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# Nominal increases and the perception of likelihood<sup>☆</sup>

Wei-Kang Wong<sup>\*</sup>

*Department of Economics, National University of Singapore, AS2, 1 Arts Link, Singapore 117570, Singapore*

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## Abstract

Using surveys, this paper shows that a nominal increase in likelihood has a relatively small effect on individual's own perception of likelihood, but a large and robust effect on beliefs about the perception of likelihood by others. These beliefs are consistent with actual choices.

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## 1. Introduction

This paper uses surveys to investigate the effect of a nominal increase in likelihood on the perception of likelihood and choices. The evidence suggests that a nominal increase in likelihood has a relatively small direct effect on the subject's own perception of likelihood, but a large and robust indirect effect on the subject's beliefs about the perception of likelihood by others; many believe that others would mistake a nominal increase in likelihood for a real increase in probability. It turns out that these beliefs are consistent with the patterns of responses for personal choice: more subjects actually choose the alternative with a higher nominal likelihood.

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<sup>\*</sup> Tel.: +65 6516 6016; fax: +65 6775 2646.

*E-mail address:* [ecswong@nus.edu.sg](mailto:ecswong@nus.edu.sg).

These findings are generally consistent with counterfactual thought (see Kahneman and Miller, 1986; Miller et al., 1989): a nominal increase in the absolute number of chances makes it easier to mentally simulate success, contributing to more favorable beliefs about the likelihood of success (particularly the beliefs about others' beliefs). However, in contrast to Miller et al. (1989), while the situations are statistically equivalent a priori, the actual probability of success may depend on others' choice in some scenarios. These findings on likelihood are similar to the findings on money illusion – a tendency to think in terms of nominal rather than real monetary values – by Fehr and Tyran (2001). Fehr and Tyran (2001) show that money illusion could be quite substantial and long lasting, not because of individual mistakes, but because some people behave differently in anticipation of money illusion by others. These findings are also reminiscent of the findings by Shafir, Diamond, and Tversky (1997), who show that although most people can distinguish between nominal and real monetary values, they still tend to prefer a higher nominal value. This paper shows that the same can be said about the perception of likelihood and choices in the absence of “money.”

## 2. Methodology and results

The subjects were undergraduate students at the National University of Singapore. I adopted a between-subjects design: I presented each student with only one question in one scenario in a single sheet of paper.

### 2.1. Scenario 1 [ $N=245$ ]

Because of fixed capacity constraint and the greatly expanded enrollment, two rival colleges have announced the following close bid system to allocate their courses. Under the system, the colleges would give each enrolled student some bid points to bid for courses every semester. The students observe only their own bids, but not the bids posted by others. The capacity constraint of each course is public information. The highest bidders will fill the class until the capacity constraint is reached. All successful bidders are charged the minimum successful bid. Unused points will expire at the end of the semester.

These two colleges are comparable in every aspect and they are located across the street from each other. However, they differ in the number of bid points they give each student:

College A gives every student 1000 points.  
College B gives every student 2000 points.

These points are not transferable and the students can only bid for courses in their own college.

- [1] Students of which college will be happier with their bidding system?  
[2] Students of which college will be more upset for not getting the courses they want?  
[3] Objectively, it is more likely for the students of which college to get the courses they want?

| Choice      | [1a] Happier | [1b] Happier | [2] More Upset | [3] More Likely |
|-------------|--------------|--------------|----------------|-----------------|
| College A   | 13%          | 12%          | 15%            | 10%             |
| College B   | 13%          | 10%          | 22%            | 8%              |
| The same    | 74%          | 78%          | 63%            | 82%             |
| Sample size | 62           | 73           | 67             | 50              |

Note: The subjects were students taking Principles of Economics.

Because the capacity constraint is fixed and the colleges are comparable in every aspect, success depends on relative, not absolute, bids. The number of bid points has no real effect on the probability of success. I surveyed four groups of students: the first two groups for their responses on happiness, the third group for how upset they would feel in the case of failure, and the fourth group for their objective likelihood assessment. It is worth noting that the questions in this scenario do not allow for much strategic interaction.

It turns out that the patterns of responses for happiness and likelihood assessment are quite similar. A great majority of the students (82% of total) realized that the number of bid points had no effect on the likelihood of success. About equal number of students (10% of the total respectively) thought that having more or less points made it more likely for them to get the courses they wanted.<sup>1</sup> However, when asked about how upset they would feel in the case of failure, the fraction of students who chose college B – the college that gave more points – roughly doubles while the fraction who chose college A increases only slightly. This result is consistent with counterfactual thought (Miller et al., 1989): ex ante, more bid points in college B makes it easier to imagine success in bidding, leading to greater ex post disappointment when bidding fails. Nevertheless, the direct effect due to individual's own misperception is relatively small.

## 2.2. Scenario 2 [ $N = 283$ ]

Two leading internet companies are trying to attract more internet users to list their online auction (both buy and sell) on their websites. They are close competitors.

To attract more users, both companies decide to reward their users with bid points for transactions conducted through their websites. These points can be accumulated and used to bid for attractive prizes offered periodically on their websites. Because prizes are limited in quantity, only the highest bidders get the prize, paid for using their bid points. The prizes offered by both companies are similar.

Company A gives its users only one bid point for every dollar's worth of transaction conducted through its website. In contrast, company B gives its users two bid points for every dollar's worth of transaction conducted through its website. These points are not transferable between websites.

[1] Which company will be more successful in attracting more users?

