

Predictors of Jurors' Understanding of Evidence Strength

Kristen McCowan, Emily Denne, Annelisse Velazquez, Robin Milligan, Emily N. Line, Tess M.S. Neal, Sarah J. Gervais, Brian H. Bornstein, & Kimberly S. Dellapaolera



Funded by NSF Grant #1733961

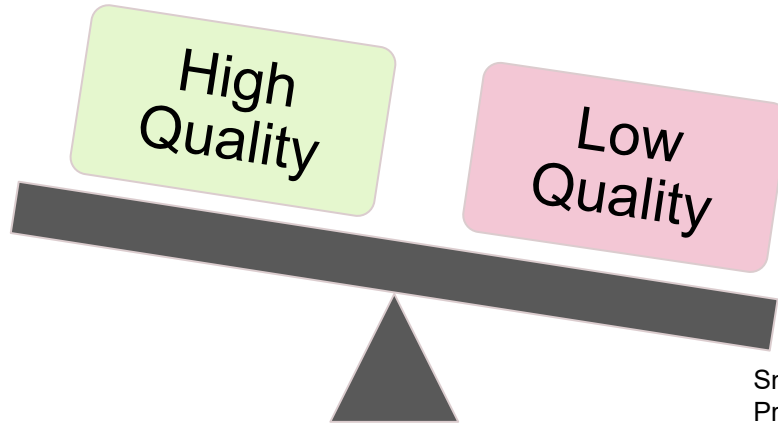
Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.



UNIVERSITY of NEBRASKA
LINCOLN

Science in the Courtroom

- Standards for scientific evidence
 - Reliable & Valid



Smithburn, 2004

President's Council of Advisors on Science and Technology, 2016

Evidence Comprehension

Can jurors differentiate evidence quality?

- Mixed results

 - ✓ Strong vs. Weak evidence¹

 - ✗ General scientific understanding^{2,3}

- Individual differences⁴

1. Smith, Bull, & Holliday, 2011
2. McAuliff, Kovera, & Nunez, 2009
3. Gray & Mandel, 1994
4. Coutinho, 2006

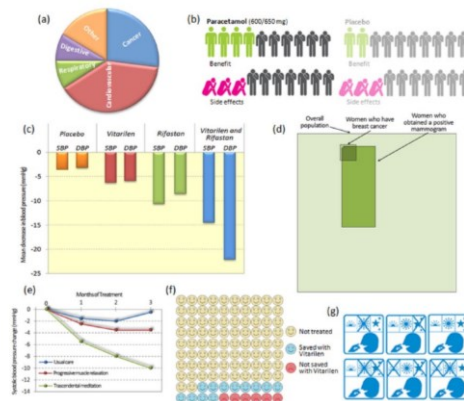
Fuzzy Trace Theory & Visual Aids

Verbatim

Word for word,
Specific information/
representation

Gist

Bottom line,
Summary



Improved risk assessment & decision-making



Reyna & Brainerd, 1995
Reyna & Lloyd, 2006
Brainerd, Reyna, & Poole, 2000
Reyna, 2015
Garcia-Retamero & Cokely, 2017

Current Study

Are jurors able to
differentiate
between High vs.
Low quality
science?

Do safeguards
help jurors be
better calibrated
to the strength of
evidence and
understand the
scientific
evidence better?

Do individual
differences affect
jurors'
understanding of
scientific
evidence?

Design

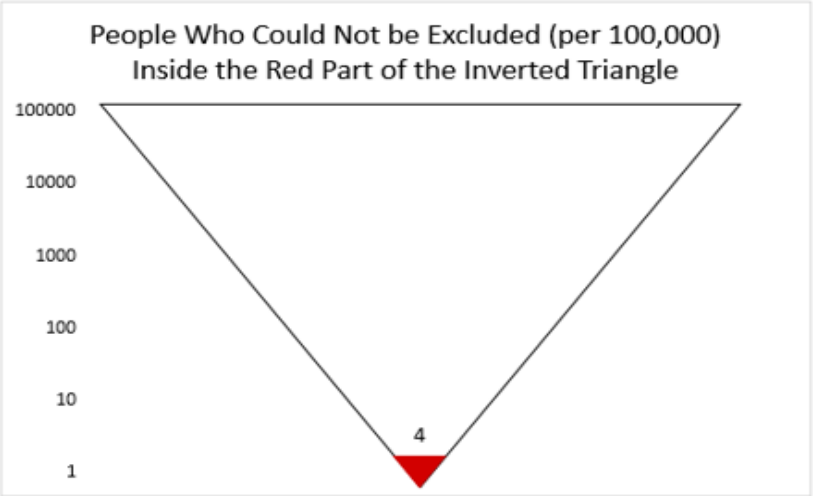
Visual & Gist Aids

Quality of
scientific
evidence

		With Decision Aids	No Decision Aids
Quality of scientific evidence	High	High quality, with aids	High quality, no aids
	Low	Low quality, with aids	Low quality, no aids

