

EXPERIENCE ALTERS PERCEPTION

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Abstract

Our experiences change the way we perceive events and objects in our everyday life. Hindsight bias is one such eventuality. In this project we have qualitatively and quantitatively demonstrated hindsight bias through psychological experiments on subjects. Furthermore, we have attempted to characterize this bias and found that people fail to remember sources of knowledge that they have, indicating a plausible reason for how experience alters our perception.

1 Background

1.1 Hindsight Bias

Hindsight bias or knew-it-all-along bias is a common phenomenon we come across in day to day lives. It means that when shown the outcome of an event we overestimate our ability to have been able to predict this result accurately. Hindsight bias is the tendency to see events that have occurred as being more predictable than they were before they took place.

This bias, also known as creeping determinism, can be seen in a variety of situations in our day-to-day lives. For example, someone might say that “Sachin will score a century in the next match,” given his or her general knowledge of cricket. If Sachin does make a 100 runs after this statement is made the person might feel that the prediction was stronger than it really was.^[8] However, incorrect or inaccurate predictions tend not to be remembered as well as vaguely correct predictions, reinforcing the idea in someone’s mind that his/her predictive skills are better than they really are.

Fischoff^[1] observed that after learning event outcomes, people view it as having been inevitable. On the other hand, prior to outcome knowledge, people view it as not necessarily inevitable. “People misremember their own predictions so as to exaggerate in hindsight what they knew in foresight.”^[2]

1.2 Assessing Odds

We are “wildly optimistic” in judging the chances of our success or failure. This can be attributed to the fact that we “rehearse success” and spend less time

thinking about failure. For example, most people feel that they are more likely than average to be gifted with a smart child, or win the lottery, or to find ‘true love’ or find a ‘dream job’, when the chances of this happening are actually quite bleak. Gamblers play with instinct rather than sound, reliable comparisons to weigh the odds.

We measure the value of an item with a scale that heavily relies on our past experiences. We are especially influenced when the price of an item is shown to have fallen. A tag that prices a Rs.200 item as “Now for Rs. 100!!”, chances are we’ll end up buying it. Presence of a larger range of prices in a shop has also been shown to increase the average amount spent by the customer.^[3]

1.3 Happiness

Our definition of happiness is also constantly changing. Our experiences are a very vital component in deciding how we perceive events/objects, and consequently, what makes us happy. Our failure to make objective comparisons results in inaccurate decisions, further cascading into an inability to know how happy that gain/loss will make us. This results in a human tendency to “synthesize” happiness. This synthetic happiness is observed in hindsight, generally with regard to a past event. We tend to value things that we own, more than others value them. At the heart of this is the adage that tells us to be satisfied with what we have - hence the need to synthesize happiness.

1.4 Learning Facts from Fiction

Throughout our lives we are exposed to myriad sources of information from which we learn facts. Books, TVs, movies, the internet and even the people around us are repositories of a lot of information. But not all the sources provide accurate and factual knowledge. Many sources contain fictional and/or incorrect information. Therefore, there exists a need to remember the sources of information while drawing upon data from our minds.

Marsh et. al.(2003)^[4]suggest that these reference tags that map the information to the source are missing sometimes. So, in hindsight, we tend to not know the source of knowledge, suggesting an inaccuracy or bias.

2 Experiments and Results

We have conducted 3 experiments v.i.z *poster rankings, the lady or tiger?, learning facts from fiction* to demonstrate through hindsight bias how experiences alter our perception.

2.1 Poster Rankings : Subjects and Methodology

This experiment was conducted to show how happiness is synthesized in hindsight, based on experience. 5 male subjects, who were final year undergraduates at IIT Kanpur and avid listeners of western music, were shown 7 posters of different Western music bands, viz. *The Beatles, Pink Floyd, Led Zeppelin, The Who, Bob Dylan, Guns N’ Roses* and *Jimi Hendrix*. They were individually asked to rank the posters 1 through 7; with 1 being the poster they liked the

most and 7 being the one they liked least. We then asked the subjects to choose one from the posters they ranked 4th and 5th, to take home. After a gap of 4 days, the subjects were asked to rank the same set of 7 posters, again. We then measured the average percentage change in the rank of the 4th poster and 5th poster.