[2] If you were a user, which company's website would you choose?

[3] Objectively, it is more likely for the users of which company's website to be rewarded with attractive prizes?

| Choice      | [1a] Attract More | [1b] Attract More | [2] Personally Choose | [3] More Likely |
|-------------|-------------------|-------------------|-----------------------|-----------------|
| Company A   | 1%                | 3%                | 17%                   | 23%             |
| Company B   | 53%               | 51%               | 30%                   | 8%              |
| The same    | 46%               | 46%               | 53%                   | 69%             |
| Sample size | 92                | 73                | 47                    | 71              |

1a, 2 and 3: The subjects were students taking Principles of Economics.

1b: The subjects were students taking Introductory and Intermediate Macroeconomics (pooled to increase sample size).

Holding other things constant, doubling the number of bid points has no effect on the probability of winning a bid. However, the actual likelihood of a successful bid depends on the choices of the other users. Thus, a person's choice in turn depends on his beliefs about how the other users perceive and react to nominal differences in

<sup>1</sup> Admittedly, it is unclear why some students thought that having fewer bid points would increase the likelihood.

likelihood. I surveyed four groups of students: the first two groups for the perceived attractiveness of the websites to general users, the third group for their personal choice, and the last group for their objective likelihood assessment.

These three questions evoked very different responses: while about half of the students in both groups (53% and 51% respectively) thought that company B – the company that gave more bid points per dollar transaction – would be more successful in attracting more users, only 8% of the students thought that it was more likely for users of company B's website to be rewarded with attractive prizes. In fact, most students (69% of them) believed that there was really no difference between the two websites in the likelihood of being rewarded with attractive prizes. Nevertheless, these expectations about the relative success of company B's website turn out to be correct: as high as 30% of the students actually chose company B's website for themselves, compared to 17% who chose company A's website.

While only 3% of the students thought that company A would attract more users, 17% of the students actually chose company A's website for themselves, and 23% of the students thought that it was more likely to be rewarded with attractive prizes in company A. This result is not surprising: if one believed that fewer users would be attracted to company A's website, then fewer transactions would be conducted there, resulting in less competition for attractive prizes later.

These patterns of responses suggest that while the direct effect of nominal differences on individual's own perception of likelihood is relatively small, the indirect effect on beliefs about the perception of likelihood by others can be large; many believed that others would be lured by the nominal increase and a number of them best responded to this belief. The actual effect on personal choice lies somewhere between the direct and indirect effects in magnitude. Thus, nominal differences in likelihood can affect choices systematically, at least in the short run.

### 2.3. Scenario 3 [ $N=294$ ]

There are two rival supermarkets A and B in a neighborhood. The stores are similar in every aspect – prices, size of the store, range of goods sold, services – and they are located near each other.

Both stores decide to hold lucky draws to attract more customers. The conditions governing the lucky draws in both stores are otherwise the same: when sales in the store reach \$100,000, one lucky winner will be randomly selected from the tickets issued and the winner will get a shopping voucher worth \$1000.

However, store A gives away one ticket to its lucky draw for every \$10 spent in its store, while store B gives away two tickets to its lucky draw for every \$10 spent in its store.

[1] Which store will attract more customers?

[2] If you were a customer, which store would you choose?

[3] Objectively, it is more likely for the customers of which store to win the lucky draw in their store?

| Choice      | [1a] Attract More | [1b] Attract More | [2] Personally Choose | [3] More Likely |
|-------------|-------------------|-------------------|-----------------------|-----------------|
| Store A     | 3%                | 4%                | 7%                    | 17%             |
| Store B     | 73%               | 59%               | 34%                   | 11%             |
| The same    | 24%               | 37%               | 59%                   | 72%             |
| Sample size | 91                | 71                | 56                    | 76              |

1a, 2 and 3: The subjects were students taking Principles of Economics.

1b: The subjects were students taking Introductory Macroeconomics.

The probability of winning the lucky draw is exactly the same in stores A and B. I again surveyed four groups of students: the first two groups for the perceived attractiveness of the lucky draws to general shoppers, the third group for their personal choice, and the last group for their objective likelihood assessment.

Again, these three questions evoked very different responses: while most of the students in both groups (73% and 59% respectively) thought that store B – the store that gave more lucky draw tickets per \$10 spent – would be more successful in attracting more customers, only 11% of the students thought that it was more likely for customers of store B to win the lucky draw in store B. Indeed, more than two-thirds of the students (72%) believed that objectively there was no difference in the likelihood of winning the lucky draws in stores A and B. Nevertheless, as many as 34% of the students actually chose store B for themselves, compared to 7% who chose store A. So the belief about the popularity of store B was in fact correct.<sup>2</sup>

In summary, the indirect effect on beliefs about misperception by others is again large, while the direct effect on individual's own misperception is smaller. Again, these beliefs are supported by actual personal choices.

### 3. Conclusions

Using surveys, this paper finds significant effect on choices arising from nominal differences in likelihood. The direct effect on individual's misperception of likelihood is relatively small, although the effect on choices tends to be larger. The indirect effect on individual's beliefs about how the others perceive and react to nominal differences in likelihood can be large. The indirect effect also shows some robustness across different samples of subjects.

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<sup>2</sup> 17% of the students made a mistake in their likelihood assessment: they believed that it was more likely to win the lucky draw in store A, presumably because they believed that fewer customers would choose store A, resulting in less competition for the lucky draw when it was held — incorrect because a lucky draw would only be held when sales in the store reached \$100,000.