversion as a bias. Such an interpretation is also confirmed by the interviews conducted with accountable subjects. The simplicity of the prospects employed makes it indeed easy to recognize loss aversion as a bias, so that similar effects may be expected to occur also with a more general subject population. This seems indeed intuitive here because it is easy to see that the value of the gain that makes the trade-off "fair" is equal to the absolute value of the loss. This leads subjects to indicate gains that are close to the absolute value of the loss in the high accountability condition. When on the other hand subjects are not accountable, they follow their instinct and demand higher compensation for a given potential loss, an effect which seems to increase with the amount to be lost (see table 1).

Decisions in general often appear to be the outcome of a conflict between a quicker emotional mechanism and more reflective and rational mechanisms that are activated more slowly (Kahneman, 2003a; Loewenstein *et al.*, 2001; Sloman 2002; Sanfey *et al.*, 2006), as described in dual-process models (Chaiken & Trope, 1999; Sloman, 2002). Loss aversion appears to be caused mainly by emotional mechanisms. This interpretation also finds support in studies about loss aversion displayed by Capuchin monkeys (Chen *et al.*, 2006) and by young children (Harbaugh *et al.*, 2001), which both point in the direction of an instinctive origin of loss aversion.

Loss aversion thus seems to stem from adaptive mechanisms that have developed in the very early stages of human evolution to cope with basic environmental challenges (Chen *et al.*, 2006; Rayo & Becker, 2005). This interpretation is corroborated by recent evidence from neuroeconomics (Breiter *et al.*, 2001; Sanfey *et al.*, 2006), which with

proper caution constitutes a promising way to test social psychological models (Willingham & Dunn, 2003).

When there is the need to justify one's behavior in front of somebody else, however, the higher cognitive effort activated by this need reduces the bias (Tetlock, 1983; for a case of how rationality can impair decisions, see Dijksterhuis, 2004). Indeed, "an answer provided by the associative system just 'pops' into the head so the perceiver may be unable to provide any justification for it other than intuition" (Smith & DeCoster, 2000, p. 115). They will however "go beyond heuristic processing when circumstances […] make them feel an unusually great need to be accurate, defend an attitude or create a positive impression" (p. 119). This interpretation thus raises the issue of the motivational activation of the more rational, rule-based system by accountability that warrants further investigation.

The activation of more rational thought processes seems to be driven by the typical desire of being favorably evaluated and avoiding criticism generally displayed by accountable subjects (Chen & Chaiken, 1999; Simonson & Nye, 1992, Smith & DeCoster 2000; see also Baumeister & Leary, 1995). Indeed, accountability can be seen as increasing the social and reputation cost of relying on a simple decision heuristic. It thus becomes beneficial to engage in more complex deliberative behavior which results in a reduction of the decision bias, if the higher cost of the more complex deliberation is outweighed by the reputation costs of a bad decision (Arkes, 1991). This conclusion is also consistent with recent findings of the disappearance of loss aversion when subjects think more deeply about the decision at hand either because they are more experienced in market transactions (List, 2004) or because they are encouraged to properly learn and understand the incentive mechanism in repeated trials (Plott & Zeiler, 2005a).

Finally there remains a methodological point to be made. Traditional experiments in economics and psychology tend to isolate subjects as much as possible from outside influences and to guarantee subjects as much anonymity as possible, thereby keeping accountability artificially low. Plott & Zeiler (2005a) explicitly state that they want subjects to be anonymous in order to study their "real" preferences. Hoffman *et al.* (1996) find that granting subjects anonymity reduces offers in dictator games and hence pushes behavior towards predictions of economic theory. While interesting insights can be gained from such manipulations, such a procedure does however not accurately reflect circumstances as encountered in the real world and thus threatens to jeopardize the external validity of experimental results. Any effect accountability is found to have on loss aversion may thus change the interpretation of results obtained in lab experiments according to the particular circumstances under which they were conducted.

