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## Quantity versus uncertainty: When winning one prize is better than winning two

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### Abstract

We predicted that a state of uncertainty would prolong a positive mood, but that people would not anticipate this when making affective forecasts. In Study 1, participants learned that they had won one prize (certain condition), two prizes (two-gift condition), or one of two prizes (uncertain condition). People in the uncertain condition were in a positive mood longer than people in the other two conditions. In Study 2, forecaster participants underestimated the benefits of uncertainty and overestimated the benefits of quantity (getting two gifts instead of one). Under some circumstances, and contrary to people's predictions, uncertainty can prolong positive mood, and winning one prize under a state of uncertainty can bring more short-term pleasure than winning two prizes.

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### Introduction

Imagine that you are shown an assortment of desirable consumer items, such as a box of chocolates, a disposable camera, and a coffee mug. You learn that you will win an item and are asked to pick out your two favorites. You then find out which of your two favorites you have won, based on a coin flip. How happy do you think you would be, compared to these alternative scenarios? (a) The coin flip is delayed for 30 min; thus, you do not know which of your favorite items you will win until that time; (b) you learn that actually, you will get both of your favorite items.

We trust that for most of our readers, the answer is obvious. Two things are better than one, and surely you would be happiest if you got both the chocolates and the camera, say, instead of just one of these items. And surely having to

wait to find out which gift you would receive would be a little frustrating. For example, studies have found that people prefer to resolve uncertainty sooner rather than later (Lov-allo & Kahneman, 2000; Wilson, Centerbar, Kermer, & Gilbert, 2005).

As sensible as these affective forecasts are, we hypothesized that they are wrong, at least under certain conditions. First, research has found that an element of uncertainty about a positive experience can prolong the pleasure people derive from it (Wilson et al., 2005). We thus predicted that not knowing which of two gifts they would receive would keep people in a good mood longer than knowing which gift they would receive. Second, although surely it is often better to get two things instead of one, there is reason to believe that the added value of a second gift to people's happiness would be minimal. In short, we hypothesized that when imagining the above scenarios people would focus on quantity, predicting that they would be happiest if they got both of their favorite items, but that when people actually experienced the scenarios, uncertainty would matter more than quantity.

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### *The pleasures of uncertainty*

Our hypotheses were based in part on recent theorizing about the pleasures of uncertainty. Emotional events attract our attention, particularly ones that are self-relevant but poorly understood (Allport & Postman, 1947; Wilson & Gilbert, 2006). When people attend to such events they try to understand them, by assimilating the event to their preexisting schemas or creating new schemas to accommodate the event (Piaget, 1952). As a result, events that were not well understood come to seem predictable and ordinary (Fischhoff, 1975; Roese & Olson, 1996), and no longer attract as much attention as they did originally. Put differently, the process of understanding an event—categorizing it, explaining it, assimilating it to our knowledge structures—transforms extraordinary, emotion-provoking events into ordinary events that people do not think about very much.

It follows that anything that makes it difficult to understand an event will prolong people's affective reactions to it. One such factor is uncertainty. The more uncertain people are about what has happened or will happen to them, the more difficult it is to understand the event or assimilate it to their knowledge structures, which in turn keeps the event active in people's thoughts. For this reason, uncertainty can be excruciating when one of the possible outcomes is negative, such as having to await the results of a medical test that will reveal either that we are seriously ill or free of disease. Wiggins et al. (1992), for example, studied people who had taken a test to see if they had inherited the gene for Huntington's disease, an adult-onset fatal disorder. As would be expected, people who found out they did not have the gene showed an increase in psychological well-being and a decrease in psychological distress over the next year. Surprisingly, the people who learned that they had inherited the gene showed an equivalent increase in psychological well-being and a decrease in psychological distress over the next year. The people who did the worst were those who received inconclusive results. The genetic test could not determine whether they had inherited the disease; and the continued uncertainty about their health was, apparently, more distressful than knowing that they had the gene and would die at an early age.

By the same reasoning, uncertainty about positive events should prolong the pleasure people derive from them, by making it difficult for people to understand and thereby "ordinize" the events. Wilson et al. (2005) referred to this as a *pleasure paradox*: people are motivated to understand positive events in order to make them more predictable and replicable, yet by so doing they make the events seem ordinary and thus spoil the pleasure they get from them. In one study, for example, college students learned that three opposite sex students selected them as their best potential friend (over two other participants) and read distinctive comments from the students explaining the reasons for their choice. People who were uncertain which student wrote which set of comments remained in a good mood

longer than people who knew which student wrote which set of comments.

