Sensometrics 2020

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# How to Conduct Business Relevant Difference Testing

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Video and Additional Resources: https://bit.ly/346rdbc

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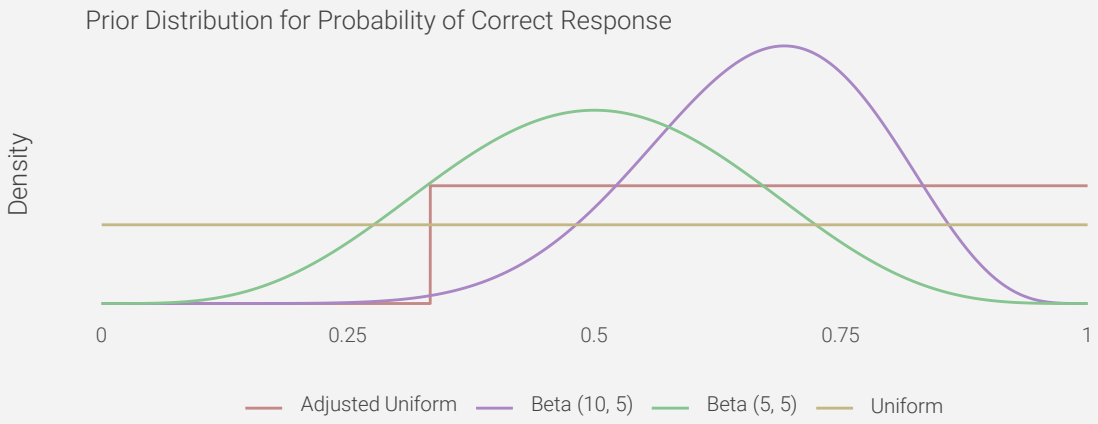
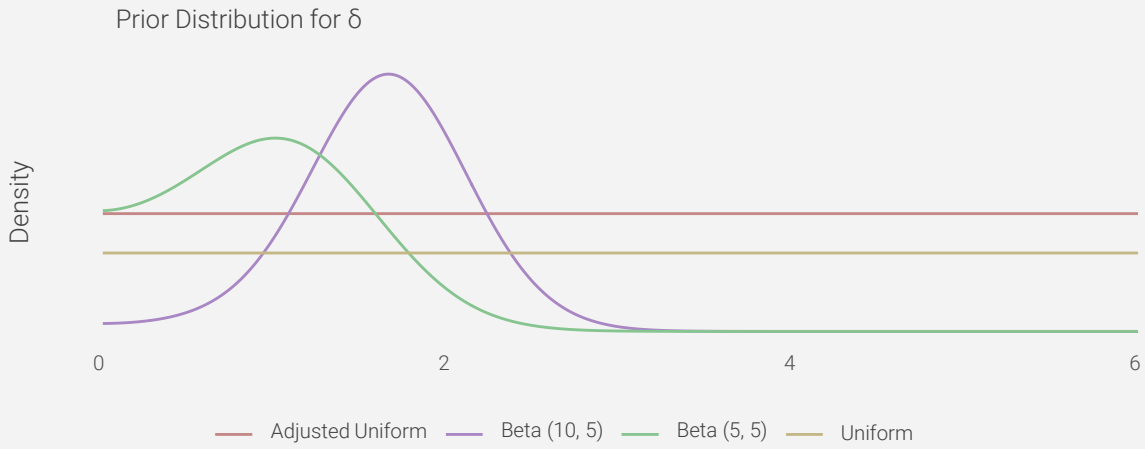
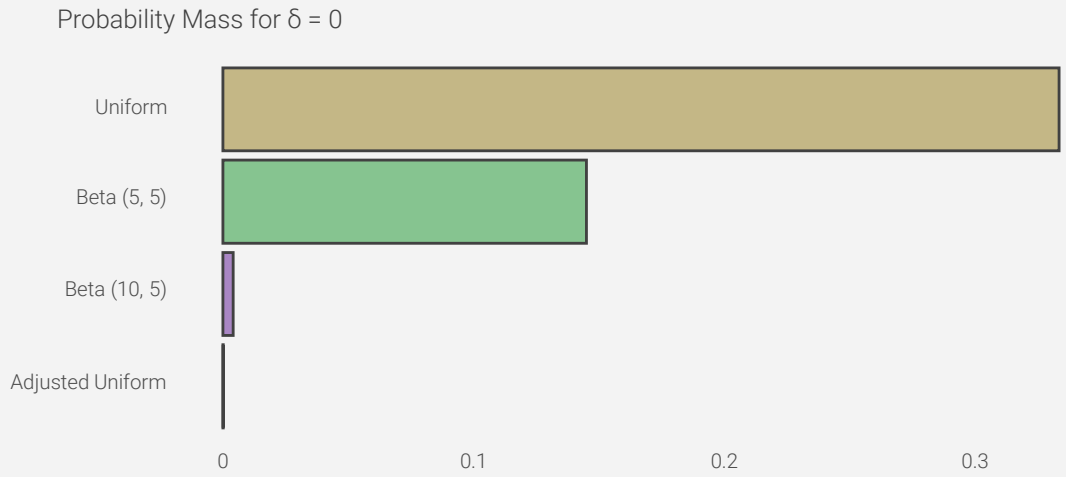
# Background and Challenge