Design

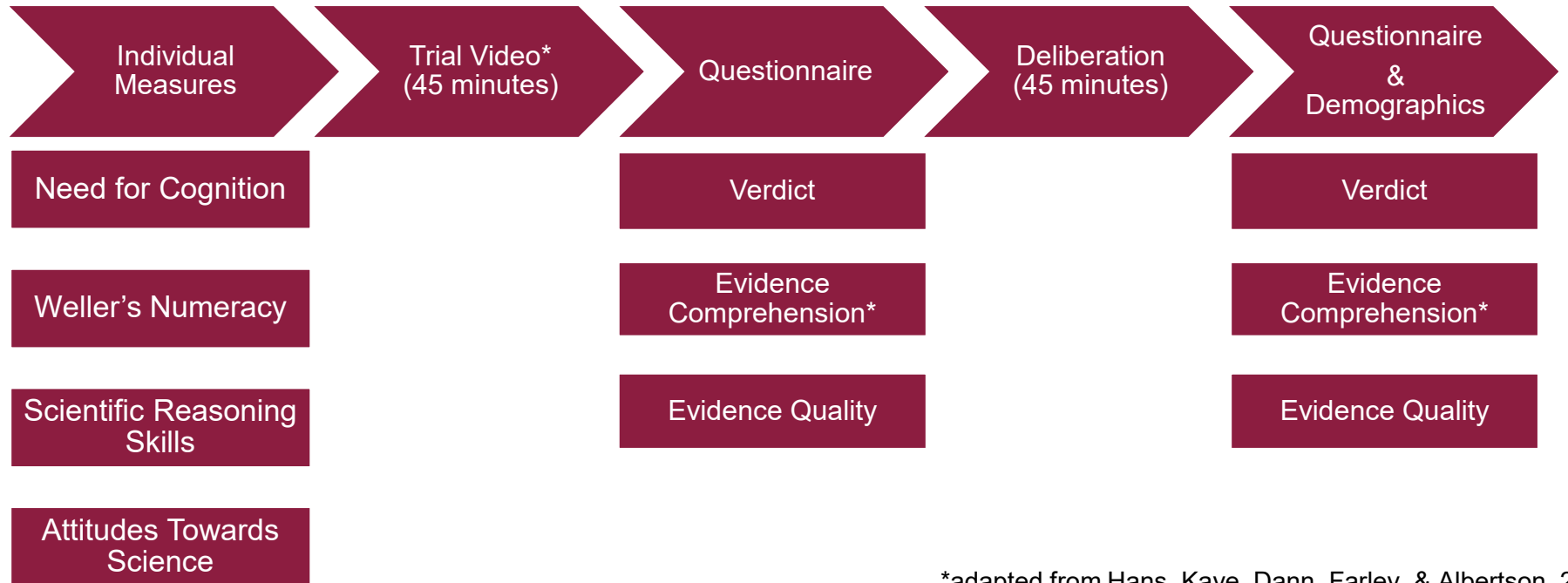
Visual & Gist Aids



Quality of
scientific
evidence

	With Decision Aids	No Decision Aids
High	High quality, with aids	High quality, no aids
Low	Low quality, with aids	Low quality, no aids

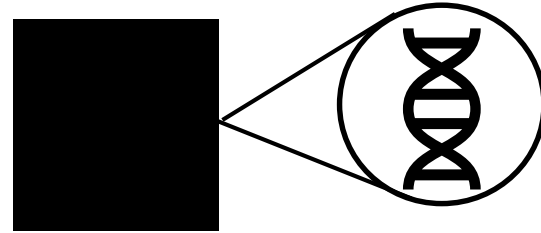
Procedure



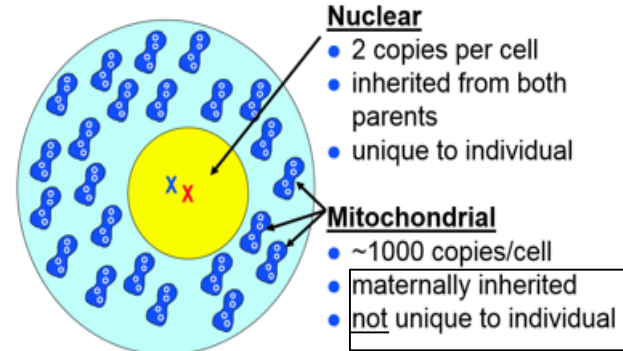
*adapted from Hans, Kaye, Dann, Farley, & Albertson, 2011

