

Quality of science: Are jurors equipped to discriminate good and bad science?

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Science in the Courtroom

- National Academy of Science Report
- Two important gaps that needed attention:
 1. Clearer standards
 2. Evaluating specific methods to determine if they are scientifically established as valid and reliable
- Recommendations on actions to strengthen forensic science

Science in the Courtroom

- Low quality science is entering the courtroom
- Jurors are expected to accurately evaluate the evidence



Evidence Comprehension

- Teaching based efforts
- Flawed experiment vs. well designed experiment
- Cross-examination - informative vs not informative

Current Study

- Preliminary study for evidence comprehension
- Complicated types of evidence
 - mtDNA
- Research Question: Are jurors sensitive to the quality of mtDNA evidence?

Procedure

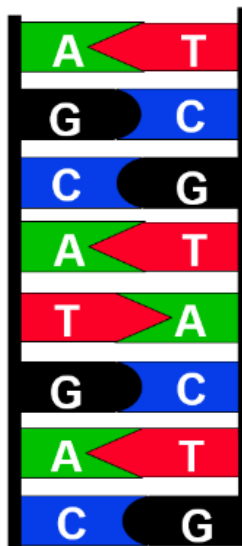
- Vignettes*
- Conditions (between-subjects)
- Verdict
- Evidence Comprehension

*Case and materials from Hans, Kaye, Dann, Farley, & Albertson (2011)

Vignettes

- State v. Kevin Jones
 - Bank robbery case
 - Expert witness on mitochondrial DNA

What is DNA?



- DeoxyriboNucleic Acid
- found in most cells
- two strands form a twisted ladder
- ladder rungs made of pairs of “**bases**”-- building blocks of DNA
 - 4 bases -- G, C, A, T
- **order** of bases is important
 - 123-1234 vs. 321-4321

Conditions

- Fraction of population excluded from mtDNA
- 2 Conditions
 - High Quality
 - Low Quality

Conditions

- High Quality:
 - 1 out of every 24,286 Caucasians
 - 99.996% of all Caucasians would be excluded
- Low Quality:
 - 1 out of every 129 Caucasians
 - 99.22% of all Caucasians would be excluded

Responses

- Participants were asked to give the following:
 - Verdict - Guilty or Not Guilty
 - Rating of the scientific quality of the mtDNA evidence

Hypothesis

Jurors will be unable to distinguish high- from low-quality DNA evidence.

