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The Impact of Probability and Magnitude of Outcome on Disappointment and Elation

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Bell's (1985) disappointment theory postulates that probability and magnitude of outcome affect the intensity of disappointment after undesirable outcomes and that of elation after desirable outcomes. The influence of probability and magnitude of outcome on the intensity of disappointment and elation was examined in five studies. Study 1 (within-subjects design) showed an effect of probability on both disappointment and elation. Study 2 (between-subjects design) showed only an effect of probability on disappointment. Study 3 also relied on a between-subjects design, used a different set of pay-offs, and replicated the findings of Study 2. In Study 4 both probability and magnitude of outcome were systematically varied. Results showed a large effect of probability on disappointment, but only a small effect on elation. Magnitude had a large effect on elation, but only a small effect on disappointment. Study 5 (using a real lottery) replicated the findings of Studies 2 and 3. Overall, these results suggest that experienced disappointment is primarily determined by the probability of the (undesirable) outcome, while elation is primarily determined by the magnitude of the (desirable) outcome. Possible explanations for this asymmetry are proposed, and implications for disappointment theory are briefly outlined.

Imagine that the head of your department tells you that she is very pleased with your work and offers you a salary increase of $250 a month; how would you feel? If you were expecting an increase of $450, you would feel disappointed; however, if you were expecting an increase of only $50, or no increase at all, you would feel elated. Disappointment is a psychological reaction to an outcome that does not match up to expectations. "Elation" refers to the euphoria associated with an outcome that exceeds expectations. The greater the disparity between outcome and expectations, the greater one's disappointment or elation.

The role of these emotions in decision making was first explored by Bell (1985) and Loomes and Sugden (1986). Their work diverges from the classical consequential view of decision making. The central proposition of their disappointment theories is that individuals form expectations about uncertain prospects. The expectations may vary from person to person. For example, a mathematician may expect the probabilistic average, an optimist may expect more, a pessimist less. If the actual consequence turns out to be worse (or better) than what was expected, they will experience a sensation of disappointment (or elation). This sensation generates a decrement (or an increment) of utility which modifies the basic utility derived from the consequences (Loomes and Sugden, 1987). Basically, the decision maker's disappointment is assumed to be in direct proportion to the difference between what (s)he expected and what (s)he got. More formally, disappointment = $dp(x - y)$ in a lottery where x is at least as preferred as y, p is the probability of winning, and d is a constant reflecting the degree to which a unit of disappointment affects the decision maker (see Bell, 1985, p. 5). Similarly, if x (the desirable outcome) occurs, the experienced elation is assumed to be proportional to the difference between what the decision maker expected and what (s)he got; elation = $e(1 - p)(x - y)$, where $e \geq 0$ is a constant reflecting the degree to which the decision maker is affected by each unit of elation. Bell argued that although psychological feelings of disappointment and elation are ignored in rational economic analysis, they play a role in the informal evaluation of alternatives by decision makers. People who anticipate these feelings may take them into account, e.g., when comparing uncertain alternatives.

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Generally, both disappointment and elation are assumed to be a function of the difference between the obtained outcome and prior expectations. For given values of outcome and prior expectation, both disappointment and elation are also assumed to be directly related to the probability with which the outcome occurred. Bell (1985) illustrated the possible role of the prior probability of an outcome using the following example:

> Consider a 50–50 lottery between $0 and $2,000 and also a lottery with normal distribution having mean $1,000 and standard deviation of $10. Compare your reaction to receiving $0 in each case. The disappointment may be greater in the second case than in the first. In the first lottery, the zero outcome had a 50% chance of occurring and bordered on being 'expected'. In the second lottery, an outcome as low as $0 was virtually impossible and a feeling of great dismay would be understandable.(p. 9)