Conclusion

Accountability was found to reduce loss aversion. This result is consistent with recent studies that find beneficial effects of learning on decision making, in the sense that they reduce or even eliminate loss aversion. Additional cognitive effort induced by accountability is hereby found to improve decisions, even though it falls clearly short of completely eliminating the bias of loss aversion.

This activation of cognitive effort is linked to recent dual-processing models of the human mind, and a connection between the existing accountability literature and those models is established. This study thus touches upon the interesting question of

accountability-driven motivational effects for the differential activation of mental processes. This finding also has important implications for traditional laboratory studies of loss aversion. To the extent that such studies have kept accountability low as is common practice in psychology and economics experiments, they may systematically overestimate the size of the bias. Future investigation of loss aversion will thus need to carefully control for the accountability variable in order to maximize the external validity of their results.

References

Abdellaoui, M., Bleichrodt, H., & Paraschiv, C. (2007). Loss Aversion under Prospect Theory: A Parameter-Free Measurement. *Management Science*, forthcoming.

Arkes, H. R. (1991). Costs and Benefits of Judgment Errors: Implications for Debiasing. *Psychological Bulletin 10(3)*, 486-498.

Baumeister, R. F., & Leary, M. R. (1995). The Need to Belong: Desire for Interpersonal Attachments as a Fundamental Human Motivation. *Psychological Bulletin 117(3)*, 497-529.

Benartzi, S., & Thaler, R.H. (1995). Myopic Loss Aversion and the Equity Premium Puzzle. *The Quarterly Journal of Economics 110(1)*, 73-92.

Bleichrodt, H., Pinto, J. L., & Wakker, P. P. (2001). Making Descriptive Use of Prospect Theory to Improve the Prescriptive Use of Expected Utility. *Management Science 47 (11)*, 1498-1514.

Booij, A. S., & van de Kuilen, G. (2006). A Parameter-Free Analysis of the Utility of Money for the General Population under Prospect Theory. CREED, University of Amsterdam.

Breiter, H. C., Aharon, I., Kahneman, D., Dale, A., & Shizgal, P. (2004). Functional Imaging of Neural Responses to Expectancy and Experience of Monetary Gains and Losses. *Neuron 30*, 619 – 639.

Brown, T. C. (2005). Loss Aversion Without the Endowment Effect, and Other Explanations for WTA-WTP Disparity. *Journal of Economic Bahavior and Organization 57*, 367-379.

Camerer, C. F. (2000). Prospect Theory in the Wild: Evidence from the Field. in *Choices, Values, and Frames*. D. Kahneman and A. Tversky, eds., Cambridge University Press.

Camerer, C. F., Babcock, L., Loewenstein, G., & Thaler, R. H. (2000). Labor Supply of New York City Bap Drivers: One Day at a Time. In *Choices, Values, and Frames*. D. Kahneman and A. Tversky, eds., Cambridge University Press.

Chaiken, S., & Trope, Y, Ed.s (1999). *Dual-Processing Theories in Social Psychology*. New York: Guilford.

Chen, S. & Chaiken, S. (1999). The Heuristic-Systematic Model in its Broader Context, in *Dual-Processing Theories in Social Psychology*, 73-96, S. Chaiken and Y. Trope (Ed.s), New York: Guilford.

Chen, M. K., Lakshminarayanan, V., & Santos, L.R. (2006). How Basic are Behavioral Biases? Evidence from Capuchin Monkey Trading Behavior. *Journal of Political Economy 114(3)*, 517-537.

Cohen, M., Jaffray, J.Y., & Said, T. (1985). Individual Behavior under Risk and Under Uncertainty: An Experimental Study. *Theory and Decision 18,* 203-228.

Curley, S. P., Yates, J.F., & Abrams, R. A. (1986). Psychological Sources of Ambiguity Avoidance. *Organizational Behavior and Human Decision Processes 38*, 230-256.