- Bayesian approaches to sensory difference testing typically begin with probability of correct response:
  - Psychometric function provides link to δ
  - Prior distributions for δ may not be realistic
  - Possibility that δ = 0 may be overstated



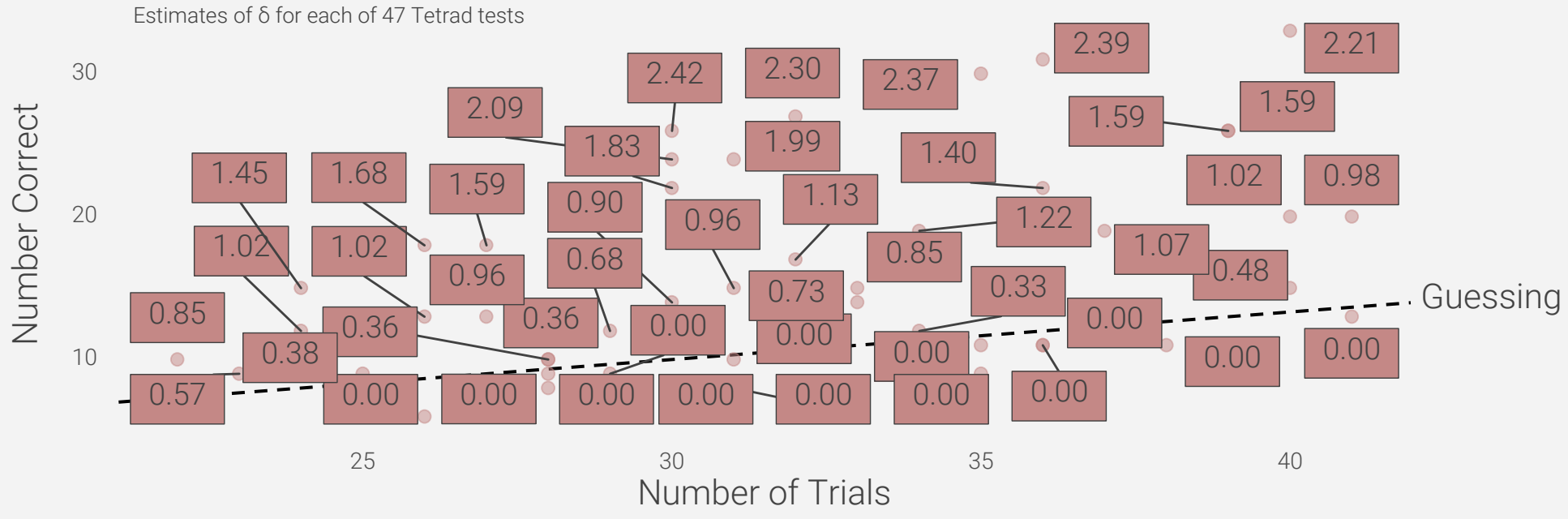




- Through a numerical Bayesian approach, we form prior distributions starting with δ:
  - Possibility of δ = 0 no longer overstated
  - Historical testing results can be used to create the prior