Bell (1985) thus suggests that both disappointment and elation may be related not only to the level of prior expectations (expected value) but also to the probability of obtaining the outcome. Thus, disappointment is most intense when you least expect the undesirable outcome, and elation increases when the likelihood of the desirable outcome is low. Disappointment has attracted attention not only from researchers in the field of decision making, but also from emotion researchers. Frijda (1994) defines disappointment as an emotion that signals the relationship between progress and expectations regarding one's progress and as having implications for energy investments and ultimately for action termination or goal abandonment. Ortony, Clore, and Collins (1988) define disappointment as an emotion that will be experienced when an expected (desirable) outcome does not materialize.[1] They characterize disappointment as a 'prospect-based' emotion, where the prospect of an event refers to a conscious expectation that it will occur in the future. In their cognitive theory of emotion they share Bell's view that people are more disappointed when the disappointing outcome was less likely to occur. Although Bell and Ortony *et al.* agree on the impact of the probability of an outcome on the intensity of disappointment, to date there is no empirical evidence to support the assumption that the probability of an outcome has an impact on disappointment and elation. Loomes (1987) describes various experiments in which he attempted to test the impact of regret and disappointment in choice under uncertainty. He found strong support for predictions derived from regret theory (Bell, 1982; Loomes & Sugden, 1982) but mixed and weak support for disappointment theory. The main dependent variable in his research was preference for decision alternatives, some of which were in line with expected-utility theory, while others were consistent with regret and/or disappointment theory. Loomes did *not* include measures of experienced disappointment and elation.

We will focus on a more basic assumption of disappointment theory and address the impact of probability and magnitude of outcomes on the *amount* of experienced disappointment, in order to provide more direct evidence for the presumed role of probability and magnitude as determinants of disappointment and elation. On the basis of Bell's (1985) theory one would expect both probability of the (un)desirable outcomes and the magnitude of these outcomes to determine *both* disappointment and elation. We will investigate these assumptions in a number of experiments, the first series of which focus on the role of probability.

STUDY 1

In order to test the relation between probability of an outcome and disappointment we used five lotteries[2] with an equal expected value of 1000 Dutch Guilders (fl.1000; approximately $625). The probabilities of obtaining a zero outcome were 90, 70, 50, 30, and 10% (see Table 1). Disappointment is hypothesized to be an inverse function of the prior probability (p) with which the zero outcome occurred, increasing as p decreases and decreasing as p increases. Disappointment is expected to be highest in the fifth lottery and lowest in the first.

To test the relation between the probability of an

TABLE 1

Disappointment—Lotteries Study 1

Lottery		
1	10% × fl.10,000	90% × fl.0
2	30% × fl.3,333	70% × fl.0
3	50% × fl.2,000	50% × fl.0
4	70% × fl.1,429	30% × fl.0
5	90% × fl.1,111	10% × fl.0

[1] Ortony, Clore, and Collins (1988) do not mention elation in their theory. They use the term satisfaction when an expected outcome does materialize. We think that the term satisfaction is appropriate when an outcome matches one's expectation; the term elation is appropriate when an outcome exceeds one's expectations.

[2] Bell (1985) proposed four lotteries (with an equal expected value of $1000) to test the relation between probability and disappointment. A 10–90% lottery between $10,000 and $0, a 50–50% lottery between $2000 and $0, a 90–10% lottery between $1111 and $0, and a 99.9–0.1% lottery between $1001 and $0. In the present study we used the first three of Bell's lotteries and added two more. This was done to create a more equal distribution of probabilities.

outcome and elation we used five lotteries[3] with an equal expected value of 9100 and a top prize of 10,000 Dutch Guilders. The probabilities of winning fl.10,000 were 90, 70, 50, 30, and 10% (see Table 2). Elation is hypothesized to increase as a function of the odds against winning. Elation is expected to be highest in the fifth lottery and lowest in the first.