Dijksterhuis, A. (2004). Think Different: The Merit of Unconscious Thought in Preference Development and Decision Making. *Journal of Personality and Social Psychology 87(5)*, 586-598.

Eibach, R. P., & Keegan, T. (2006). Free at Last? Social Dominance, Loss Aversion, and Black and White Americans' Differing Assessments of Racial Progress. *Journal of Personality and Social Psychology 90(3)*, 453-467.

Fennema, M.G., &Perkins, J.D. (2008). Mental Budgeting Versus Marginal Decision Making: Training, Experience, and Justification Effects on Decisions Involving Sunk Costs. *Journal of Behavioral Decision Making 21(3)*, 225-239.

Fishburn, P. C., & Kochenberger, G. A. (1979). Two-piece von Neumann Morgenstern Utility Functions. *Decision Sciences 10*, 503-518.

Harbaugh, W. T., Krause, K., & Vesterlund, L. (2001). Are Adults Better Behaved Than Children? Age, Experience, and the Endowment Effect. *Economic Letters 70*, 175-181.

Hoffman, E., McKabe, K., & Smith, V. L. (1996). Social Distance and Other-Regarding Behavior in Dictator Games. *The American Economic Review 86(3)*, 653-660.

Huber, Oswald, and Gabriele Seiser (2001). Accounting and Convincing: The Effect of Two Types of Justification on the Decision Process. *Journal of Behavioral Decision Making 14*, 69-85.

Huber, Oswald, Arlette S. Bär, and Odilo W. Huber (2009). Justification Pressure in Risky Decision Making: Search for risk defusing operators. *Acta Psychologica 130*, 17-24.

Johnson, E. E., Gächter, S., & Herrmann, A. (2006). Exploring the Nature of Loss Aversion. *IZA Discussion Paper No. 2015*.

Kahneman, D. (2003). A Perspective on Judgment and Choice: Mapping Bounded Rationality. *American Psychologist 58*, 697-720.

Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991). Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias. *The Journal of Economic Perspectives 5(1)*, 193-206.

Köbberling, V., & Wakker, P. P. (2005). An Index of Loss Aversion. *Journal of Economic Theory 122*, 119-131.

Lerner, J. S., & Tetlock, P. E. (1999). Accounting for the Effects of Accountability. *Psychological Bulletin 125*, 255-275.

Levy, J. S. (1996). Loss Aversion, Framing, and Bargaining: The Implications of Prospect Theory for International Conflict. *International Political Science Review 17*, 177-193.

Lightdale, J. R., & Prentice, D. A. (1994). Rethinking Sex Differences in Aggression: Aggressive Behavior in the Absence of Social Roles. *Personality and Social Psychology Bulletin 20*, 34 – 44.

Lion, R., & Meertens, R.M. (2001). Seeking Information About a Risky Medicine: Effects of Risk-Taking Tendency and Accountability. *Journal of Applied Social Psychology 31*, 778-795.

List, J. A. (2004). Neoclassical Theory versus Prospect Theory: Evidence from the Marketplace. *Econometrica 72(2)*, 615-625.

List, J. A., Berrens, R. P., Bohara, A. K., & Kerkvliet, J. (2004). Examining the Role of Social Isolation on Stated Preferences. *American Economic Review 94(3)*, 741-752.

Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as Feelings. *Psychological Bulletin 127(2)*, 267-286.

