Mental Systems, Business Strategy and Anchoring effect

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Abstract. Anchoring effect is one of the most famous part of Heuristics, which basically refers to the estimation of an unknown quantity will be closer to the value that have already been considered. This decision-making method is impacted by the two systems described in Thinking Fast and Slow. The system 1 is automatic, unconscious, and quickly while the system 2 need concentrations, complex operations and related to make decisions. With the combination of these two systems, anchoring effect influences the decisions invisibly, and even has a further effect on the finance and economy.

Keywords: Anchoring Effect; System 1; System 2; Heuristics; Economy.

1. Introduction

Anchoring effect is one of the most significant categories of Heuristics, which refers to when people who consider about an exact value of an unknown quantity, their estimations will normally be closer to the considered value, the anchor. This effect is the result of the decision-making system, system 2 that operate voluntarily and depends on the memory and basic idea of system 1. The anchoring effect will happen in plenty of moments, such as online shopping or induction of answers. This anchoring effect, which often occurs, greatly impacts our estimates and judgments at the time.

In the experiment introduced in Thinking Fast and Slow, the author and his partner figured out the tendency of making decisions of a closer amount of the hint. Furthermore, people started to calculate the index if anchoring effect in the experiment established by San Francisco Exploratorium. After the discussion of experiment, the real life scenario of setting up a limit of purchasable amount of product finally claims that anchoring effect have ability of influencing the decision-making strategy and multiply the profit. As the result, the anchoring effect will influence our choices, and ultimately leads to different events. With the enormous influence on our life, the deep understanding of Anchoring effect will solve the mistakes in the decisions and improve the market efficient.

For a deep understanding, this article will combine the the theory of two systems described in Thinking Fast and Slow, the form of anchoring effect and the related experiments and applicants. With the step by step understanding, people know more comprehensive about their decisions, and attempt to avoid inefficient decisions.

This essay is divided in these parts below.

Part 1: The brief explaination of system 1 and system 2

Part 2: Two experiments that how people are influenced by the anchoring effect.

Part 3: The Application of anchoring effect in the real situation

Part 4: Conclusion and Implications

Part 5: Reference

2. Two Systems

There are two systems mentioned in Thinking Fast and Slow. The system 1 that operates automatically and unconsciously usually stick the memory. System 2, on the other hand, focus more on the complex and hard consideration and decisions, which are usually in a volunteer manipulation and depend on the memory. With the memory required characteristic, the operation of the system 2 will be influenced by the memory in system 1, which might contain the possible anchors. Therefore, the anchoring effect in decision making strategy is led by the system 2.

3. Experiments

In the first experiment, one of the most common applicants of anchoring effect is induce to an answer which is closer to the number we had. In Thinking, Fast and Slow, the author and his partner introduce an experiment which contains one open-ended question while another is with an anchoring factor. In the beginning of the experiment, researchers built a wheel marked with 1 to 100 but can only stop at 10 or 65. Every participant spins the wheel and writes down their number, 10 or 65. In the first question, the researcher asked that is the percentage of African nations among UN members larger or smaller than the number you just wrote, and they asked what is your best guess of the percentage of African nations in the UN as the next step.

In the experiment, the researchers found that the average estimates of participants who saw 10 and 65 were 25% and 45%, which suggests that they did not ignore the information from the result of the wheel. During the experiment, the percentage of African nations in UN is the estimation that participants concentrate on, while the number shown on the wheel, 10 or 65, is the anchoring factor, which provides a possible solution to the question. With the tendency of following this possible solution, the real estimations will be closer to the anchor.

In addition, the anchoring effect in the experiment can not only prove that people will estimate closer to the anchors, but can also be actually measured. In the second experiment established by San Francisco Exploratorium, participants are asked about these two questions: Is the height of the tallest redwood more or less than 1,200 feet, and what is your best guess about the height of the tallest redwood? With this anchor, some participants were influenced by the "high anchor" of 1,200 feet, while others referred to a "low anchor" of 180 feet, which leads to a difference of 1,020 feet. As a result, a vast difference of 562 feet caused the mean estimates result from "high anchor" and "low anchor": 844 and 282 feet. The anchoring index is simply the ratio of the two differences (562/1,020) expressed as a percentage: 55%. The anchoring measure would be 100% for people who slavishly adopt the anchor as an estimate and zero for people who can ignore the anchor altogether. The value of 55% observed in this example is typical. Similar values have been observed in numerous other problems.