Method

Participants and procedure. Psychology students at the University of Amsterdam ($N = 377$) participated (in partial fulfillment of a course requirement) in this study, which was a part of a larger paper-and-pencil session. Half of the participants rated their disappointment after imagining winning nothing in each of the five disappointment lotteries. These ratings were given on a 9-point scale, with endpoints labeled *not disappointed at all* (1) and *very disappointed* (9). The other half of the participants rated their elation after imagining winning fl.10,000 in each of the five elation lotteries on a 9-point scale, with endpoints labeled *not elated at all* (1) and *very elated* (9). For both types of lotteries (i.e., disappointment and elation), half were presented with ascending probabilities and the other half with descending probabilities.

Results and Discussion

The predictions concerning disappointment and elation were tested in two separate ANOVAs with lottery as independent factor and emotion ratings as within-subjects factor. There was no difference between the participants who were presented with ascending probabilities and those who were presented with descending probabilities, so this factor was ignored in the analyses.

TABLE 2

Elation—Lotteries Study 1

Lottery		
1	90% × fl.10,000	10% × fl.1,000
2	70% × fl.10,000	30% × fl.7,000
3	50% × fl.10,000	50% × fl.8,200
4	30% × fl.10,000	70% × fl.8,714
5	10% × fl.10,000	90% × fl.9,000

[3] Bell (1985) proposed four lotteries (with an equal expected value of $9000) to test the relation between probability and elation. A 90–10% lottery between $10,000 and $0, a 50–50% lottery between $10,000 and $8000, a 10–90% lottery between $10,000 and $8888, and a 0.1–99.9% lottery between $10,000 and $8999. In the present study we used five lotteries with an expected value of 9100 Dutch Guilders. We did not use a lottery with a zero outcome, because this could have a separate effect on elation ratings. With doing this all lotteries have (besides a topprize of 10,000 Dutch Guilders) a positive alternative outcome.

Disappointment. Results revealed a significant effect of the presented lottery, $F(4, 183) = 349.98$; $p < .001$, with the fifth lottery generating the highest level of disappointment (7.52), followed by the fourth lottery (6.47), the third lottery (5.55), the second lottery (3.90), and the first lottery (3.20) (see Table 3). Planned comparisons revealed that all these means were significantly different from each other ($p < .01$).

Elation. Results showed a significant effect of the presented lottery, $F(4, 178) = 33.56$, $p < .01$, with the fifth lottery generating the highest level of elation (8.50), followed by the fourth lottery (8.43), the third lottery (8.21), the second lottery (8.06), and the first lottery (7.90) (see Table 3). Planned comparisons revealed that these means (with the exception of those for the fourth and the fifth lottery) were significantly different from each other ($p < .01$).

The results of this study suggest that both disappointment and elation are dependent upon the probability of the obtained outcome. However, because of the similarity between the lotteries there is a possibility that participants may have formed hypotheses about the aim of the study (Keren & Raaijmakers, 1988), and their responses may not reflect their actual preferences, but rather reflect the effect of demand characteristics. Participants were able to directly compare the five lotteries, and because of the clearly noticeable differences they may have been tempted to differentiate both the disappointment and the elation ratings. In order to address this issue, we conducted a second study using a between-subjects design.

STUDY 2

Method

Participants and procedure. Psychology students at the University of Amsterdam ($N = 492$) participated in this study, which was part of a larger paper-and-pencil session. One hundred ninety-two were paid fl.10, while the other 300 participated in partial fulfillment of a course requirement. They were presented with either a disappointment lottery which was equal to disappointment lottery 1, 3, or 5 from Study 1 (see Table 1),

TABLE 3

Means of Disappointment and Elation Ratings Study 1

Type of lottery	Lottery 1	Lottery 2	Lottery 3	Lottery 4	Lottery 5
Disappointment	3.20[a]	3.90[b]	5.55[c]	6.47[d]	7.52[e]
Elation	7.90[a]	8.06[b]	8.21[c]	8.43[d]	8.50[d]

Note. Scores could range from 1 (not at all disappointed/elated) to 9 (extremely disappointed/elated). Means within the same row with different superscripts differ significantly at $p < .01$.

or an elation lottery which was equal to elation lottery 1, 3, or 5 from Study 1 (see Table 2). As was the case in Study 1, participants who were presented with a disappointment lottery were asked to rate their disappointment after imagining winning nothing in the lottery on a 9-point scale, with endpoints labeled *not disappointed at all* (1) and *very disappointed* (9). Participants who were presented an elation lottery were asked to rate their elation after imagining winning fl.10,000 in the lottery on a 9-point scale, with endpoints labeled *not elated at all* (1) and *very elated* (9).