People seem unaware of the pleasures of uncertainty when predicting how they will feel; in fact, they seem to have the theory that uncertainty is a uniformly negative state (Lovallo & Kahneman, 2000). Participants in Wilson et al.'s (2005) studies, when asked to predict how they would feel, said they would be in a better mood if they were certain about the event (e.g., if they knew who authored the comments than if they did not)—the opposite of what happened in the actual study.

### *Two gifts versus one*

In the present study, we predicted that people who were uncertain which gift they would receive would remain in a good mood longer than people who knew which gift they would receive. But what about people who win both of their favorite gifts? We suspected that they would not be in as good a mood as people who were uncertain about which of two gifts they would receive, for two reasons. First, although people who have won two gifts have an extra item to be happy about, they can easily make sense of both items (e.g., "oh nice, I won the camera and the chocolates; I'll take pictures of my roommate later, and eat the chocolates after dinner"). Once these events are assimilated into their knowledge structures, their thoughts turn to other matters, reducing the affective impact of receiving the gifts. In contrast, people who know they will win only one of the gifts, but do not know which one, are less likely to begin the process of assimilation and understanding. They think more about the gifts, which maintains their positive mood.

Second, people who win both gifts do not know that other participants win only one, and thus might not frame their good fortune as "two instead of one." In Hsee and Zhang's (2004) terms, they are in single evaluation mode, thinking only about the specific circumstances they are experiencing (receiving two gifts), rather than in joint evaluation mode, whereby they are comparing different scenarios (getting one versus two gifts). Consequently, getting two small gifts may not improve people's mood much more than getting just one.

To test these hypotheses we conducted two studies, one in which participants ("experiencers") received the gifts under the conditions outlined above, and the other in which participants ("forecasters") imagined received gifts under these same conditions and predicted how they would feel. In the first study, experiencers took part in a two-stage lottery, the first to see if they would win a prize, the second to determine the specific prize they would win. All participants learned that they won the first stage and thus would receive one of their two favorite gifts. In the certain condition, they immediately took part in the second lottery to determine which specific gift they would receive. In the uncertain condition, participants were told that the second lottery would be held at the end of the study; thus, they did not know which of their two favorite gifts they would receive. We

hypothesized that people in the uncertain condition would remain in a good mood longer than people in the certain condition, because thoughts about the gift would be more accessible as time passed. People in the certain condition, once they learned which gift they had won, were expected to begin the process of understanding and assimilation (e.g., “oh nice, I won the camera, I’ll take pictures of my roommate later”) which would cause them to lose interest in the prizes and think about other things. Uncertainty might even trump the receipt of two gifts, given that people who know which two gifts they will receive can also quickly assimilate this to their knowledge structures.

Rather than anticipating the positive effects of uncertainty, forecasters were hypothesized to focus on quantity. We expected that forecasters who imagined winning two gifts would predict that they would be in a better mood than forecasters who imagined winning one gift, either under conditions of certainty or uncertainty.

### Study 1: Experiencers

#### Overview

Participants learned that one in five people would win a gift worth \$5, as part of a study of website designs. They spun a virtual wheel of fortune and learned that they were a winner, and then picked the two gifts they would most like to receive. Participants in the certain condition then spun another wheel, which determined which of the two gifts they won, and completed the dependent measures. Participants in the uncertain condition did not learn until the end of the study which gift they had won. Participants in the two-gift condition were told at the outset that they could have both their two favorite gifts. We predicted that people in the uncertain condition would remain in a good mood longer than people in the certain or two-gift conditions.

#### Method

##### Participants

Participants were 42 students (23 men, 19 women) who participated in exchange for partial course credit in an undergraduate psychology course.

##### Procedure

Participants completed a 30-min study on a computer, ostensibly to study the effectiveness of computer presentations. They learned that one in five participants would win one of the following \$5 items: a disposable camera, a small box of Godiva chocolates, a box of blank, recordable compact discs (CD-Rs), a University of Virginia (UVA) bottle opener on a keychain, UVA car decals, and a UVA coffee mug. (Pilot participants rated these items as desirable.) After indicating which two items were their favorites, participants pushed a button to set a virtual roulette-type wheel in motion on the computer screen, ostensibly to determine whether they would win a gift. The wheel was

divided into segments labeled “no prize” or “winner,” with the size of the segments making it appear that participants had a 1 in 5 chance of winning. The wheel stopped on a segment marked “winner” for all participants.