In this example, 1,200 feet provides anchor that led people 's answer to follow this possible solution. In both questions, participants establish a potential value before they provide the answer and finally influence their estimations. Dividing the difference between the "high anchor" with the estimations from them, we can successfully find the index of anchoring effect in this experiment.

With the usage of the index of the anchoring effect, the difference between the "high anchor" and the "low anchor" can be calculated efficiently and used to hint at the potential value given by others. Therefore, the sellers can increase the price of the products and even hint at the customers buying certain products. For example, the tourists at the Exploratorium, an environmentally sensitive crown, were usually willing to pay an average $64 without an anchor. However, if Exploratorium introduced and anchoring sum as only $5, people were willing to pay averaged $20, and this value could increase to an average of $143 when anchor was a rather extravagant $400. high-anchor and low-anchor groups led to a difference of $123. The anchoring effect was above 30%, indicating that expanding the initial request by $100 brought a return of $30 in average willingness to pay.

Also, measuring anchoring effect can also derive the relationship between referendum contingent, a protocol for elicitation of Willingness-to-Pay for public good, and willingness to pay for public goods. In another paper written by Donald Green, Karen E. Jacowitz, Daniel Kahneman, Daniel McFadden, an experiment designed by Jacowitz and Kahneman 1995 compared anchoring effect, referendum and open-ended formats in objective estimation tasks and in WTP for public goods.

The samples, 370 adult volunteers, were asked in an open-ended format for WTP for two public goods and for estimates of three objective quantities:

First, WTP per year to save 50,000 offshore Pacific Coast seabirds from small offshore oil spills, until ways are found to prevent spills or require owners of tankers to pay for the operation.

Second, Estimate the height in feet of the tallest redwood in California.

Estimate the number of gallons of gasoline, on average, used by an individual car owner in the US in one month.

Estimate the average number of inches of rainfall that fall each year at Mount Wialeale in Hawaii, the wettest spot on earth. As shown in Table 1.

WTP per year for California highway improvements and enforcement of traffic laws that in five years will reduce the number of traffic accidents by 20%.

Table 1. Willingness to-pay to save 50,000 off-shore seabirds per year

Distribution	Open-ended	Starting-point bid				
		US$5	US$25	US$60	US$150	US$400
US$0–4.99	19.8%	12.2%	8.5%	0.0%	8.3%	12.0%
US$5–24.99	27.3%	67.4%	25.5%	41.7%	29.2%	22.0%
US$25–59.99	31.4%	12.2%	53.2%	14.6%	27.1%	20.0%
US$60–149.99	12.4%	8.2%	8.5%	41.7%	16.7%	18.0%
US$150–399.99	5.0%	0.0%	2.1%	2.1%	18.8%	10.0%
US$400+	4.1%	0.0%	2.1%	0.0%	0.0%	18.1%
Sample size	121	49	47	48	48	50
P (open-ended response ≥ bid)		80.2%	52.9%	21.5%	9.1%	4.1%
(Std. error)		3.6%	4.5%	3.7%	2.6%	1.8%
P (Referendum Yes/Bid)		87.8%	66.0%	43.8%	18.8%	18.0%
(Std. error)		4.7%	6.9%	7.2%	5.6%	5.4%
Median open/follow-up response	US$25.00	US$10.00	US$25.00	US$25.00	US$43.00	US$50.00
(Std. error)	US$6.03	US$2.33	US$1.16	US$14.04	US$10.87	US$23.41
Mean open/follow-up[a] response	US$64.25	US$20.30	US$45.43	US$49.42	US$60.23	US$143.12
(Std. error)	US$13.22	US$3.64	US$12.61	US$6.51	US$8.59	US$28.28

	Coefficient	*Std. error*
Marginal effect of starting point bid	0.284	0.032
K–J interquartile anchoring index[b]	0.273	0.136
Nonparametric referendum mean[c]	US$167.33	US$76.90
Referendum multiplier	2.60	1.31
Parametric referendum mean	US$265.59	US$138.96
Referendum multiplier	4.13	2.32

[a]One observation of US$2,000,000 is excluded from the calculation of the open-ended mean.
[b]If the open-ended mean WTP of US$64.25 were representative of all California adults, then the total state WTP for protecting 50,000 seabirds would be US$1.49 B, or US$29,800 per bird.
[c]The upper bound to the distribution is assumed to equal the largest anchored response, US$1000. The reported std. error is the RMSE at the maximum possible bias, given the upper bound to the distribution.

The questions were asked in the order above, but subjects could look ahead or review their responses. Next, five anchor values were selected for each task, at approximately the 25, 50, 75, 90, and 95 percentiles of its calibration distribution.