Results and Discussion

Disappointment. ANOVA showed a significant effect of the presented lottery, $F(2, 191) = 13.73$, $p < .01$. The third lottery was rated as generating the highest level of disappointment (6.84), followed by the second lottery (5.77), while the first lottery elicited the lowest level of disappointment (4.77) (see Table 4). Planned comparisons showed that all means are statistically different from each other ($p < .05$).

Elation. ANOVA showed no significant effect of the presented lottery, $F(2, 299) < 1$, *ns*. Mean elation scores were 8.29, 8.32, and 8.37 (see Table 4). Planned comparisons revealed no significant differences between these means.

The results of this study replicated those of Study 1 by showing that participants were more disappointed with a zero outcome when the probability of this outcome was lower. However, Study 2 did not reveal a relation between probability and elation. Participants were *not* more elated when the probability of winning fl.10,000 was lower. This finding does not support Bell's (1985) assumption that probability affects both disappointment and elation. One could argue that this finding is due to a ceiling effect and, as a consequence, may tell us nothing about the relationship between probability and elation; participants receiving any of the three elation lotteries are likely to be very elated given the pay-off of fl.10,000. To test this possibility, we conducted a third study using much smaller pay-offs.

TABLE 4

Means of Disappointment and Elation Ratings Study 2

Type of Lottery	Lottery 1	Lottery 2	Lottery 3
Disappointment	4.77[a]	5.77[b]	6.84[c]
Elation	8.29[a]	8.32[a]	8.37[a]

Note. Scores could range from 1 (not at all disappointed/elated) to 9 (extremely disappointed/elated). Means within the same row with different superscripts differ significantly at $p < .05$.

STUDY 3

Method

Participants and procedure. Psychology students at the University of Amsterdam ($N = 210$) participated in this study in partial fulfillment of a course requirement. This study was part of a larger paper-and-pencil session. The procedure was similar to that used in previous study, except that each lottery had a pay-off that was 100 times smaller than the equivalent lottery used in Study 2.

Results and Discussion

Disappointment. ANOVA showed a significant effect of the presented lottery, $F(2, 104) = 10.30$, $p < .001$. Planned comparisons showed that the mean of lottery 1 differs significantly from the means for lottery 2 and lottery 3 ($p < .001$). The means of lottery 2 and 3 did not differ from each other significantly (see Table 5).

Elation. ANOVA showed no significant effect of the presented lottery, $F(2, 104) < 1$, *ns*. Mean elation scores were 7.23, 7.23, and 7.54 (see Table 5). Planned comparisons revealed no significant differences between these means.

As far as disappointment is concerned the results of this study replicated the findings of Study 1 and Study 2; a higher probability of attaining an outcome gives rise to greater disappointment when the outcome is not obtained. With regard to elation, the results of the present study replicated the findings of Study 2: the probability of attaining an outcome had *no* significant effect on the intensity of elation. The fact that rather small pay-offs were used makes it unlikely that the results of Study 2 were due to ceiling effects.