Participants randomly assigned to the certain condition then learned that they would spin a second wheel to determine which of their two favorite prizes they would win. They pressed a button that spun a wheel on the computer screen in which half of the spaces were marked with a “1” to represent the gift they had listed first or a “2” to signify the gift they had listed second. The wheel randomly stopped on one of the spaces, such that people in this condition learned which gift they had won. Participants in the uncertain condition were told that they would spin the second wheel at the end of the study. Participants in the two-gift condition were informed at this point that, because the study was nearing its end, and because there were some extra prizes, they would receive both of their favorite gifts.

#### Dependent measures

All participants then rated two items that assessed their mood and one that assessed their level of arousal. The mood questions asked how positive or negative their mood was at that moment and pleasant or unpleasant they felt. The arousal question asked how calm versus excited people felt. Participants responded to all three items on 12-point scales with appropriate endpoints. They then completed three filler tasks, one of which was included to see if the gifts were more accessible in people’s thoughts in the uncertain condition.<sup>1</sup> In this task participants looked at photographs of the prizes as well as some filler objects and rated the pleasantness of each photograph on a 7-point scale ( $1 = \text{not at all pleasant}$ ,  $7 = \text{extremely pleasant}$ ). The computer recorded the amount of time they looked at each photograph. We hypothesized that people in the uncertain condition would look at the pictures of their top two gifts longer than would participants in the other conditions.

Finally, participants in the uncertain condition spun the second wheel and found out which of the two gifts they had won. All participants then completed the mood and arousal questions again.

<sup>1</sup> The two other tasks were also designed to assess accessibility. The first was a word completion task in which participants were given word stems such as MU\_\_\_\_\_ and CA\_\_ and asked to make three words from each stem (Hetts, Sakuma, & Pelham, 1999). Some of the stems could be completed with words relevant to the prizes (e.g., mug, camera). As it happened, people listed very few of the gift-relevant words; for example, only two of 42 participants completed mud\_\_ with “mug” and no participant completed ca\_\_ with “camera.” The number of gift-related words did not differ by condition. The third task was a memory test in which people were presented with a 3 × 4 grid of words of 12 words for 20 s. The words included all of the prize items (e.g., camera, keychain), as well as some filler items (e.g., lamp, candle). Participants were asked to recall and reproduce the grid as best as they could by typing in words to a blank matrix in the place they had been located. Because of a programming error, however, the recall data for some words were not saved and we could thus not conduct a meaningful analyses of the results.