This experiment is inspired from the experiment Daniel Gilbert explains in his book 'Stumbling With Happiness.

2.2 Poster Rankings : Results and Discussions

All the subjects selected the poster they ranked 4th to take home. Figure 1 shows the ranking table for the 5 subjects initially and after 4 days. It can be seen that the poster that was taken home improved in its ranking for all the subjects. On the other hand, the poster that the subject could not take home, slipped below its initial value.

	Ranking	The Beatles	Pink Floyd	Led Zeppelin	The Who	Bob Dylan	Guns N' Roses	Jimi Hendrix
Subject 1	Initial	1	2	4*	3	6	7	5*
	After 4 days	1	2	3*	4	5	6	7*
Subject 2	Initial	5*	1	2	3	7	6	4*
	After 4 days	6*	1	4	3	7	5	2*
Subject 3	Initial	5*	3	2	1	6	4*	7
	After 4 days	5*	4	2	1	6	3*	7
Subject 4	Initial	7	3	4*	5*	2	6	1
	After 4 days	7	3	2*	6*	3	5	1
Subject 5	Initial	5*	3	2	7	6	1	4*
	After 4 days	5*	4	2	7	6	1	3*

Figure 1: Poster ranking subject-wise. Note how the rank of the star marked, 4th poster (taken home) improves, while the rank of the 5th poster (not taken home) reduces.

Figure 2 shows the average percentage change of rank for the 4th and 5th poster. The 4th poster shows an average 20% increase in its ranking. However, the 5th poster shows an average 11.43% drop in its ranking. What the subject owns, ends up becoming more valuable and what he left behind becomes less valuable. We have a tendency to like what we own, more than we would have, if we didn't own it - hence the jump in the rank for the 4th poster. The inverse happens for the poster the subjects leave behind; a feeling which says, "If I've left it behind, it must be worthless." This here is the tendency to synthesize happiness in hindsight. The experiment demonstrates how our perception of happiness is dependent on our past experience.

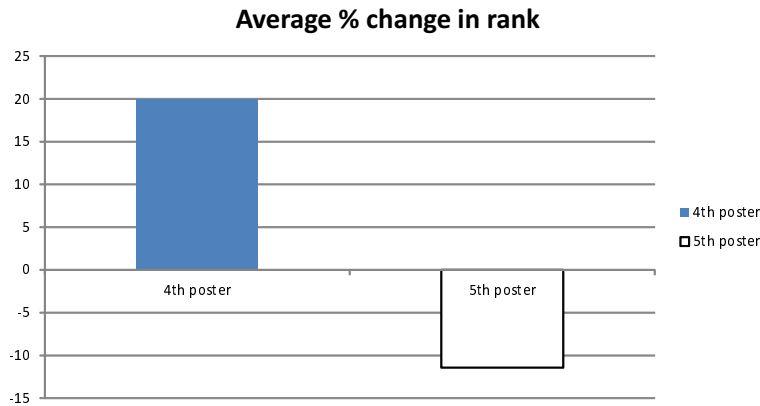


Figure 2: The 4th poster shows an average 20% increase in ranking. The 5th poster shows an average 11.43% drop in ranking.

2.3 The Lady or the Tiger? : Subjects and Methodology

This experiment was conducted to quantitatively demonstrate the phenomenon of hindsight bias. 34 male subjects, all 3rd and 4th year undergraduate students at IIT Kanpur, were divided into 2 sections: the *Before group* and the *After group*. The *Before group* had 7 subjects, while the *After group* was further divided into groups of 7, 6, 7 and 7 respectively. All subjects were requested to read the short story by Frank Stockton - *The Lady or the Tiger?* [see Appendix A]. The edited story was mailed to all the subjects as the concluding section of the story was omitted in the reading material for all the groups. Both the groups were given a set of 4 possible outcomes for the story. Additionally, each of the 4 *After groups* were also given concluding paragraphs stating one of the 4 outcomes as “true”. Since all the outcomes were mutually exclusive, 3 *After groups* were given “true” outcomes that actually didn’t happen in the story. Subjects were now asked through e-mail or personally to estimate the likelihood of occurrence of each of the possible 4 outcomes regardless of the “true” outcome given to them.