McFadden, D. (2006). Free Markets and Fettered Consumers. *American Economic Review 96(1)*, 5-29.
Plott, C. R., & Zeiler, K. (2005a). The Willingness to Pay – Willingness to Accept Gap, the "Endowment Effect", Subject Misconceptions and Experimental Procedures for Eliciting Evaluations. *American Economic Review 95(3)*, 530-545.
Plott, C. R. & Zeiler, K. (2005b). Asymmetries in Exchange Behavior Incorrectly Interpreted as Evidence in Prospect Theory. Working Paper
Rayo, L., & Becker, G. S. (2005). Evolutionary Efficiency and Happiness. Working Paper
Rosenthal, R. (1991). *Meta-Analytic Procedures for Social Research*. Sage Publication, Newberry Park, CA.
Sanfey, A. G., Loewenstein, G., McClure, S. M., & Cohen, J. D. (2006). Neuroeconomics: Cross-Currents in Research on Decision Making. *Trends in Cognitive Sciences 10(3)*, 108-116.
Schmidt, U., Starmer, C., & Sugden, R. (2008). Explaining Preference Reversal with Third-Generation Prospect Theory. *Journal of Risk and Uncertainty 33(6)*, 203-223.
Schmidt, U., & Zank, H. (2005). What is Loss Aversion? *Journal of Risk and Uncertainty 30(2)*, 157-167.
Schoemaker, P. J.H. (1990). Are Risk-Attitudes Related across Domains and Response Modes? *Management Science 36(12)*, 1451-1463.
Shafir, E., Simonson, I., & Tversky, A.(1993). Reason-based Choice. *Cognition 49*, 11-36.
Shefrin, H., & Statman, M. (1985). The Disposition to Sell Winners too Early and Ride Losers too Long: Theory and Evidence. *Journal of Finance 40(3)*, 777-790.
Simonson, I. (1989). Choice Based on Reason: the Case of Attraction and Compromise Effect. *The Journal of Consumer Research 16(2)*, 158-174.
Simonson, I., & Nye, P. (1992). The Effect of Accountability and Susceptibility on Decision Errors. *Organizational Behavior and Human Decision Processes 51*, 416-446.
Sloman, S. A. (2002). Two Systems of Reasoning. In *Heuristics and Biases: The Psychology of Intuitive Judgment.* T. Gilovich, D. Griffin, and D. Kahneman eds., 379-396.
Smith, E. R., & J. DeCoster (2000). Dual-Process Models in Social and Cognitive Psychology: Conceptual Integration and Links to Underlying Memory Systems. *Personality and Social Psychology Review 4(2)*, 108-131.
Sugden, R. (2003). Reference-Dependent Subjective Expected Utility. *Journal of Economic Theory 111*, 172-191.
Tetlock, P. E. (1983). Accountability and Complexity of Thought. *Journal of Personality and Social Psychology 45(1)*, 74-83.
Tetlock, P. E. (1985). Accountability: The neglected social context of judgment and choice. *Research in Organizational Behavior 7*, 297-332.
Tetlock, P. E., & Kim, L. I. (1987). Accountability and Judgment Processes in a Personality Prediction Task. *Journal of Personality and Social Psychology 52(4)*, 700-709.
Thaler, R. (1980). Toward a Positive Theory of Consumer Choice. *Journal of Economic Behavior and Organization 1*, 39-60.

Thaler, R. H., Tversky, A., Kahneman, D., & Schwartz, A. (1997). The Effect of Myopia and Loss Aversion on Risk Taking: An Experimental Test. *The Quarterly Journal of Economics 112(2)*, 647-661.

Trautmann, Stefan T., Ferdinand M. Vieider, and Peter P. Wakker (2008). Causes of Ambiguity Aversion: Known Versus Unknown Preferences. *Journal of Risk and Uncertainly 36*, 225-243.

Trautmann, S. T., Vieider, F. M., & Wakker, P. P. (2009). Preference Reversal under Ambiguity. Working Paper. Erasmus University Rotterdam.

Tversky, A., & Kahneman, D. (1991). Loss Aversion in Riskless Choice: A Reference-Dependent Model. *The Quarterly Journal of Economics 106(4)*, 1039-1061.

Tversky, A., & Kahneman, D. (1992). Advances in Prospect Theory: Cumulative Representation of Uncertainty. *Journal of Risk and Uncertainty 5*, 297-323.

Warner, L. G., & DeFleur, M. L. (1969). Attitudes as an Interactional Concept: Social Constraint and Social Distance as Intervening Variables Between Attitudes and Actions. *American Sociological Review 34 (2)*, 153-169.

