



Why Not Both: A Qualitative Analysis of Alternative Outcomes

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Background

When interacting with empirical research, it is important to consider possible alternative outcomes for research studies.

- Classroom interventions with high school students (Munnich et al., 2004) and Journalism graduate students (Ranney et al., 2008) have prompted students to consider alternative predictions and explanations and found transfer to consideration of alternatives in novel items in a test phase: when asked about new items they discussed potential alternatives without prompting and their estimations were more accurate.
- Despite this, in a brief intervention in where participants made predictions about the results of psychological studies and were provided the actual results, they did not show transfer in test phase. (Hoffmann et al., 2016; Ortega et al., 2017).
- This leads one to believe that perhaps the classroom setting is a vital component for transfer.

Current Study

How does alternative causal reasoning help with reasoning for novel information?

- When learning new information, people often overestimate their approximation abilities (*Hindsight Bias*; e.g., Slovic & Fischhoff, 1977) so we manipulated when participants were given results several studies - whether they predicted results before (Foresight) or after (Hindsight) learning the true outcome.
- We mimicked a classroom discussion, by first asking participants why they thought one outcome occurred, then presenting them with a reason another participant gave for the opposite outcome.
- Here we wanted to examine the nature of the alternative outcomes participants thought of to inform future studies
- Question:** What kinds of alternative reasons are participants thinking of, and in response to which questions?

Materials

Table 1. Psychological Studies as Stimuli

Topic	Option A	Option B
Is it better to keep or change test answers? <small>(Bauer et al. 2007)</small>	Keep Answer	Change Answer
Is memory better with a normal or unusual font? <small>(Diamond-Yauman et al. 2010)</small>	Normal Font	Unusual Font
Which helps students remember information better? <small>(Mueller & Oppenheimer 2014)</small>	Notes By Hand	Notes By Laptop
Are people happier with children or without? <small>(Deaton & Stone 2013)</small>	Children	No Children
Which related to law enforcement as punishers? <small>(Thibodeau & Boroditsky 2011)</small>	Virus	Beast
What praise will lead students to a more challenging task? <small>(Mueller & Dweck 1998)</small>	Intelligence	Effort

Method

Participants: were undergraduates in an introductory psychology course, randomly assigned to either a Hindsight or Foresight group.

Materials and Procedure: Items were based on the results of six psychology studies, divided into sets of three, which were counterbalanced across Learning and Testing Phases:

- Learning Phase:** A brief description of the psychological finding was presented, then participants either predicted the results of the study or indicated what they would have predicted after being given the results.
- Test Phase:** participants predicted the results and gave explanations for their predictions. They then learned the actual results of the studies and indicated their surprise levels.

Summary of Quantitative Results

See Bittner et al. (2019)

Hindsight Bias: Participants in the hindsight condition showed hindsight bias for some items, and their confidence was significantly inflated in comparison to the foresight participants' confidence for those items.

Alternative Outcomes: There were no significant differences in confidence between learning and test phases suggesting that as a group participants did not consider alternative outcomes. However, we observed that individual participants were generating alternative reasons. We now turn to a qualitative analysis of these responses.

Present Results

Trends in the data: although not all participants listed alternative outcomes, a minority consistently demonstrated alternative reasoning.

- The two studies that elicited the highest number of responses demonstrating alternative reasoning were notes-by-hand vs. laptop (n=7) and children vs. no-children (n=9). This could be due to participants' familiarity with these issues, facilitating their access to reasons in both directions.
- Very few participants provided alternative responses for keep vs. change answer, normal vs. unusual font, and virus vs. beast

A Closer Examination of Alternative Reasons

Reasons to keep answer	Reasons to change answer
I was taught to answer based off of your intuition because it was explained to me whichever answer you put first is a reaction that shows you know the answer right off the bat...On the other hand you should be careful not to overthink choosing a different answer...	...but sometimes that is blatantly incorrect way to go about taking tests because sometimes your first answer may be wrong.
Normal Font	Unusual Font
I thought that when reading something in a font that is unfamiliar would cause distractions from what is being conveyed by the text. Reading a difficult text in comic sans might distract the reader from what is being conveyed because their brain is being distracted by the unusual font the information is presented in...	...However it is also possible that a reader remembers the text better, because their brain works in a different way to decipher the text, and therefore creates a more vivid memory of the unusual experience.
Normal font--as unusual fonts would be distracting...	...however, I'm not entirely confident that this would lead to better memory, as the unusual fonts (in moderation) may be more effective in ingraining information
Notes By Hand	Notes By Laptop
When notes are taken by hand they are committed to memory better than notes taken online.	The notes taken on a laptop, however, are generally easier to look through and review.
...However, since there is the possibility of people being distracted while using computers, taking notes by hand may remove all distractions. Taking notes by hand is also slower so it means more time to retain information.	Personally, I find taking notes on a laptop more useful because when taking notes by hand, I am more susceptible to falling asleep in class and not remembering anything. Reading notes on a laptop is also more engaging and accessible than having to read notes on paper...
...but mostly depending on what the lecturer's style of teaching and what they put on the slide or write down.	having a laptop is much easier to study from and can take in much more info from a fast paced lecture compared to notes by hand...
Children	No Children
...However, adults may have friends who have children and might feel left out	Many adults see no fulfillment in having their own children/have no desire to be parents...
Children are great resources for happiness because they bring a sense of purpose, love, and nature...	...But when you are not able to provide or take care of the child, there can be difficulties and this can cause unhappiness.
...However, if both partners work to care for and love for the child, it usually results in the pair becoming closer than they were before	Obviously they are difficult to deal with at times, and each partner could feel slighted if the other is not putting the effort to raise it. Having a child also limits the amount of things that each person is able to do (i.e. travel, etc)...
some people like kids...	some don't...
Virus	Beast
...But calling crime a virus makes it seem invisible and unstoppable. It is something that spreads and is difficult to contain. I would lean more towards this answer because crime is difficult to control.	This is slightly harder to choose one for me. Calling crime a beast makes it seem more powerful than good. And it should not be like that because good should overpower bad...But good can overpower bad so it should not be called a beast...
Praising Intelligence	Praising Effort
If you're told you are smart you are willing to try harder things...	...but also if you are told your effort is noticed it could lead to harder tasks as well just at a slower rate.
If the child is intelligent, he/she won't have to work hard to make it seem like a challenging task...	...while those who put effort would mean they are persistent and mentally challenged.
A challenging task obviously would seem to require harder work however that could require either thinking critically (intelligence)...	[A challenging task obviously would seem to require harder work] ...or more effort.
...but also they are kids so they might want to be 'the best' in something.	I feel like it is important to praise effort...

Discussion

Some possible explanations for these trends are:

- The topics of several studies were easily understood or it was easy to generate alternative outcomes
 - For two studies, a significant minority of participants listed alternative outcomes. This suggests that it is reasonable to strive to cultivate consideration of alternative hypotheses in a college psychology classroom.
 - For one study (change vs keep answer) reasons for two different alternatives were widespread, but did not occur on an individual basis. This suggests that class discussions of the issue would lead individuals to consider both outcomes.

The trends found here will inform how to prompt for alternative reasoning in future research. We hope to look at whether prompting for plausible vs. implausible outcomes impacts confidence in an initial outcome.

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