Trial Video

Kevin Jones



Sources of DNA



Condition – Evidence Quality

High

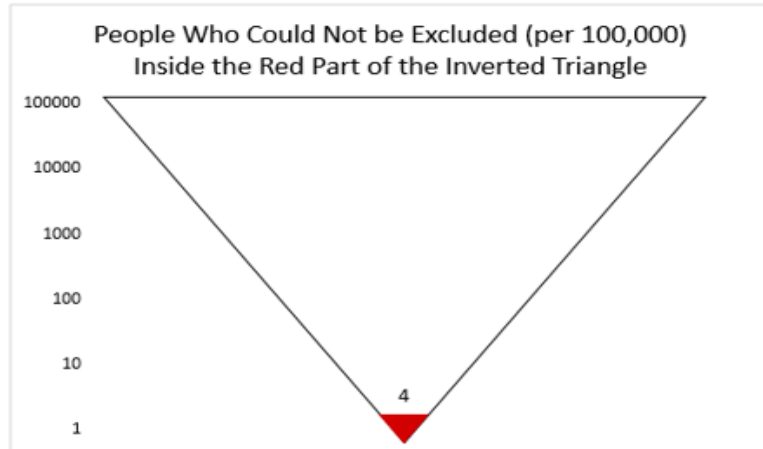
- Database: 24,285
- 1 out of 24,286 Caucasians would have that DNA
- 99.996% would be excluded
 - 12 could not be excluded

Low

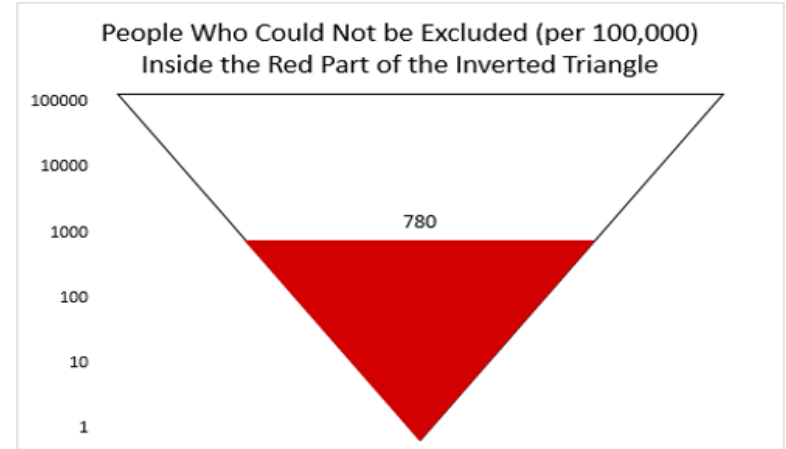
- Database: 128
- 1 out of 129 Caucasians would have that DNA
- 99.22% would be excluded
- 2,248 could not be excluded

Condition - Visual & Gist Aids

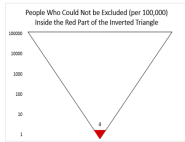
High



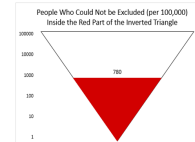
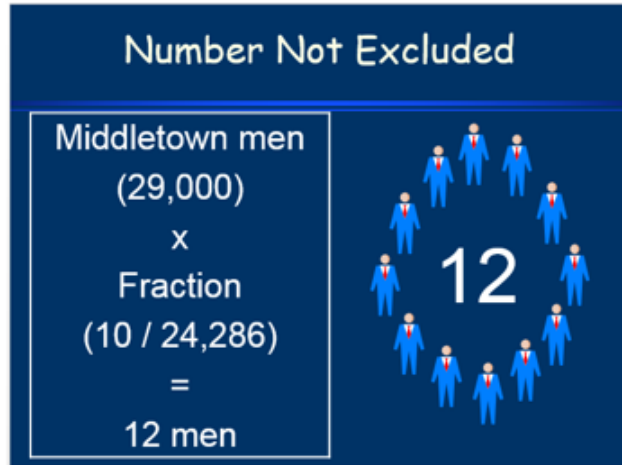
Low