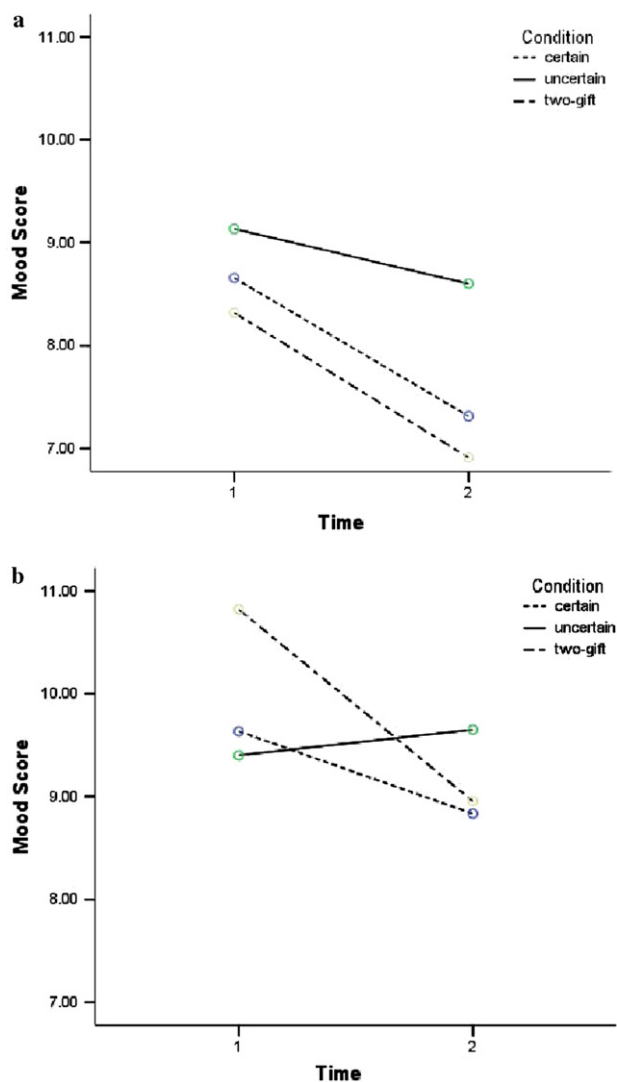


Fig. 1. (a) Experiencers: reported positive mood by time and condition. The higher the number, the more positive the reported mood. (b) Forecasters: predicted positive mood by time and condition. The higher the number, the more positive the predicted mood.

### Results and discussion

Participants' ratings on two of the items on the mood measure (how pleasant/unpleasant and how positive/negative they felt) were highly correlated ( $r = .75$  and  $.81$  for the measure at Times 1 and 2, respectively) and were therefore averaged to create an overall mood index at these two times.

#### Mood over time

We predicted that participants in all conditions would be in an equally good mood at Time 1, right after learning that they would win a gift.<sup>2</sup> We predicted that this good mood

<sup>2</sup> Pilot testing indicated that the gifts were about equal in desirability. Consistent with the pilot testing, there was no significant difference in mood, in the certain and uncertain conditions, for participants who won the first prize they selected versus those who won the second prize they selected.

would persist longer in people in the uncertain condition. As seen in Fig. 1a, this prediction was confirmed. We performed a planned comparison that assigned a weight of 1 to all three experiencer means at Time 1, and weights of 1,  $-2$ , and  $-2$  to the experiencer means in the uncertain, certain, and two-gift condition, respectively, at Time 2. This contrast was significant,  $F(1, 39) = 9.04$ ,  $p = .005$ . Additional contrasts revealed that, as predicted, there were no significant differences between conditions at Time 1,  $F(1, 39) < 1$ . At Time 2, the mean in the uncertain condition was significantly larger than the average of the mean in the certain and two-gift conditions,  $F(1, 39) = 4.09$ ,  $p = .05$ . The difference between the means in the certain and two-gift conditions was not significant,  $F(1, 39) < 1$ , *ns*. Finally, we did not anticipate any effects of condition or time on the measure of arousal (calm-excited) and none were found.

#### Gaze task

Participants rated pictures of the gifts and the computer recorded how long they looked at each picture. As predicted, those in the uncertain condition looked at the pictures of their two favorite gifts the longest ( $M = 9.49$  s,  $SD = 4.21$ ), as compared to the certain ( $M = 5.93$  s,  $SD = 2.20$ ) and two-gift conditions ( $M = 8.01$  s,  $SD = 3.67$ ),  $F(2, 39) = 4.26$ ,  $p = .02$ .<sup>3</sup> A planned comparison revealed that, as predicted, the mean in the uncertain condition was significantly greater than the mean in the certain condition,  $F(1, 39) = 11.56$ ,  $p = .002$ . The mean in the uncertain condition was not significantly larger than the mean in the two-gift condition,  $F(1, 39) = 1.35$ ,  $p = .25$ .

One explanation of these results might be that people in the certain condition had lost interest in the prize they did not win but spent a lot of time looking at the prize they did win. Alternatively, we predicted that people in the certain condition would explain and make sense of the prize they won and spend relatively little time looking at it, relative to people in the uncertain condition. Consistent with the latter prediction, people in the certain condition spent relatively little time looking at either the picture of the prize they had won ( $M = 5.73$  s,  $SD = 2.20$ ) or the one they did not ( $M = 6.13$  s,  $SD = 2.95$ ),  $t(16) < 1$ , *ns*.

### Study 2: Forecasters

#### Overview

In a between-subjects design, forecasters were asked to predict how they think they would feel if they were in one of the three conditions in Study 1. We hypothesized that forecasters who were asked to imagine being in the uncertain condition would predict a being in a less positive mood than those in the certain condition, opposite to what experiencers reported.