High-quality DNA Evidence = Low-quality DNA Evidence

Participants

- N = 346
- Jury-eligible
- Amazon Mechanical Turk

Data Analysis

- Analyzing the null hypothesis
- Bayesian Modeling

$$\textit{Prior} + \textit{Data} = \textit{Posterior}$$

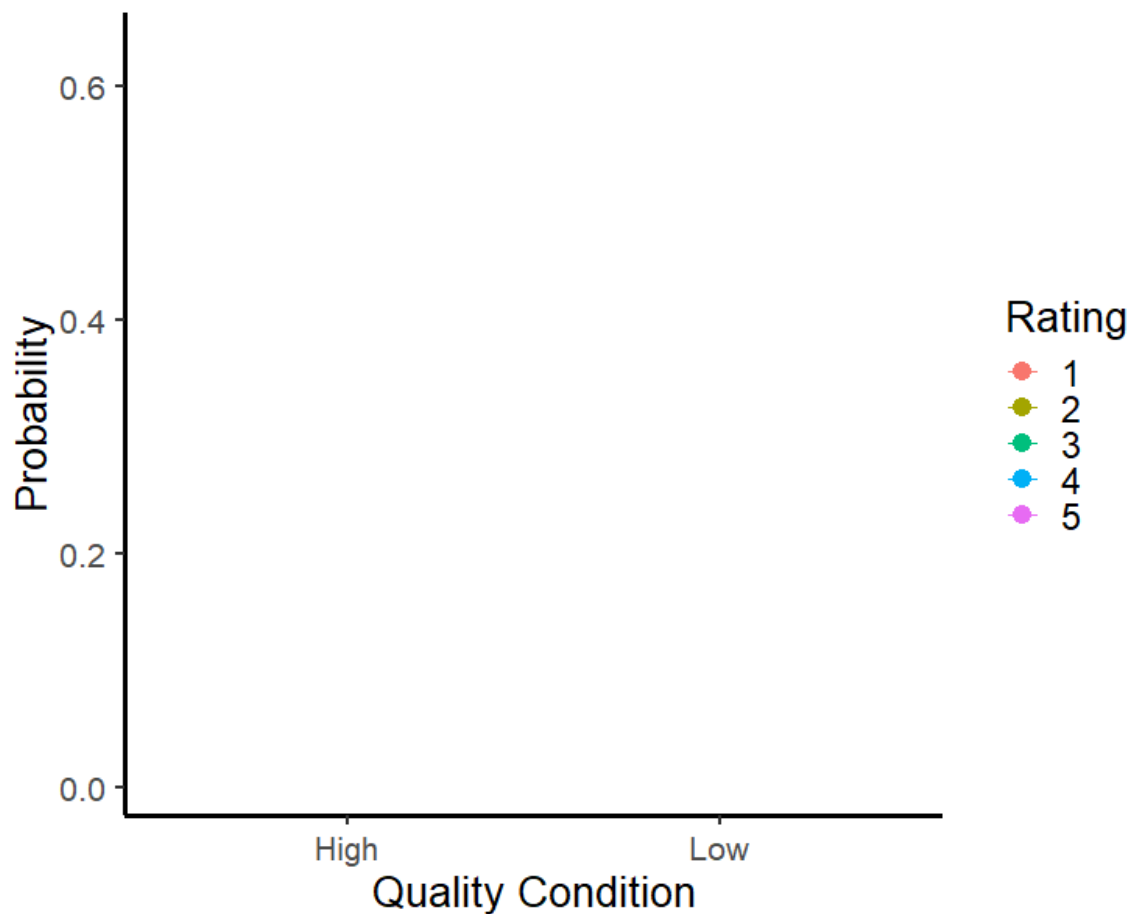
Data Analysis

- Bayes Factors
- A Bayes Factor of X means that the null hypothesis is X times as probable as an alternative hypothesis.