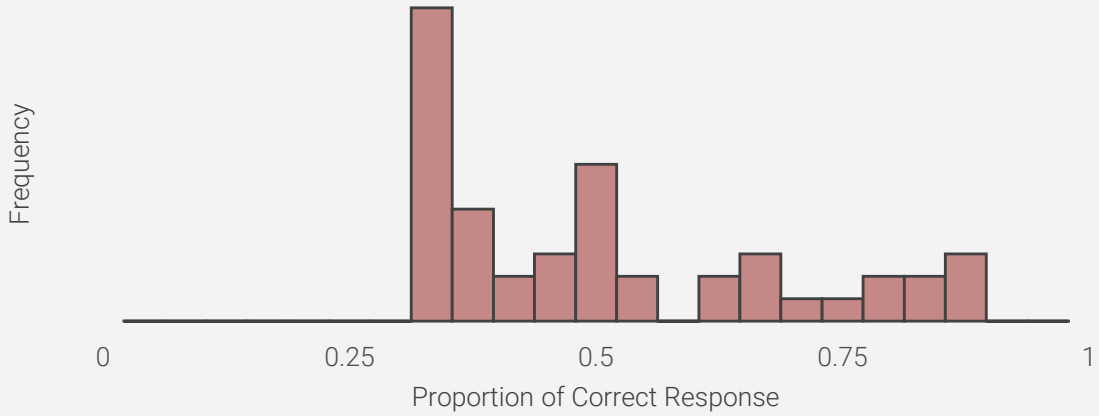
# Scenario

- You conduct a Tetrad test for sparking fruit juice beverage samples:
  - 16 out of 31 correct, p-value = 0.027, estimate of δ = 1.08
  - 95% confidence interval for δ is (0, 1.70)
- Your internal action standard is set at δ = 1.5, so the samples fail
- However, within this category, you have 47 previously completed Tetrad tests
  - Is there something more informed you could do with your analysis?