<sup>3</sup> The analyses were conducted on a log transformation of the time data, though the reported means are in seconds.

## Method

### Participants

Participants were 36 students from the University of Virginia who participated in exchange for partial course credit in an undergraduate psychology course.

### Procedure

The method was identical to that of Study 1, up to the point where participants saw the computer screen instructing them to spin the first roulette-type wheel. At this point, they were given a written description of one of the three conditions described above (certain, uncertain, or two-gift), and were asked to predict how they would feel in that condition, using a mood scale identical to that used by experiencers. At the end of study, they were also given a brief written description of both the certain and the uncertain condition, and were asked to indicate which of the two they would prefer to be in, if given the choice. (We did not include the two-gift condition as an option, because we assumed that if we did everyone would choose it.)

### Results and discussion

As in Study 1, participants' ratings on two of the items on the mood measure (how pleasant/unpleasant and how positive/negative they felt) were highly correlated ( $r = .85$  and  $.64$  for the predicted measure at Times 1 and 2, respectively) and were therefore averaged to create an overall mood index at these two times. As predicted, forecasters in the two-gift condition predicted that would be happier (at least at Time 1) than did participants in the certain or uncertain condition. A 3 (condition)  $\times$  2 (time) ANOVA revealed a significant interaction,  $F(2, 33) = 3.73$ ,  $p < .04$ . A contrast on the Time 1 results that assigned a weight of 2 to the two-gift condition and  $-1$  to the certain and uncertain conditions was significant,  $F(1, 33) = 5.44$ ,  $p < .05$ . At Time 2, participants in all three conditions predicted they would feel about the same; there were no significant differences between conditions.

### Condition preference

When asked to indicate if they would prefer to be in the certain or uncertain condition, 19% of participants preferred to be in the uncertain condition, 58% preferred to be in the certain condition, and 22% indicated that they had no preference. Considering only those who had a preference, significantly more preferred the certain condition,  $p = .01$ .

### General discussion

We predicted that forecasters would be influenced by quantity more than uncertainty, when predicting how they would feel after winning a gift. Consistent with these predictions, forecasters who imagined winning two gifts predicted they would be in a better mood, at least initially, than people who imagined winning one gift. Whether they

would know right away which gift they would win (certain condition) or not (uncertain condition) had no effect on forecasters' predicted mood, though when asked to choose which condition they would prefer to be in, significantly more chose the certain condition.

Experiencers who actually won gifts showed a different pattern of results. As predicted, people in the uncertain condition were in a significantly better mood at Time 2, compared to those in the certain condition, and most strikingly, those in the two-gift condition. Although it is somewhat surprising that people who got two gifts were not in a better mood than people who got only one and knew which one it was, it is important to keep in mind that people in the two-gift condition did not know that other participants received only one gift. That is, people in the two-gift condition were probably not using one gift as a reference point, and were thus in single evaluation mode (Hsee & Zhang, 2004). As an example, consider someone who goes to the grocery store and gets a free sample of a gourmet chocolate and a slice of French cheese, versus someone who goes to the store later and gets only the chocolate. There is no reason to expect the first person to be twice as happy as the second, especially given that he or she does not know that the store will run out of cheese and that later customers will only get the chocolate.

It is possible, of course, that the greater overall utility of receiving two gifts exceeded the overall utility of receiving one in our study, once people took their gifts home and experienced the pleasure of two items instead of one. Also, because we did not include a mood measure in between the two raffles, it is also possible that the period of uncertainty was not uniformly positive for those in the uncertain condition. Nonetheless, it is interesting that people who were uncertain about which of their two favorite gifts they would receive were in a better mood, by the end of the experiment, than people who knew they would get both of their favorite gifts.

An alternative explanation for the uncertain participants' higher mood at Time 2 is that a *reduction* of uncertainty brings pleasure, not the inability to make sense of a positive event. Loewenstein (1994) suggests that uncertainty is a negative state, whereas resolving uncertainty is a positive state. At Time 2, people in the uncertain condition had just learned which gift they would receive, whereas people in the other conditions had their uncertainty resolved at Time 1. According to this perspective, however, people in the two-gift and certain conditions should have reported a better mood at Time 1 than people in the uncertain condition, because their uncertainty had just been reduced. There was no significant difference between conditions in mood at Time 1. Further, Wilson et al. (2005) found that participants in an uncertain condition similar to that of the present study reported more positive mood *prior to* the reduction of their uncertainty.