This experiment is on the lines of the experiment conducted by B Fischhoff, to quantify the hindsight bias.^[1]

2.4 The Lady or the Tiger? : Results and Discussions

The 34 subjects’ responses can be seen in Figure 3. The *After group* showed a tendency to assign a higher probability of occurrence of the outcome provided to them (marked in bold). A given outcome increases the perceived likelihood of occurrence. What can also be hypothesized is that subjects are most likely unaware of the effect of the knowledge of outcome on their perception.

Experimental group	n	Outcome provided	%age subjects who found option most likely			
			A	B	C	D
Before	7	None	42.58	28.56	14.28	14.28
After	7	A	28.56	28.56	14.28	28.56
	6	B	16.66	50.00	16.66	16.66
	7	C	14.28	14.28	42.85	28.56
	7	D	0	14.28	14.28	71.42

Figure 3: The After group showed a tendency to assign a higher probability of occurrence of the outcome provided to them.

2.5 Learning facts from fiction : Subjects and Methodology

In an attempt to point out an idiosyncrasy of our learning process, we gave 22 male subjects who were, IIT Kanpur 4th year undergraduates, a passage called *Evolution of Love* [see Appendix B] to read. The passage was printed and different copies were distributed amongst all the subjects. In the passage were embedded certain obscure and well known facts which were framed correctly, incorrectly and neutrally. The subjects were asked to answer some general knowledge questions the next day, the questions were printed in form of a questionnaire which included some of the facts mentioned in the passage. The subjects were instructed that the questions were GK based, rather than “Answer according to the passage” type questions. However, against every question answered, the subject was asked to tick mark whether he used information from the passage or his prior knowledge when giving the answer.

This experiment is based on experiment conducted by Marsh et al.^[4]

2.6 Learning Facts from Fiction: Results and Discussions

This experiment aims to understand the subjects’ ability to accurately/inaccurately recall the source of knowledge used to answer the questions. Only the correct answers to relevant questions were considered for source attribution distribution (except for incorrectly framed facts). Figure 4 shows the data collected from 22 subjects for source attribution.

Question number and fact framing	%age answers	Source attribution (%)	
		Prior knowledge	Story
1: Correct-easy	86.36 (correct)	94.74	5.26
3: Correct-difficult	27.27 (correct)	33.33	66.66
5: Incorrect-easy	63.64 (wrong)	78.57	21.43
	36.36 (correct)	100	0
7: Incorrect-difficult	68.18 (wrong)	86.16	13.33
	31.82 (correct)	100	0
8: Neutral-difficult	45.45 (correct)	70	30
10: Neutral-easy	86.36 (correct)	68.42	31.58

Figure 4: Subjects’ source attribution can be inaccurate, especially for reproduction of misinformation.

From Figure 4 we see that correctly framed facts’ sources are accurately judged. Easy answers to correctly framed facts do not require any reference to the story,

hence attributed to prior knowledge. But correctly framed difficult facts require one to remember the source as can be seen in the data. Reproduction of misinformation is incorrectly attributed to prior knowledge. For such framing of facts, from easy to difficult, we also find attribution to prior knowledge increases. This probably occurs because with increase in difficulty, source tags become less important/obvious. For neutral frames, from easy to difficult, story attribution decreases very slightly. People fail to remember the source of the knowledge present – which can be both factual as well as fictional.

Since these questions are answered a day after reading the passage, the answers are basically answered in hindsight. Throughout, we can clearly notice an inability to accurately and consistently predict sources of knowledge used. This bias might stem from the missing reference/source tags when one learns new things; a byproduct of our learning process.

3 Conclusion

Through these experiments we got a holistic view of some of the ways of how experience alters our perception of the world. Hindsight bias may give us the illusion that we are accurately able to understand what the past was all about, which may impede us from learning anything, whose ramifications may be life threatening. We are poor judges of objective (price) and subjective (happiness) things because we base them on our experiences rather than fact. The biggest problem may be the apparent unawareness of the subjects to such biases. We also performed a small experiment to test the effect of our experience on subjective things like price of an item and our decision of taking the item or leaving it. In this experiment we asked 29 subjects (male and female) whether they would be interested in purchasing a pizza, which was priced at Rs. 400, at a 'discounted' price of Rs. 300. 24 of the 29 subjects, i.e 82.75% agreed to purchase the pizza at the "discounted" price of Rs. 300. This was despite the actual cost of the pizza, or "worth" being approximately Rs. 250. This experiment qualitatively shows how we measure the value of an item on a scale that relies heavily on our past experiences; in this case the list price of Rs. 400.