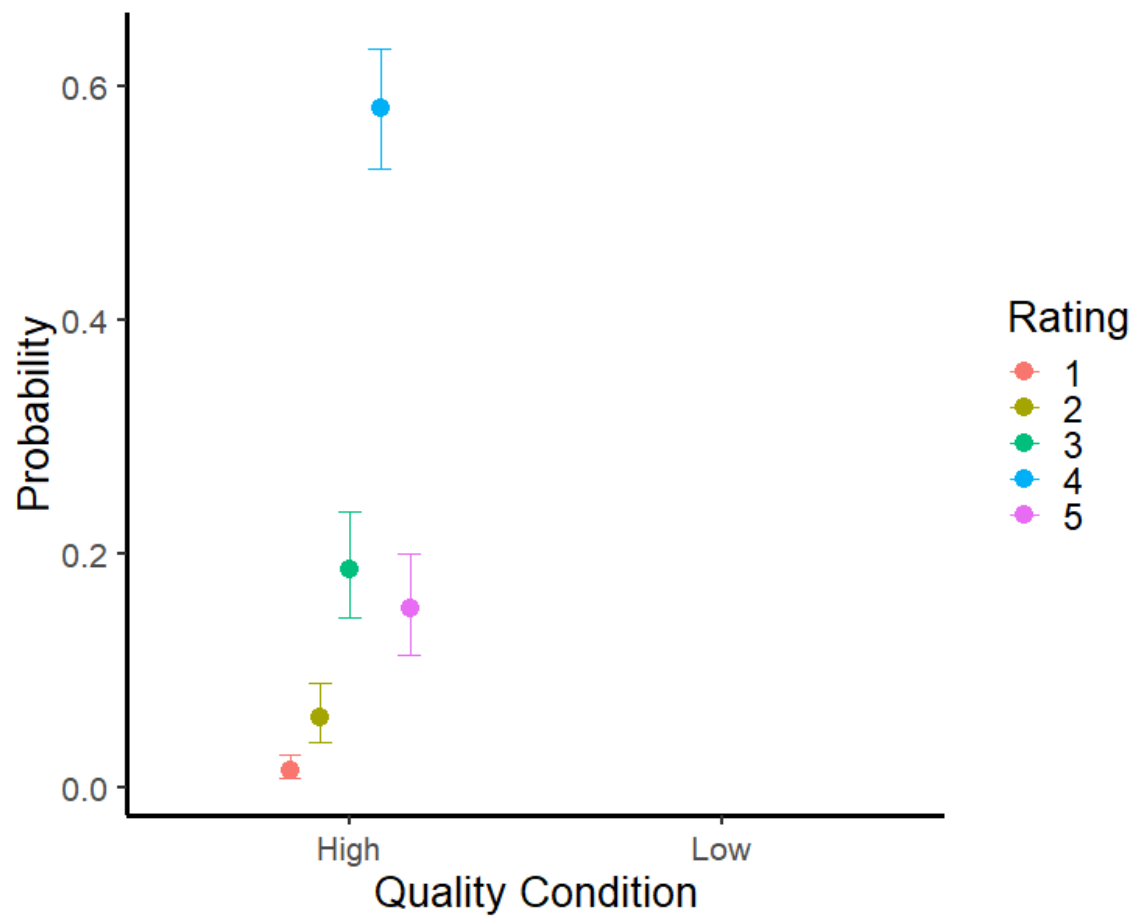
Results

- Variety of models used
- $4 < BF < 8$
- Null hypothesis is 4-8 times as likely as an alternative