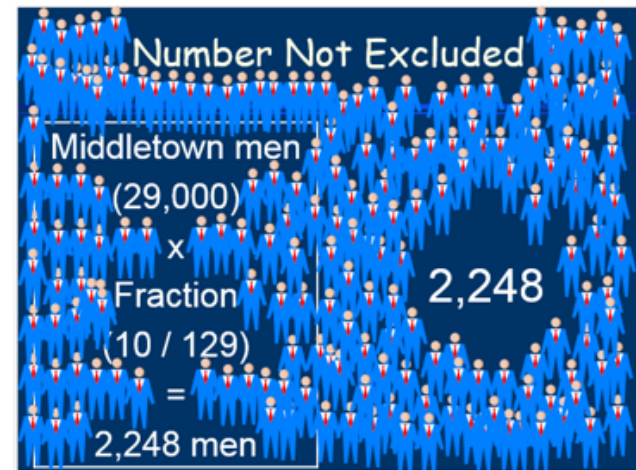
Condition - Visual & Gist Aids



High

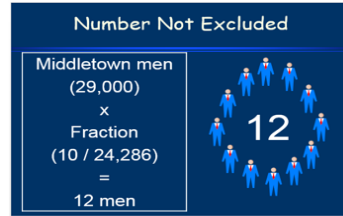
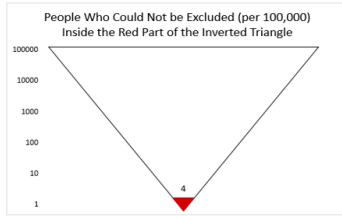


Low



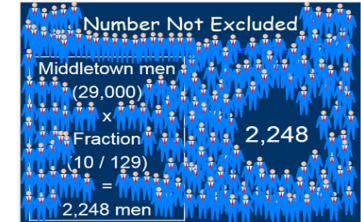
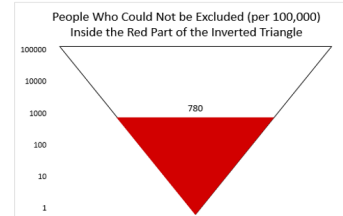
Condition - Visual & Gist Aids

High



Those odds are similar to a person's chances of being any particular Starbucks customer at a busy store in a given month

Low



That's more people than the number of people who drink coffee daily at any given Starbucks location

Questionnaires

1. Rating of the scientific quality of the mtDNA evidence
2. Rating of the expert credibility
3. Scientific Evidence Comprehension*
 - 20 T/F questions
 - “A person’s mtDNA comes from both the mother and the father.”

Individual Measures

Need for
Cognition¹

"I would prefer complex to simple problems."
1 = *Extremely Uncharacteristic*, 5 = *Extremely Characteristic*

Weller's
Numeracy²

"Imagine that we roll a fair, six-sided die 1,000 times. Out of 1,000 rolls, how many times do you think the die would come up as an even number?"

Scientific
Reasoning
Skills³

"A researcher finds that American states with larger parks have fewer endangered species. True or False? These data show that increasing the size of American state parks will reduce the number of endangered species."

Attitudes
Toward
Science⁴

"Science and technology are making our lives healthier, easier, and more comfortable."
1 = *Strongly Disagree*, 4 = *Strongly Agree*

1. Cacioppo et al., 1984

2. Weller et al., 2012

3. Drummond and Fischhoff's 2015

4. National Science Board, 2004; 2006

Pre-registered Hypotheses

H1: Evidence quality and decision aid will interact to predict calibration.

Decision Aid → Better calibration

Pre-registered Hypotheses

H1: Evidence quality and decision aid will interact to predict calibration.

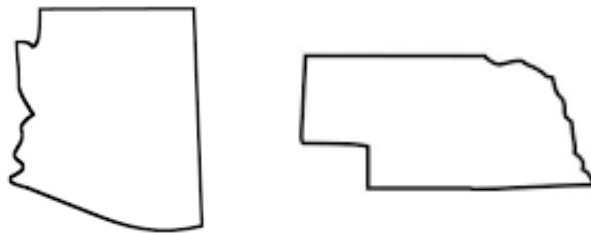
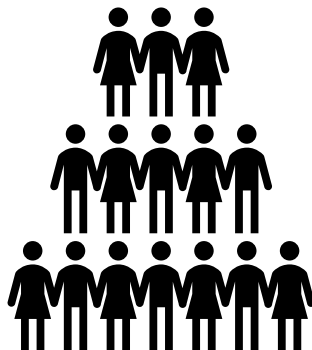
Decision Aid → Better calibration

H2: Individual differences would influence jurors' understanding of scientific evidence.