Through these experiments we may also extrapolate and say that the brain's quick computational ability and low energy consumption (with respect to comparable artificial computational machines) might originate from the brain's ability to *lose* extraneous information like the source tag. "One apparent source of that bias is automatically making sense of new information as it arrives. Such rapid updating should facilitate learning—at the price of obscuring how much has been learned. Underestimating what one had to learn may mean underestimating what one still has to learn, thereby promoting overconfidence."^[5]

Awareness of the fact that our experiences might alter our perception will go a long way into helping people find ways around such inequities of the mind.

References

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4 Appendix

4.1 Appendix A

This appendix contains some text of the short story “*The Lady or the Tiger?*” by Frank Stockton and the multiple outcomes provided by us. The full text can be found here [<http://www.eastoftheweb.com/short-stories/UBooks/LadyTige.shtml>]. This reproduction is only for academic purposes and does not intend to violate international copyright laws.

Question: Which is the most likely way in which the author would have concluded the story?

Outcome A: The tiger

Her right arm lay on the cushioned parapet before her. She raised her hand, and made a slight, quick movement toward the right. No one but her lover saw her. Every eye but his was fixed on the man in the arena.

He turned, and with a firm and rapid step he walked across the empty space. Every heart stopped beating, every breath was held, every eye was fixed immovably upon that man. Without the slightest hesitation, he went to the door on the right, and opened it.

Her decision had been indicated in an instant, but it had been made after days and nights of anguished deliberation. How in her grievous reveries had she gnashed her teeth, and torn her hair, when she saw his start of rapturous delight as he opened the door of the lady! How her soul had burned in agony when she had seen him rush to meet that woman, with her flushing cheek and sparkling eye of triumph; when she had seen him lead her forth, his whole frame kindled with the joy of recovered life; when she had heard the glad shouts from the multitude, and the wild ringing of the happy bells; when she had seen the priest, with his joyous followers, advance to the couple, and make them man and wife before her very eyes; and when she had seen them walk away together upon their path of flowers, followed by the tremendous shouts of the hilarious multitude, in which her one despairing shriek was lost and drowned!

She had known she would be asked, she had decided what she would answer, and, without the slightest hesitation, she had moved her hand to the right. Would it not be better for him to die at once, and go to wait for her in the blessed regions of semi-barbaric futurity?

Outcome B: The lady

Her right arm lay on the cushioned parapet before her. She raised her hand, and made a slight, quick movement toward the right. No one but her lover saw her. Every eye but his was fixed on the man in the arena.

He turned, and with a firm and rapid step he walked across the empty space. Every heart stopped beating, every breath was held, every eye was fixed immovably upon that man. Without the slightest hesitation, he went to the door on the right, and opened it.

Her decision had been indicated in an instant, but it had been made after days and nights of anguished deliberation. How often, in her waking hours and in her dreams, had she started in wild horror, and covered her face with her hands as she thought of her lover opening the door on the other side of which waited the cruel fangs of the tiger! That awful tiger, those shrieks, that blood!

But she had known she would be asked, she had decided what she would answer, and, without the slightest hesitation, she had moved her hand to the right. Despite her grievous reveries, she thought of his rapturous delight when he opened the door to the lady. She imagined his whole frame kindled with the joy of recovered life; when she had heard the glad shouts

from the multitude, and the wild ringing of the happy bells. She had lost him, but in doing so gave him happiness.

Outcome C: The king intervenes

Her right arm lay on the cushioned parapet before her. She raised her hand, and made a slight, quick movement toward the right. No one but her lover saw her. Every eye but his was fixed on the man in the arena.

He turned, and with a firm and rapid step he walked across the empty space. Every heart stopped beating, every breath was held, every eye was fixed immovably upon that man. Her decision had been indicated in an instant, but it had been made after days and nights of anguished deliberation. But she had known she would be asked, she had decided what she would answer, and, without the slightest hesitation, she had moved her hand to the right.

