Bayesian Statistics Workbook

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1 Bayes' Rules

1.1 Buidling up to Bayes' Rule

Excercise 1. *Comparing the prior and posterior*
For each scenario below, you're given a pair of events, A and B. Explain what you believe to be the relationship between the posterior and prior probabilities of B: $P(B|A) > P(B)$ or $P(B|A) < P(B)$

a) A = you just finished reading Lambda Literary Award-winning author Nicole Dennis-Benn's first novel, and you enjoyed it! B = you will also enjot Benn's newest novel.

b) A = it's 0 degrees Fahrenheit in Minnesota on a January day. B = it will be 60 degrees tomorrow.

c) A = the authors only got 3 hours of sleep last night. B = the authors make several typos in their writing today.

d) A = your friend includes three hashtags in their tweet. B = the tweet gets retweeted.

Solution

a) **Answer**: $P(B|A) > P(B)$

- The prior probability, $P(B)$: The general probability that I will enjoy Benn's newest novel before reading her first one.
- The posterior probability, $P(B \mid A)$, The updated probability that I will enjoy Benn's newest novel after I have read and enjoyed her first one.

The event A is positive evidence that provides a reason to increase your belief in event B. Since I had a favorable experience with the author's work, my updated belief (the posterior) is stronger and therefore higher than your initial belief (the prior).