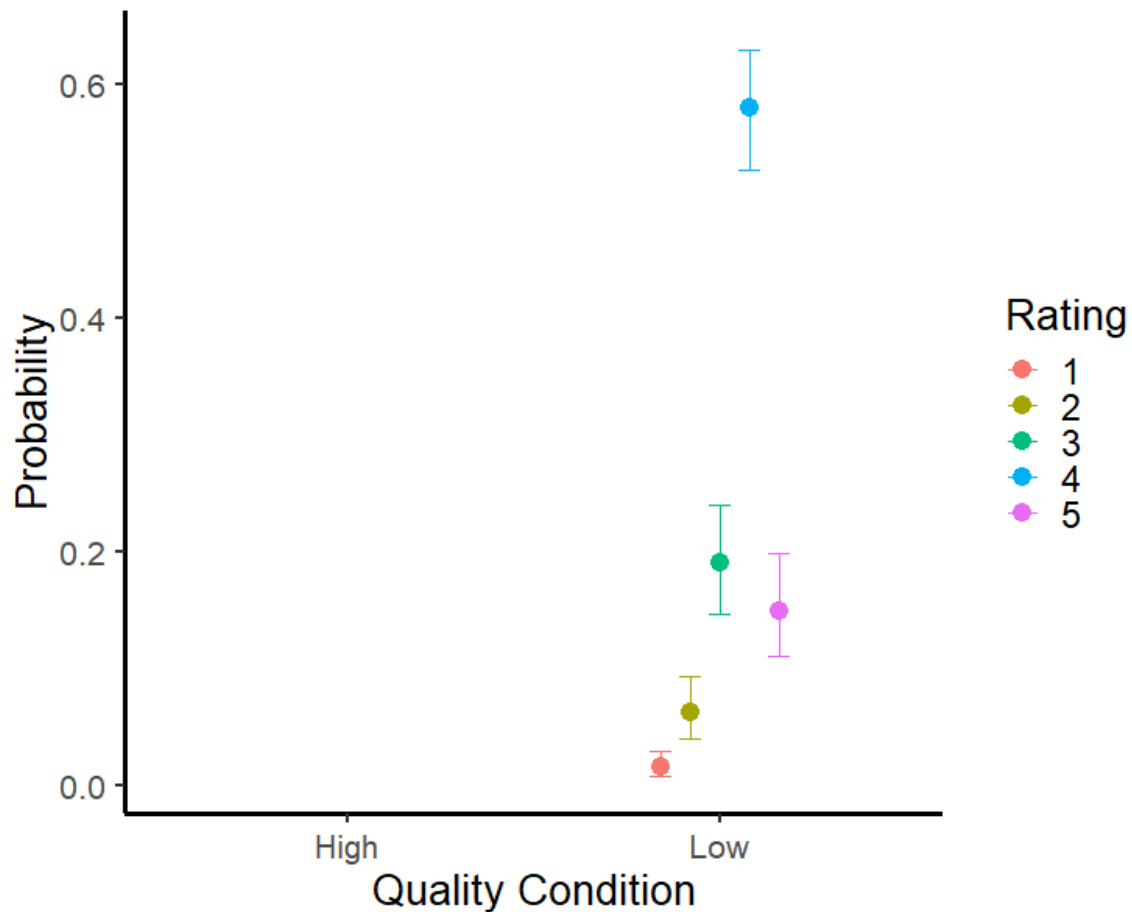
Response Predicted by Quality Condition



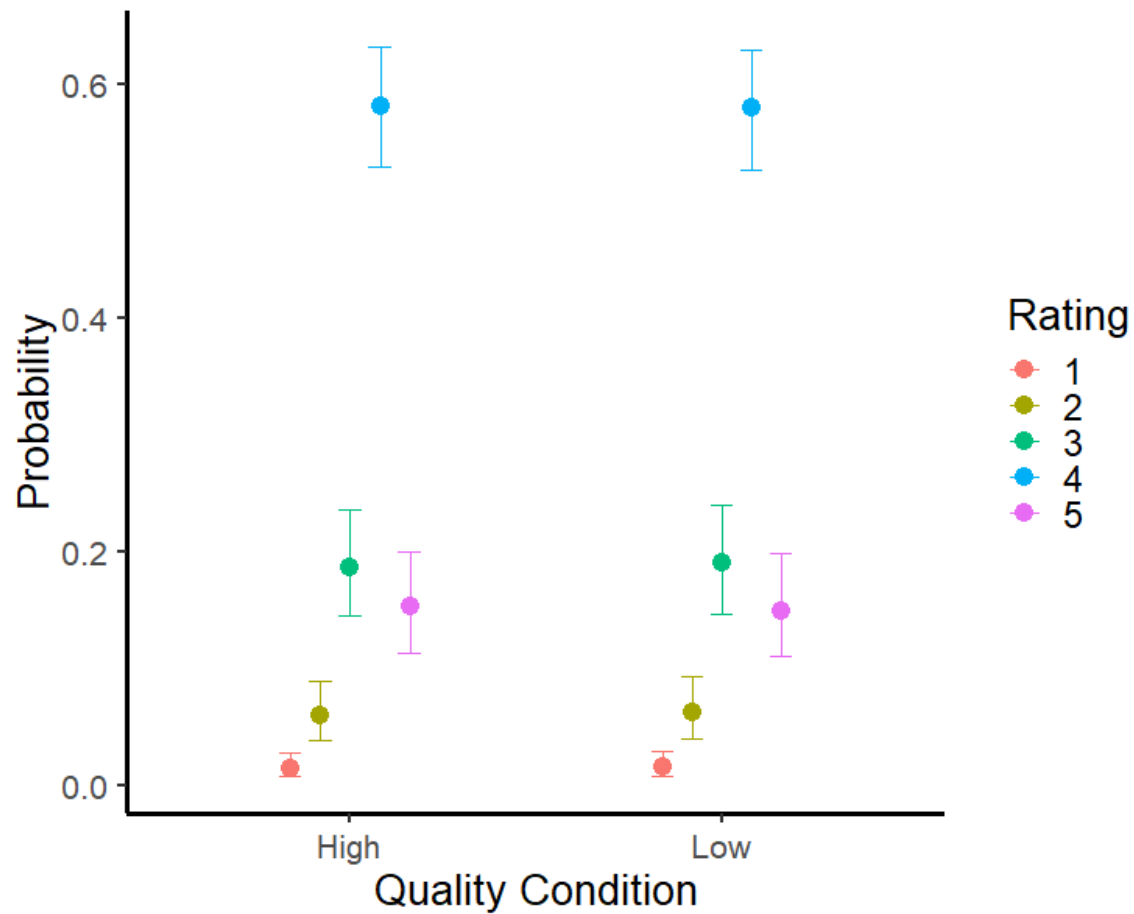
Response Predicted by Quality Condition



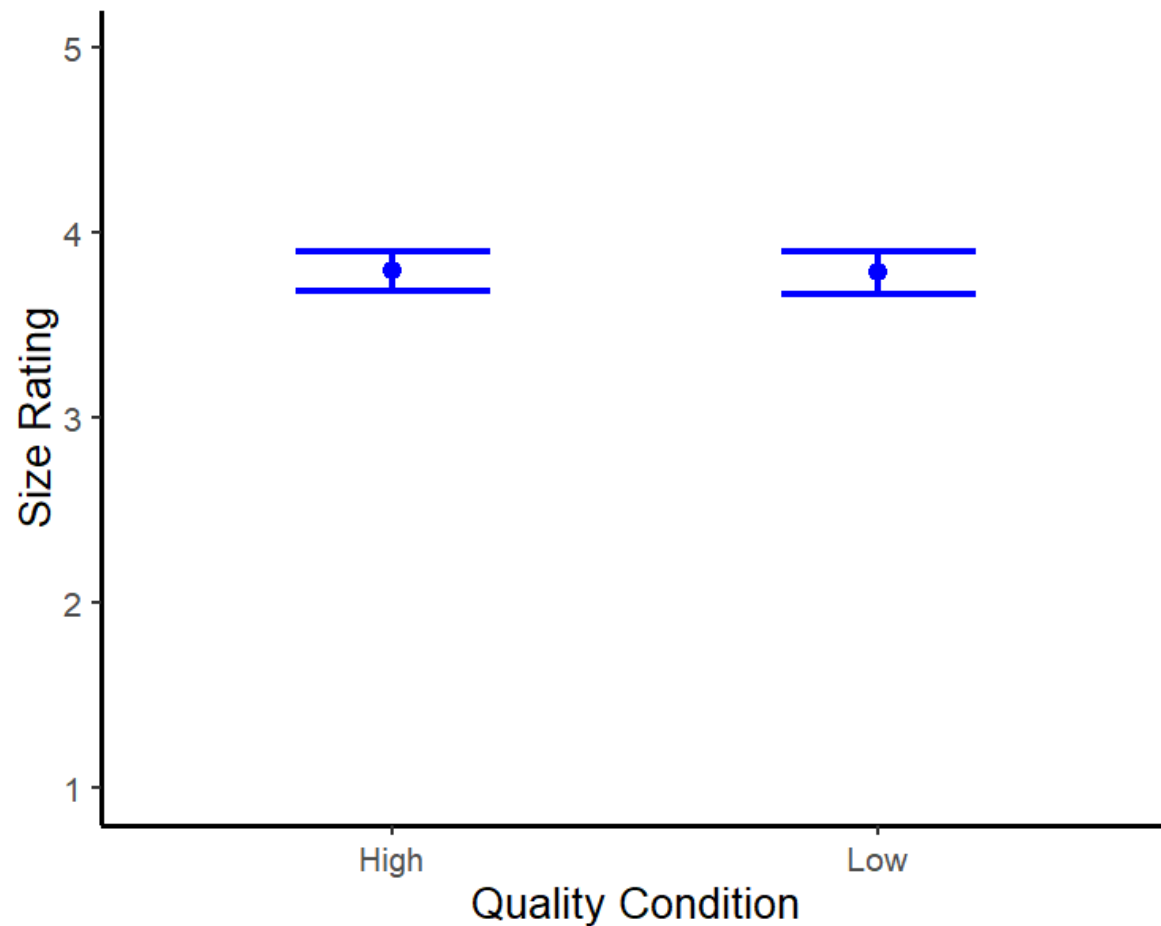
Response Predicted by Quality Condition



Response Predicted by Quality Condition



Response Predicted by Quality Condition



Discussion

- Jurors have trouble comprehending evidence quality with complicated types of evidence
- Implications for weight given to evidence



Future Directions

- Ways of presenting DNA evidence to help jurors calibrate their decisions
- Larger sample sizes
- Filmed mock jury trial



Future Directions

- Jury deliberation component
 - Group decisions about evidence quality
- What aspects of evidence do jurors focus on?
- Are they accurate when discussing and recalling scientific evidence?



Questions?

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