In sum, results of our first three studies show consistent support for the hypothesis that disappointment is affected by the probability of occurrence of an outcome that did not materialize. However, the three studies show no consistent results concerning the relation between elation and probability of outcome. This may be due to the fact that elation is less influenced by the probability of an outcome than by the *magnitude* of an outcome. To investigate the impact of probability and

TABLE 5

Means of Disappointment and Elation Ratings Study 3

Type of lottery	Lottery 1	Lottery 2	Lottery 3
Disappointment	2.54[a]	4.63[b]	4.57[b]
Elation	7.23[a]	7.23[a]	7.54[a]

Note. Scores could range from 1 (not at all disappointed/elated) to 9 (extremely disappointed/elated). Means within the same row with different superscripts differ significantly at $p < .001$.

magnitude of an outcome on both disappointment and elation, we designed a fourth study. In this study we independently varied the magnitude of the outcome and the probability of attaining the outcome. Such a design enables us to test the impact of magnitude and probability of outcome on the intensity of disappointment and elation. It should be emphasized, however, that in such a design it is not possible to keep the expected value of the lotteries constant.

STUDY 4

Method

Participants, design, and procedure. Psychology students at the University of Amsterdam (N = 300) participated in this study in partial fulfillment of a course requirement. This study was part of a larger paper-and-pencil session. The study had a 4 (magnitude of missed/obtained outcome: fl.10,000 vs fl.1000 vs fl.100 vs fl.10) × 3 (probability of missed/obtained outcome: 90% vs 50% vs 10%) between-subjects design. There were 25 participants in each condition. Participants were presented with one of the 12 lotteries and were asked to rate their disappointment at not winning the prize on a 9-point scale, with endpoints labeled *not disappointed at all* (1) and *very disappointed* (9). They were also asked to rate their elation at winning the prize on a 9-point scale, with endpoints labeled *not elated at all* (1) and *very elated* (9). The order of the disappointment and elation ratings was counterbalanced.

Results and Discussion

Disappointment. An overall ANOVA revealed an effect of probability of the outcome on intensity of disappointment, $F(12, 288) = 36.04$, $p < .001$. A higher probability of obtaining a positive outcome led to greater disappointment when the outcome was not obtained. A smaller, nearly significant effect was found for magnitude of the unobtained outcome, $F(12, 288) = 2.55$, $p < .06$ (see Table 6). Separate ANOVAs for each level of probability revealed an effect of magnitude only for the 90% lotteries, $F(3, 96) = 2.72$, $p < .05$. No effect of magnitude was found for the 50 and 10% lotteries (respectively: $F(3, 96) < 1$, *ns.*; $F(3, 96) = 1.31$, *ns.*). Separate ANOVAs for each level of magnitude showed an effect of probability for all four levels of magnitude (fl.10,000: $F(2, 72) = 8.00$, $p < .001$; fl.1000: $F(2, 72) = 9.93$, $p < .001$; fl.100: $F(2, 72) = 21.66$, $p < .001$; fl.10: $F(2, 72) = 5.80$, $p < .001$).

Elation. An overall ANOVA revealed an effect of magnitude of the obtained outcome on intensity of elation, $F(12, 288) = 38.03$, $p < .001$. A higher obtained outcome led to greater elation. A smaller, but still significant effect was found for probability of the obtained outcome, $F(12, 288) = 8.16$, $p < .001$ (see Table 7). Separate ANOVAs for each level of probability showed an effect of magnitude for all three levels of probability (90%: $F(3, 96) = 11.52$, $p < .001$; 50%: $F(3, 96) = 22.81$, $p < .001$; 10%: $F(3, 96) = 9.78$, $p < .001$). Separate ANOVAs for each level of magnitude showed an effect of probability only for the lottery with a magnitude of fl.1000, $F(2, 72) = 5.94$, $p < .005$. No effect of probability was found for the magnitudes of fl.10,000, fl.100, and fl.10 (respectively; $F(2, 72) = 2.90$, *ns.*; $F(2, 72) = 2.01$, *ns.*; $F(2, 72) = 2.04$, *ns.*).