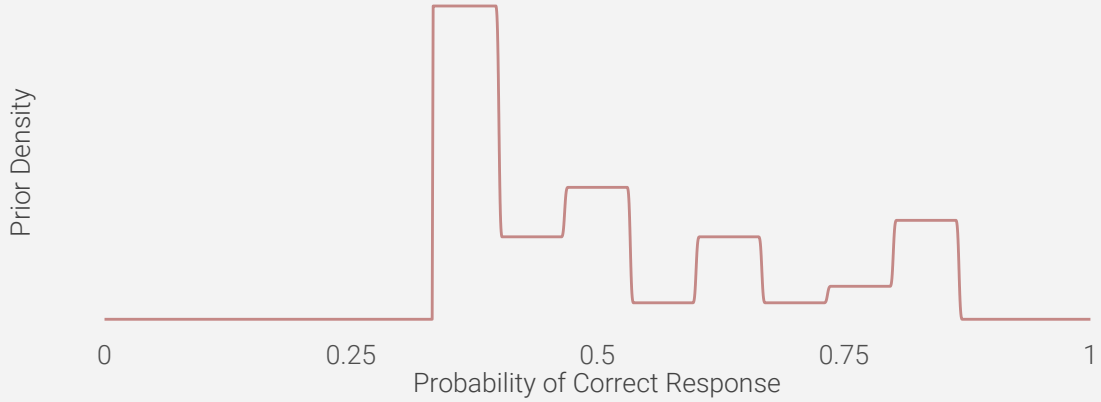


# Numerical Bayesian Approach

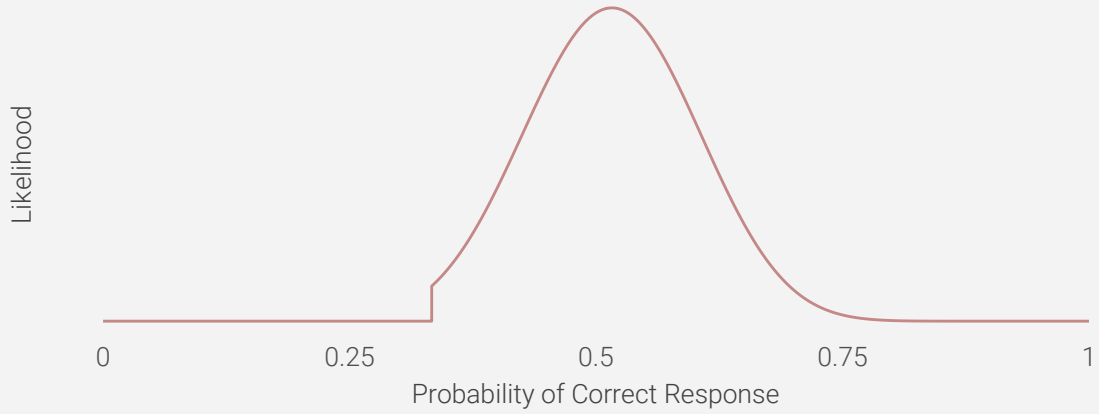
A: Historical Proportions of Correct Responses from 47 Tetrad tests



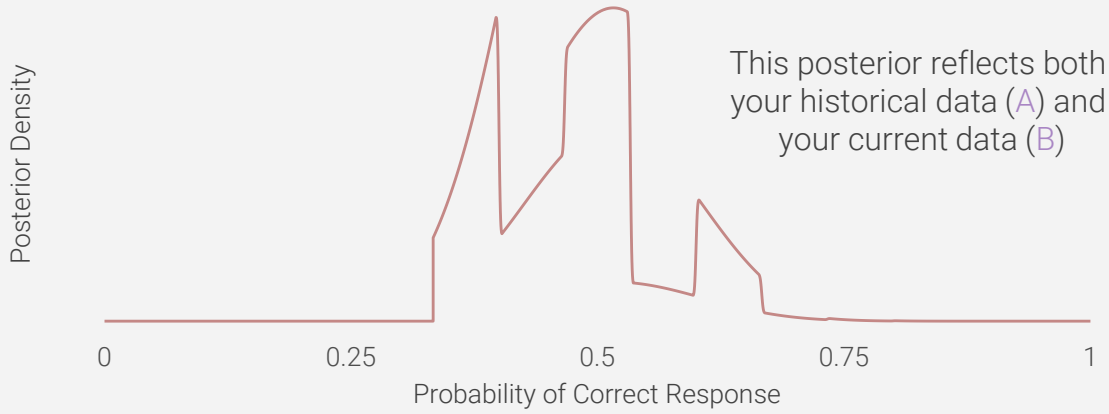

Numerical Prior Distribution for Probability of Correct Response




B: Likelihood of Observed Data (16 of 31 correct)