Weber, M., & Camerer, C. F. (1998). The Disposition Effect in Securities Trading: an Experimental Analysis. *Journal of Economic Behavior and Organization 33*, 167-184.

Wegener, D. T. & Petty, R.E. (1995). Flexible Correction Processes in Social Judgment: The Role of Naive Theories in Corrections for Perceived Bias. *Journal of Personality and Social Psychology 68(1)*, 36-51.

Weigold, M. F., & Schlenker, B. R. (1991). Accountability and Risk Taking. *Personality and Social Psychology Bulletin 17*, 25-29.

Willingham, D. T., & Dunn, E. W. (2003) What Neuroimaging and Brain Localization Can Do, Cannot Do, and Should Not Do for Social Psychology. *Journal of Personality and Social Psychology 85(4)*, 662-671.

Wilson, R. M. S., & Zhang, Q. (1997). Entrapment and Escalating Commitment in Investment Decision Making: A Review. *British Accounting Review 29*, 277-305.

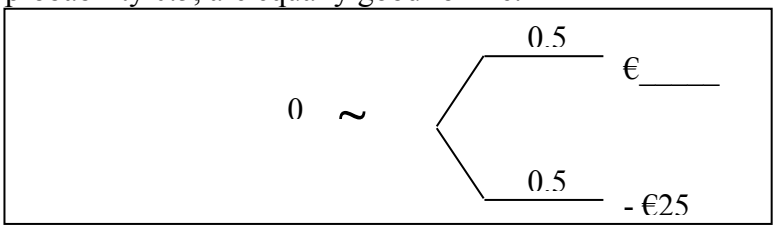
Wilson, T. D., & Brekke, N. (1994). Mental Contamination and Mental Correction: Unwanted Influences on Judgments and Evaluations. *Psychological Bulletin 116(1)*, 117-142.

Appendix: Instructions Loss Aversion

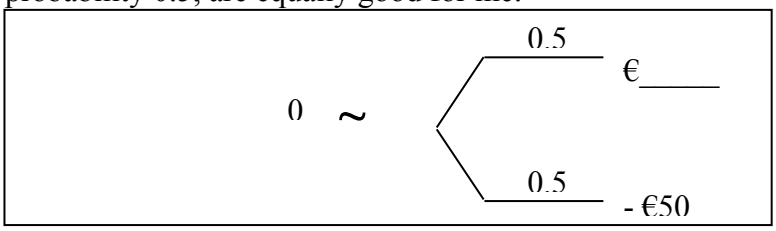
Below some pairs of gambles are presented to you. The pairs involve a trade-off between a certain amount and a gamble, and in some cases between two gambles. Please fill in the amounts that are missing from the right-hand gamble that make the two gambles equally good for you. Imagine one of the two gambles in each pair would be randomly chosen by the experimenter for real play: what amount would make you indifferent between the left hand gamble and the right-hand gamble?

Gambles are described both verbally and graphically. In the graphical representation, ~ represents indifference (the two gambles are equally good for you). The gambles are represented by means of a ramification, where probabilities are indicated above each branch and amounts to be won or lost are indicated at the end. Please pay close attention to the amounts to be won and to the signs of the amounts, as both gains and losses are involved. Probabilities always stay at 0.5 in the gambles.

Obtaining 0 for sure and a gamble giving a loss of €25 and a gain of €_____, each with probability 0.5, are equally good for me.

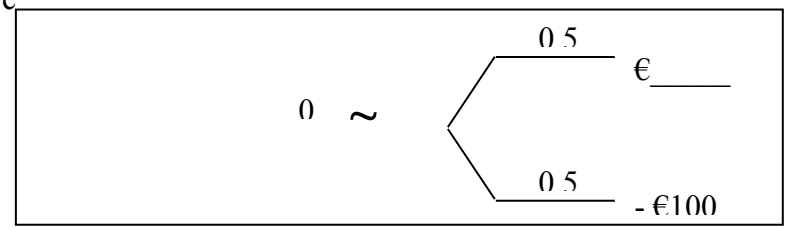


Obtaining 0 for sure and a gamble giving a loss of €50 and a gain of €_____, each with probability 0.5, are equally good for me.