As the man walked over to the door, the king stood up from his throne and raised his hand. He announced that it was a test and the man had passed. A test of the man's trust in the princess. A test of the man's unflinching love in the eyes of the king. He had known the lover would look to the princess for a signal. But would she have pointed to the lady or the tiger? The man could never have said. Would she have sent him to his death because of a jealousy fueled from her semi-barbaric blood? Or would she have borne the burden of her grief and pointed to the lady instead?

The man's love for her outweighed his doubts. And rightly so. The king's joy knew no bounds in joining his daughter's hand with a man so committed to his love. There were glad shouts from the multitude, and the wild ringing of the happy bells. Soon came the priest, with his joyous followers, advanced to the couple, and made them man and wife before the kingdom's eyes. They then walked away together upon their path of flowers, followed by the tremendous shouts of the hilarious multitude.

Outcome D: None of the above

This is original text from the story: The more we reflect upon this question, the harder it is to answer. It involves a study of the human heart which leads us through devious mazes of passion, out of which it is difficult to find our way. Think of it, fair reader, not as if the decision of the question depended upon yourself, but upon that hot-blooded, semi-barbaric princess, her soul at a white heat beneath the combined fires of despair and jealousy. She had lost him, but who should have him?

How often, in her waking hours and in her dreams, had she started in wild horror, and covered her face with her hands as she thought of her lover opening the door on the other side of which waited the cruel fangs of the tiger!

But how much oftener had she seen him at the other door! How in her grievous reveries had she gnashed her teeth, and torn her hair, when she saw his start of rapturous delight as he opened the door of the lady! How her soul had burned in agony when she had seen him rush to meet that woman, with her flushing cheek and sparkling eye of triumph; when she had seen him lead her forth, his whole frame kindled with the joy of recovered life; when she had heard the glad shouts from the multitude, and the wild ringing of the happy bells; when she had seen the priest, with his joyous followers, advance to the couple, and make them man and wife before her very eyes; and when she had seen them walk away together upon their path of flowers, followed by the tremendous shouts of the hilarious multitude, in which her one despairing shriek was lost and drowned!

Would it not be better for him to die at once, and go to wait for her in the blessed regions of semi-barbaric futurity?

And yet, that awful tiger, those shrieks, that blood!

Her decision had been indicated in an instant, but it had been made after days and nights of anguished deliberation. She had known she would be asked, she had decided what she would answer, and, without the slightest hesitation, she had moved her hand to the right. The question of her decision

is one not to be lightly considered, and it is not for me to presume to set myself up as the one person able to answer it. And so I leave it with all of you: Which came out of the opened door - the lady, or the tiger?

4.2 Appendix B

The Evolution of Love

As I walked past a poster of the Taj Mahal, I could not help but notice the 3 minars looking very majestic against the azure sky. This got me thinking about how the definition of love has changed over many generations. Shah Jahan and Mumtaz Mahal's immortal story speaks of a passion that withstood the test of time. But not all love stories have a happy ending. Like Shakespeare's tragic romance, not all couples are destined to be together. Even historically, Anarkali is said to have been burnt alive for her illicit relationship with Emperor Akbar's son, Saleem. Some people today, take an extreme view of modern love, terming it as blasphemy. The recent killings in North India demonstrates how skewed and narrow minded some people still are in a country that is being heralded as the global power of tomorrow. In June 2010, scrutinizing the increasing number of such homicides, the Supreme Court of India issued notices to the Central Government and six states including Uttar Pradesh, Punjab, Haryana and Rajasthan, to take preventive measures against the social evil. (Author: Anish Rao)

General knowledge questions

1. Shah Jahan made the Taj Mahal as a tribute to whom?
2. Who is the Greek goddess of love?
3. Given the recent homicides of young couples who marry against their parents' consent, what steps have the judiciary taken?
4. Which flower most famously symbolizes love?
5. How many minars does the Taj Mahal have?
6. "Frankly my dear, I don't give a damn," is a famous quote from which classic film?
7. How was Anarkali punished for her illicit affair by Akbar?
8. What is Shakespeare's most famous tragic romance?
9. Which section of the Indian Constitution was recently in the news regarding homosexual rights?
10. A murder of a person when he/she is said to have disgraced his/her family, according to the community is called?