As Loewenstein (1994) suggests, people do sometimes choose to be uncertain. Most people do not read the last page of a mystery novel first, instead opting to wait to find out who committed the murder, and many people avoid peeking at their birthday presents before the big day

arrives. We suspect, though, that there are other reasons why people tolerate uncertainty in these examples, other than wanting to heighten the pleasure of reducing the uncertainty. In the case of mystery novels, people derive pleasure from trying to figure out whether it was the butler or the cousin who murdered Oglethorpe. In the case of presents, waiting until one's birthday fulfills a social contract and avoids disappointing the gift giver by spoiling the surprise. If these other reasons for tolerating uncertainty were eliminated, we suspect that most people would want their uncertainty reduced right away.

There is evidence in support of this conclusion. Many prospective parents have the opportunity to learn the gender of their baby from ultrasound exams or genetic testing. Although some parents choose to remain uncertain until the baby is born, most do not; approximately 70–90% of parents chose to find out right away (Kozarovich, n.d.; Weiss, n.d.). Lovallo and Kahneman (2000) found that people were willing to pay to reduce uncertainty. They asked participants to imagine that they would participate in a gamble, such as one in which they had a 90% chance of winning \$200 and a 10% chance of winning \$8200. Participants were asked how much they would be willing to pay, if anything, to learn the outcome of the gamble the next day versus waiting 2 weeks. On average people were willing to pay \$9 to learn the answer the next day.

More to the point, a majority of the forecasters in Study 2 said they would prefer to have their uncertainty about which gift they would receive resolved right away; that is, most said they would prefer to be in the certain over the uncertain condition. Similarly, Wilson et al. (2005) found that forecasters preferred to be in certain rather than uncertain conditions. Taken together, these results suggest that people have incorrect theories about the pleasures of uncertainty. They may be correct that uncertainty is often aversive, such as when the alternatives include negative outcomes (e.g., the medical test example discussed earlier). When the alternatives are positive, however—such as whether people will win a coffee mug or a box of chocolates—people do not seem to realize that uncertainty can add to people's pleasure rather than subtracting from it. Furthermore, people do not seem to realize that at least under some circumstances, two things are not better than one. Forecasters in the two-gift condition predicted they would in a better mood than did forecasters in the certain or uncertain conditions, contrary to the results for experiencers.

A limitation of the present studies is that we conceptualized quantity in only one way; namely, whether people received one or two \$5 prizes. It is unclear whether the results would generalize to a situation in which a person could have won one item under a state of uncertainty versus, say, 10 items under a state of certainty. Future research should examine the point at which discrepancy in value or utility becomes powerful enough to trump the effect of uncertainty found in the present studies.

A second avenue for future research relates to the magnitude of the items in question. We are not arguing that get-

ting two items will never make people happier than getting one. If the items are of large magnitude and have lasting benefits, such as winning a new car and \$50,000, people would undoubtedly be happier getting both instead of just one. Even in the present study, getting two small items, such as chocolates and a camera, might bring more utility over time, such as when people go home and eat their chocolates and snap pictures with their camera. Our point is the receiving two relatively small items that can easily be assimilated into one's current knowledge structures may not bring as much pleasure as people predict, particularly if people are not using as a reference point the fact that they might have gotten only one of them.

We found tentative support for the hypothesis that when people knew which gift they would get, they engaged in a sense making process that lowered the interest value of the gifts. People in the certain condition looked less at pictures of the gifts—even the gift they had won—than people in the uncertain condition. The results in the two-gift condition were more equivocal; they too looked at the pictures less than people in the uncertain condition, but not significantly so. Clearly, more work is needed to investigate the potential mediators of the relationship between uncertainty and mood.

In sum, we found evidence for the hypothesis that, when faced with two desirable outcomes, being in a state of uncertainty can increase the duration of positive mood. Most strikingly, participants' mood was higher (at Time 2) when they had been uncertain about which of two gifts they would win, even compared to people who won both gifts—a finding that forecasters failed to predict. These findings suggest that the benefits of uncertainty are often undervalued. At least for pleasant experiences, adding an element of uncertainty may make even an ordinary life event difficult to understand, thereby keeping the experience fresh and exciting for a longer period of time.

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