Better scientific reasoning
& cognitive skills → Better calibration & scientific understanding

Participants

- N = 466, 57% female, $M_{\text{Age}} = 37.5$
- Community members
 - Fliers, bus stops, public school district staff boards, State Farm, Craigslist
- Jury-eligible
 - 18+
 - U.S. citizen
 - Never convicted of a felony



Results: Jurors' calibration to evidence

- Evidence Quality x Decision Aid ✕
- Main effect: Evidence Quality ✕

Questionnaires

1. Rating of the scientific quality of the mtDNA evidence

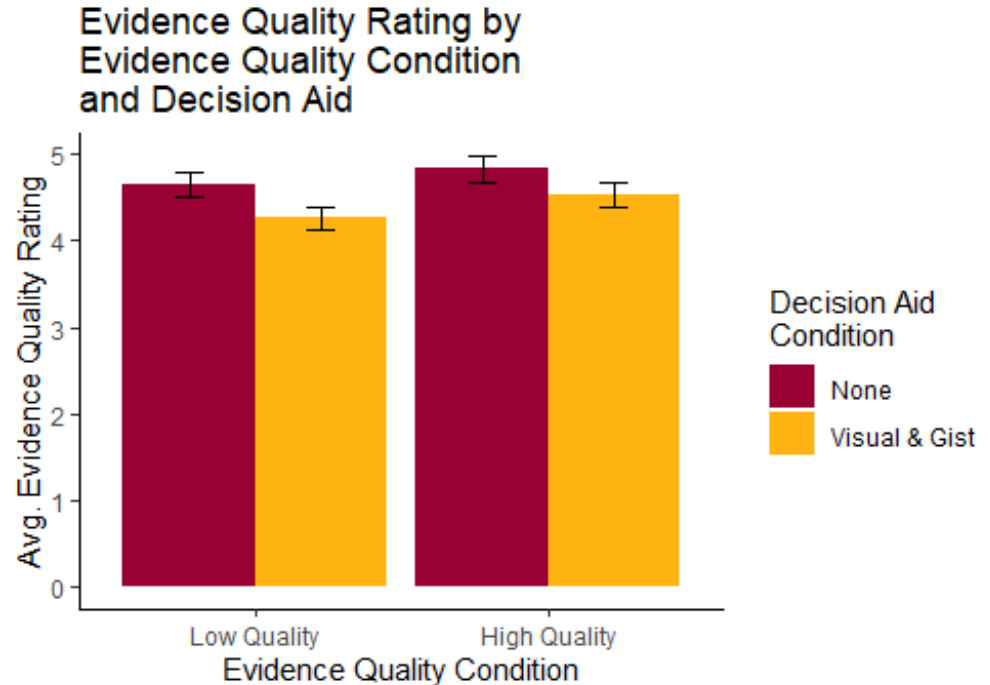
2. Rating of the expert credibility

3. Scientific Evidence Comprehension

- 20 T/F questions
- “A person’s mtDNA comes from both the mother and the father.”

Results: Jurors' calibration to evidence

- Evidence Quality x Decision Aid ✗
- Main effect: Evidence Quality ✗
- Main effect: Decision aid on the quality of expert's testimony ✓
 - $F(1, 460) = 5.48, p = .02, \eta_p^2 = .01$