Thus, both probability of outcome and magnitude of outcome resulted in an overall effect on disappointment and elation. However, the results suggest that disappointment is influenced largely by the probability of the outcome and is less affected by the magnitude of the unobtained outcome; for elation by contrast, the results suggest that magnitude of the obtained outcome is more influential than the probability of the outcome. As noted above, the lotteries used in this study did not have the same expected value. So one could argue that the effect of probability on elation was due to differences in expected value. If elation is defined as the positive

TABLE 6

Means of Disappointment Ratings as a Function of Probability and Magnitude of Outcome

	Magnitude			
Probability	fl.10,000	fl.1,000	fl.100	fl.10
90%	$6.64^{b(b)}$	$6.20^{b(c)}$	$5.96^{a,b(b)}$	$4.72^{a(b)}$
50%	$5.00^{a(a,b)}$	$4.96^{a(b)}$	$5.80^{a(b)}$	$5.00^{a(b)}$
10%	$3.84^{a(a)}$	$3.40^{a(a)}$	$3.04^{a(a)}$	$2.88^{a(a)}$

Note. Scores could range from 1 (not at all disappointed) to 9 (extremely disappointed). Means in the same row with different first superscripts after the means differ significantly at $p < .01$. Means in the same column with different second (between parentheses) superscripts differ significantly at $p < .01$.

TABLE 7

Means of Elation Ratings as a Function of Probability and Magnitude of Outcome

	Magnitude			
Probability	fl.10,000	fl.1,000	fl.100	fl.10
90%	$8.44^{c(a)}$	$7.84^{b,c(a)}$	$7.48^{b(a)}$	$5.96^{a(a)}$
50%	$8.60^{b(a)}$	$8.72^{b(b)}$	$8.24^{b(b)}$	$6.64^{a(a,b)}$
10%	$8.88^{c(a)}$	$8.56^{b,c(b)}$	$7.92^{b(a,b)}$	$7.04^{a(b)}$

Note. Scores could range from 1 (not at all elated) to 9 (extremely elated). Means in the same row with different first superscripts after the means differ significantly at $p < .01$. Means in the same column with different second (between parentheses) superscripts differ significantly at $p < .01$.

difference between outcome and expected value, elation at winning fl.1000 should be greater in the case of a lottery giving 10% chance of winning than in the case of a lottery giving 90% chance of winning. In the first case the difference between outcome and expected value is fl.900, while in the second case this difference is fl.100. The same reasoning applies to the effect of probability on disappointment,[4] as well as to the effect of magnitude on both disappointment[5] and elation.[6] However, the impact of probability on disappointment was also demonstrated in three designs using lotteries with the same expected value (Studies 1, 2, and 3).

Overall, the results of the Studies 1 to 4 provide consistent support for the impact of probability on the intensity of disappointment. This impact was shown both with lotteries having the same expected value and with lotteries not having the same expected value. However, the results concerning elation were less conclusive: we found no effect of probability using lotteries having the same expected value, but we did find such an effect when the lotteries differed in expected value. To shed further light on this issue, we conducted a further study in which the relation between the probability of an outcome and disappointment and elation was tested in a slightly different way.

STUDY 5

In this study we used a lottery in which people could really win either fl.100 for real or nothing. Furthermore, instead of giving participants objective probabilities, they were asked to indicate their subjective prior probability of winning a prize. If elation and disappointment are both dependent upon the probability of the outcome, there should be a significant correlation between the reported subjective probability of winning a prize and the ratings of elation and disappointment.

Method

Participants and Procedure. Psychology students at the University of Amsterdam (N = 186) participated in this study on a voluntarily basis at the end of a first year lecture. Participants first completed an unrelated questionnaire. As a reward for their participation they were given a chance to participate in a lottery. In this lottery they had to guess a number between 1 and 1000. The five people who guessed the right number (i.e., 341, which was randomly determined) or were closest to the winning number would win a prize of 100 Dutch guilders (fl.100; approximately $62.50). It was made clear to the participants that the lottery involved real money. After choosing their number, participants were asked to rate the subjective probability of winning one of the fl.100 prizes. Participants were told that another sample of students would also take part in the lottery, so they were unaware of the total number of people playing the lottery and hence, the objective probability of winning a prize. Participants indicated their subjective probability by marking a point on a 100-mm line. The line was labeled *highly unlikely* at the left-hand end and *very likely* at the right-hand end. They also rated their disappointment (if they did not win fl.100) and their elation (if they won fl.100). Both these ratings were given on 100-mm lines (left-hand end labeled: *not at all disappointed/elated*; right-hand side labeled *very disappointed/elated*). So ratings of probability and expected levels of disappointment and elation could vary from 0 to 100. It was made clear to participants that playing the lottery in the first place was not part of what is being evaluated.

