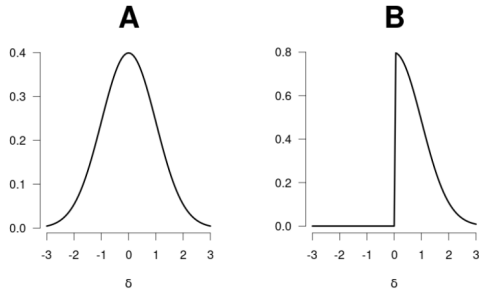
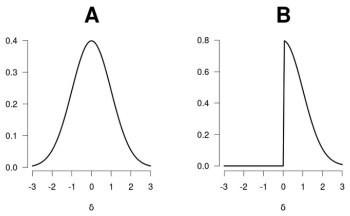
Open-ended question (part 1)
Consider a scenario where a Bayesian t-test is conducted to investigate the effect of a so-called "smart pill". The researcher in question wants to analyze this effect by administering the pill to 20 participants, and administering a placebo to 20 participants. Before they do any data analysis, they consider the two possible models below (a two-sided model and a positive one-sided model) that can be used as the alternative model in a hypothesis test.

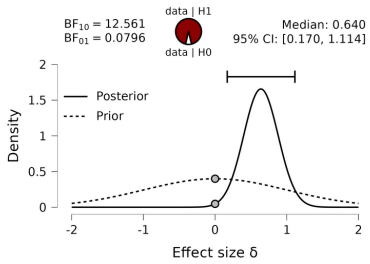


If we observe an effect size of 1, which of these two models will obtain a higher Bayes factor in its favor, when compared to the null hypothesis? *(1 point)*
Explain briefly why. *(1 point)*

Open-ended question (part 2)
Consider a scenario where a Bayesian t-test is conducted to investigate the effect of a so-called "smart pill". The researcher in question wants to analyze this effect by administering the pill to 20 participants, and administering a placebo to 20 participants. Before they do any data analysis, they consider the two possible models below (a two-sided model and a positive one-sided model) that can be used as the alternative model in a hypothesis test.



The researcher continues with alternative model A and obtains the prior/posterior plot below for their observed data.



Help the researcher interpret the Bayes factor and credible interval:
- What does this Bayes factor mean, and what does it imply here in terms of evidence for/against the null and alternative hypothesis? *(2 points)*
- What does the 95% credible interval mean? *(1 point)*

Answer key

1a (1 point)
Model B will obtain a higher Bayes factor in its favor

1b (1 point)
Key-words (any one of these, or a combination, is good)
- parsimony
- model B makes a more specific/targeted prediction
- model B only bets on positive values, and the observation is positive

2a (1 point)
The data are 12.561 times more likely under H1 (alternative) than under H0 (null)
OR
The data are 0.0796 times more likely under H0 (null) than under H1 (alternative)

2b (1 point)
The Bayes factor here indicates strong evidence in favor of the alternative hypothesis, or against the null hypothesis

2c (1 point)
The 95% credible interval means that, if the alternative model is true, there is 95% probability that the true effect size (delta) is between 0.17 and 1.114