Table 2. Height in feet of the tallest redwood in California

Distribution	Open-ended	Starting-point bid				
		180	280	370	550	1200
0–179	26.5%	8.7%	8.9%	4.4%	2.2%	12.8%
180–279	23.1%	54.4%	8.9%	10.9%	11.1%	6.4%
280–369	26.5%	23.9%	42.2%	6.5%	26.7%	17.0%
370–549	14.9%	10.9%	26.7%	56.5%	4.4%	14.9%
550–1199	4.1%	2.2%	11.1%	19.6%	53.3%	17.0%
1200 +	5.0%	0.0%	2.2%	2.2%	2.2%	31.9%
Sample size	120	46	45	46	45	47
P(Open-ended response ≥ bid)		73.6%	50.4%	24.0%	9.1%	5.0%
(Std. error)		4.0%	4.6%	3.9%	2.6%	2.0%
P(Referendum Yes|Bid)		91.3%	82.2%	78.3%	55.6%	31.9%
(Std. error)		4.2%	5.7%	6.1%	7.4%	6.8%
Median open/follow-up response	225.0	250.0	350.0	435.0	600.0	500.0
(Std. error)	29.1	10.7	20.7	27.3	107.9	227.0
Mean open/follow-up response[a]	490.8	282.0	407.0	465.7	570.4	844.2
(Std. error)	107.9	21.4	38.4	31.0	43.9	100.8

	Coefficient	*Std. error*
Marginal effect of starting point bid	0.513	0.057
K–J interquartile anchoring index	0.974	0.198
Nonparametric referendum mean[a]	975.1	359.8
Referendum multiplier	1.99	0.85
Parametric referendum mean	1196.1	283.5
Referendum multiplier	2.44	0.79
True value	366.2	
Open-ended bias	34.0%	
Single referendum bias		
Nonparametric	166.3%	
Parametric	226.6%	

[a]The upper bound to the distribution is assumed to equal the largest anchored response, 2700. The reported std. error is the RMSE at the maximum possible bias, given the upper bound to the distribution.

From this experiment, researchers conclude that anchoring effects are significant in both CV and objective estimation questions, which is also significant the response of referendum to a startingpoint bid, and the continuous response to the follow up question.

4. Application

After establishing the method of anchoring effect, merchants now widely use the anchoring effect in the daily trading to make a considerable amount of profit. Merchants normally set up an anchor, a suggestible standard to remind us of a possible estimated value and number of the certain product, and lead the customer to make the profit-maximizing decision for them.

Taking supermarket shoppers in Sioux City, Iowa as an example, it started a sale which had about 10% off the regular price for Campbell's soup, and limited the quantity available for purchase matters to 12. This limitation provided a possible number to be brought for the customers, and hinted at them to buy the product in a closer number to 12. On the other hand, without such limitation, customers had no anchors, and they made the decision with more consideration of their demand. Therefore, the average product brought by customers with a limit of 12 per person is 7 cans, which is twice as many as they bought without the limitation.

In this real life scenario, an anchor, the limit of the purchasable product imply the customers that the possible number of buying. After this hint was gained by system 1, is will stick a memory of a number, a possible solution to the answer that how much people should buy, near the limitation of the purchasable quantity. Although the system 2 will check the decision made by system1 and adjust to a fit one, this function actually depends on the memory acquired by system 1, which have already contained a number hinted by the merchant. Therefore, the number of buying adjusted by system 2 will still stick to the limit with only a few reduction, and increase the amount of selling.

5. Conclusion and Implication

In conclusion, the anchoring effect means that when people try to figure out estimations with a potential hint, the anchor, the outcomes will normally get closer to the anchor. This effect is the result that system 2 normally depends on the memory and prime idea of system 1, which is easily implied by the surrounding. For this reason, people's decisions will easily follow the potential solution rather than thinking about it.

Furthermore, the results of experiment can be used in the real life. For instance, when people want to make a decision, they want to acquire an overall estimation that can be helpful to the problem to be solved and avoid making wrong mistakes. However, because of the common psychological effect, it is hard for people to estimate exactly, which will further lead to an erroneous decision. Taking auction as an example, the merchant will provide the starting price that sets the least price of the commodities, which are used by bidders to combine his or her estimations and give the next bid. Then, the next bidders will also combine the value for their own and the price given by the last bidder. During this process, the bids given by the merchant and the last bidder will be the reference of next price and even influence the result. This phenomenon in auction reveals that other numbers, quantities or value people have already known may have an influence on their estimations and further decisions.

References

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