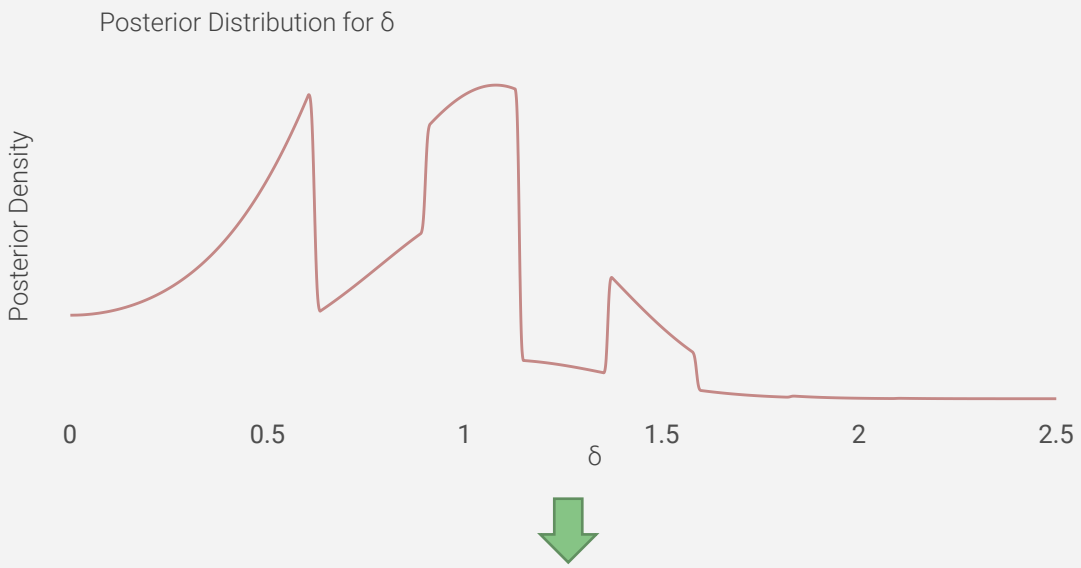


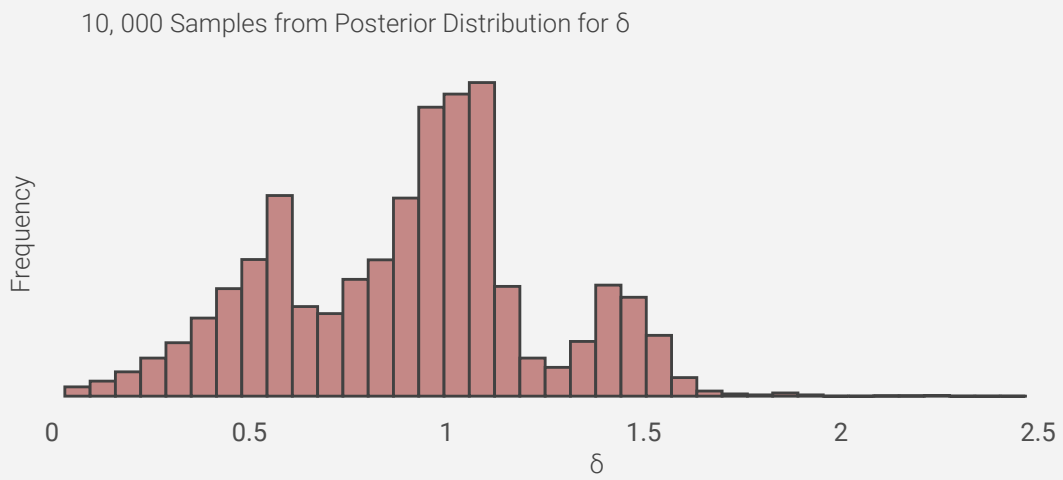

Numerically Updated Distribution for Probability of Correct Response




This posterior reflects both your historical data (A) and your current data (B)

# Interpretation and Conclusion




- You obtain the posterior distribution for δ and simulate a posterior frequency distribution for δ:
  - One-tailed credible interval of (0, 1.48)
  - Highest density credible interval (HDI) of (0.32, 1.58)
  - Compare with the 95% confidence interval of (0, 1.70)

## Conclusion

- You have quantified your belief about δ, informed by your experience and current data:
  - This richer understanding helps guide informed risk analysis
  - You might now approve the sample, depending on context

Please visit https://bit.ly/346rdbc for:

- References
- Link to video
- Contact information
- Code used in this poster
- Q&A follow up
- And more!