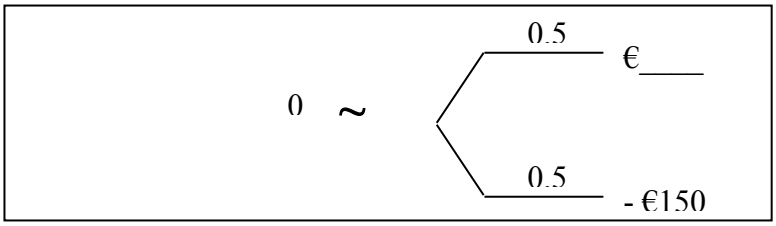


Obtaining 0 for sure and a gamble giving a loss of €100 and a gain of €_____, each with probability 0.5, are equally good for me.

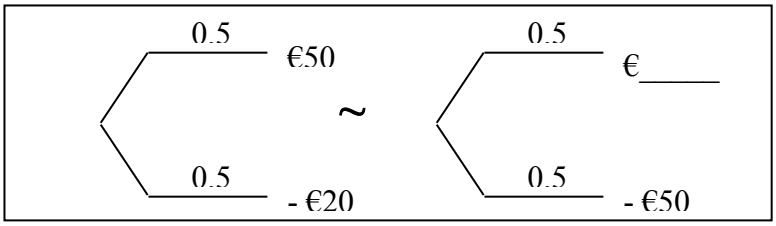
c



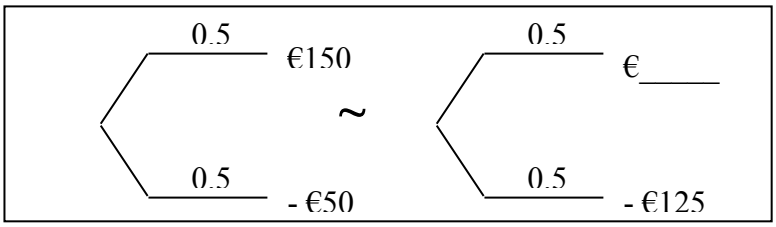
Obtaining 0 for sure and a gamble giving a loss of €150 and a gain of €_____, each with probability 0.5, are equally good for me.



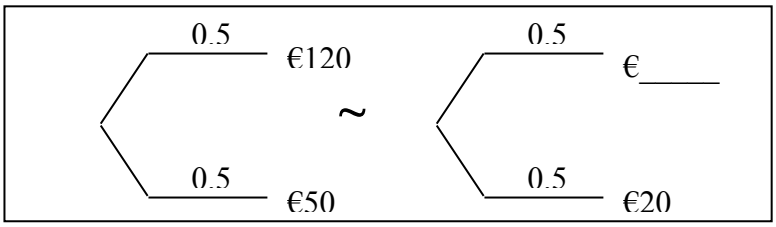
A gamble giving a loss of €20 and a gain of €50 each with probability 0.5 and a gamble giving a loss of €50 and a gain of €_____, each with probability 0.5, are equally good for me.



A gamble giving a loss of €50 and a gain of €150 each with probability 0.5 and a gamble giving a loss of €125 and a gain of €_____, each with probability 0.5 are equally good for me.



A gamble giving a gain of €50 and a gain of €120 each with probability 0.5 and a gamble giving a gain of €20 and a gain of €_____, each with probability 0.5 are equally good for me.



A gamble giving a gain of €100 and a gain of €300 each with probability 0.5 and a gamble giving a gain of €25 and a gain of €_____, each with probability 0.5 are equally good for me.