Results and Discussion

Means for disappointment and elation were respectively 13.7 (SD = 15.4) and 59.8 (SD = 12.7). Findings concerning disappointment were similar to those observed in the previous studies. There was a significant positive correlation between subjective probability and ratings of disappointment ($r = .37$, $p < .001$), indicating that people were more disappointed if they thought they had a higher probability of winning a prize (and therefore a lower probability of not winning a prize). However, there was no significant correlation between subjective probability and ratings of elation ($r = .00$; *ns*). This finding is consistent with those of the previous studies and suggests that a better-than-expected outcome leads people to focus less on the *probability* of having arrived at the obtained outcome, as compared with what happens when the outcome is worse than expected.

GENERAL DISCUSSION

In five studies we found consistent support for Bell's (1985) hypothesis that the probability of an outcome

[4] If disappointment is defined as the negative difference between outcome and expected value, disappointment after not winning fl.1000 should be higher in the case of a lottery giving 90% chance of winning than in the case of a lottery giving 10% chance of winning. In the first case the difference between outcome and expected value is fl.900, in the second case fl.100.

[5] Disappointment should be higher after not winning fl.1000 than after not winning fl.100 in a lottery giving 50% chance of winning. In the first case the difference between outcome and expected value is fl.500, in the second case fl.50.

[6] Elation should be higher after winning fl.1000 than after winning fl.100 in a lottery giving 50% chance of winning. In the first case the difference between outcome and expected value is fl.500, in the second case fl.50.

has an impact on the intensity of disappointment. Disappointment after not obtaining a desired outcome is more intense when the probability of obtaining this outcome was higher. We found support for this hypothesis in both a within-subjects and a between-subjects design, with both hypothetical and real lotteries, with both small and large pay-offs, and with both objective and subjective probabilities. However, the findings do not support the predicted impact of probability on elation. Furthermore, our results show that the magnitude of an obtained outcome has a large impact on the intensity of elation. People are more elated when they obtain a larger outcome. We also found a marginally significant effect of magnitude of the (missed) outcome on the intensity of disappointment. In sum, our results suggest that elation is less a function of the probability of an outcome and more a function of the magnitude of the outcome, whereas for disappointment the reverse applies.

Our findings suggest that in a within-subjects design disappointment is likely to be more influenced by the magnitude of the unobtained outcome than it is in a between-subjects design. In a within-subjects design people are able to make direct comparisons between different lotteries, and the first lottery may serve as a reference point or anchor value. Loomes and Sugden (1984) suggested that disappointment can result from two sorts of possible comparisons: between expectations and outcome, and between the various lotteries. This second comparison is a counterfactual, where disappointment is intensified by the knowledge that another state of the world produced a better outcome. Following this reasoning, disappointment is more intense when the unobtained outcome is better. People will be more disappointed with a zero outcome when the alternative outcome was larger. Most of our studies used between-subjects designs in which comparisons between the various alternative outcomes of the presented lotteries were not possible. However, had such comparisons been possible, we would expect more elation where the unobtained outcome was small. People should be more elated with winning fl.100 when the alternative (unobtained) outcome was fl.10 rather than fl.50.[7] Our point is not that probability has no influence on elation, or that the magnitude of the unobtained outcome is an unimportant determinant of intensity of disappointment and elation. Rather, we think that our results suggest that when using a between-subjects design, disappointment will be primarily influenced by the probability of an outcome,[8] while elation will be primarily influenced by the magnitude of the outcome.

The difference between the impact of probability on disappointment and elation could be related to the different informational value of these emotions. As Frijda (1988) stated, "emotions exist for the sake of signalling states of the world that have to be responded to, or that no longer need response or action" (p. 354). In similar vein, the feelings-as-information model (Schwarz & Clore, 1988; Schwarz, 1990) argues that the experience of a certain emotion informs an individual about the nature of the current psychological situation. Schwarz and Clore reason that thought processes could be tuned to meet the requirements signaled by one's affective state. Negative emotions such as disappointment inform an individual that action needs to be taken. However, effective action requires understanding of the situation which evoked the negative emotion. This understanding of the situation requires more detailed, systematic information processing. Positive emotions such as elation inform an individual that action is not needed, and could give rise to more heuristic information processing (Schwarz, 1990). An increased use of simplifying heuristic processing strategies during positive affect has also been proposed by Isen (see Isen, 1987, for a review). Furthermore, research (Wegner & Vallacher, 1986) has shown that failures to obtain a

[7] In an additional study, which is not reported in full here, we found that elation is dependent upon the magnitude of the unobtained outcome. People are more elated with a prize when the unobtained alternative outcome was lower. In this study we used three lotteries; lottery 1 had a 50% chance of winning fl.100 and a 50% chance of winning fl.0, lottery 2 had a 50% chance of winning fl.100 and a 50% chance of winning fl.10; lottery 3 had a 50% chance of winning fl.100 and a 50% chance of winning fl.50. Elation ratings were 8.24, 7.92, and 7.13 for, respectively, lotteries 1, 2, and 3. An analysis of variance on these ratings showed a significant effect of lottery on elation ($F(2, 72) = 5.19$, $p < .01$). This study had a between-subjects design, so a counterfactual comparison process could not account for the effect of the magnitude of the unobtained outcome. In this study the effect could be due to differences in expected value. Lottery 1 has an expected value of fl.50, lottery 2 of fl.55 and lottery 3 of fl.75. The differences between elation ratings could be due to the differences between the expected value and actual outcome. In lottery 1 this difference is fl.50, in lottery 2 fl.45 and in lottery 3 fl.25. We think that the effect in a within-subjects design would be even stronger, due to the possibility of counterfactual comparison processes.

[8] Disappointment is also dependent upon the magnitude of the obtained outcome. In a second additional study, which is not reported in full here, we found that disappointment is dependent upon the magnitude of the obtained outcome. People are more disappointed with a small outcome than with a larger outcome. In this study we used three lotteries; lottery 1 had a 50% chance of winning fl.100 and a 50% chance of winning fl.0; lottery 2 had a 50% chance of winning fl.100 and a 50% chance of winning fl.10; lottery 3 had a 50% chance of winning fl.100 and a 50% chance of winning fl.50. Disappointment ratings when receiving the smaller outcome in a lottery were 5.80, 4.12 and 3.18 for, respectively, lotteries 1, 2, and 3. An analysis of variance on these ratings showed a significant effect of lottery on disappointment ($F(2, 72) = 8.58$, $p < .001$). We think that also this effect would be stronger in a within-subjects, due to the possibility of counterfactual comparison processes.

desired outcome are more likely to direct attention to one's action strategy than are successful actions. It could be argued that individuals who experience disappointment focus their attention on features of the situation that elicited the disappointment. One of these features could be the probability with which they arrived at the (disappointing) outcome. In contrast, in the case of elation there is no need to engage in more extensive cognitive effort. The results of the present studies suggest that disappointment and elation are differentially affected by probability and magnitude of outcome. It seems that the *probability* of the undesired outcome is the prime determinant of the intensity of disappointment, while the *magnitude* of the desired outcome is the prime determinant of the experienced elation. These findings are consistent with the view that negative and positive emotional states have different effects on the way in which individuals process information.

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