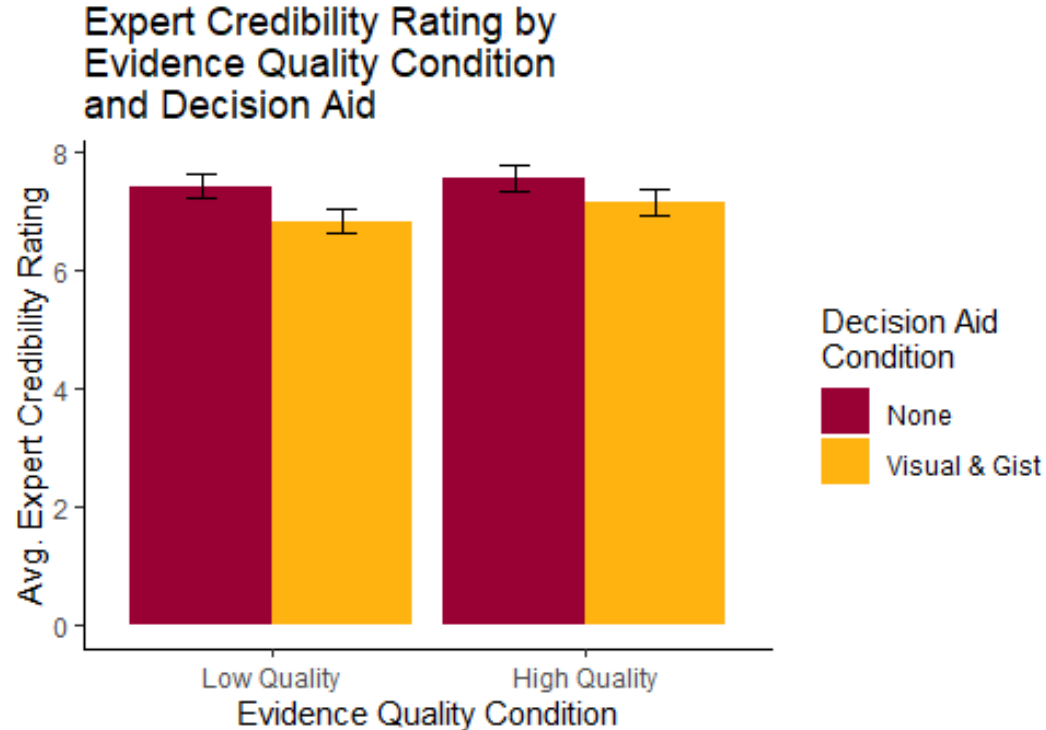


Questionnaires

1. Rating of the scientific quality of the mtDNA evidence
- 2. Rating of the expert credibility**
3. Scientific Evidence Comprehension
 - 20 T/F questions
 - “A person’s mtDNA comes from both the mother and the father.”

Results: Jurors' calibration to evidence

- Evidence Quality x Decision Aid ✗
- Main effect: Evidence Quality ✗
- Main effect: Decision aid on the quality of expert's testimony ✓
 - $F(1, 460) = 5.48, p = .02, \eta_p^2 = .01$
- Main effect: Decision aid on expert's credibility ✓
 - $F(1, 460) = 5.41, p = .02, \eta_p^2 = .01$

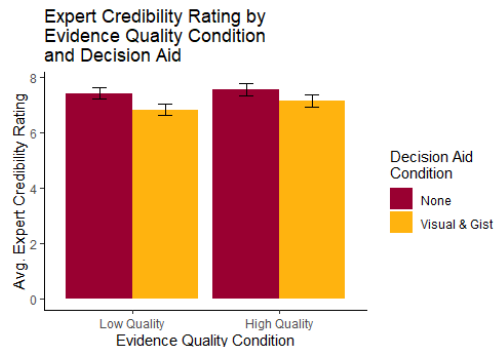
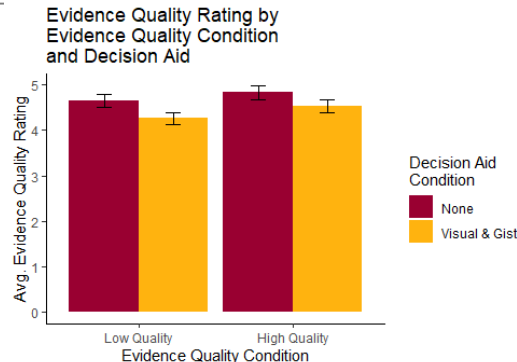


Questionnaires

1. Rating of the scientific quality of the mtDNA evidence
2. Rating of the expert credibility
- 3. Scientific Evidence Comprehension**
 - **20 T/F questions**
 - **“A person’s mtDNA comes from both the mother and the father.”**

Results: Jurors' calibration to evidence

- Evidence Quality x Decision Aid ✗
- Main effect: Evidence Quality ✗
- Main effect: Decision aid on the quality of expert's testimony ✓
 - $F(1, 460) = 5.48, p = .02, \eta_p^2 = .01$
- Main effect: Decision aid on expert's credibility ✓
 - $F(1, 460) = 5.41, p = .02, \eta_p^2 = .01$
- Juror comprehension ✗



Individual Measures

Need for Cognition

“I would prefer complex to simple problems.”

1 = *Extremely Uncharacteristic*, 5 = *Extremely Characteristic*

Weller's Numeracy

“Imagine that we roll a fair, six-sided die 1,000 times. Out of 1,000 rolls, how many times do you think the die would come up as an even number?”

Scientific Reasoning Skills

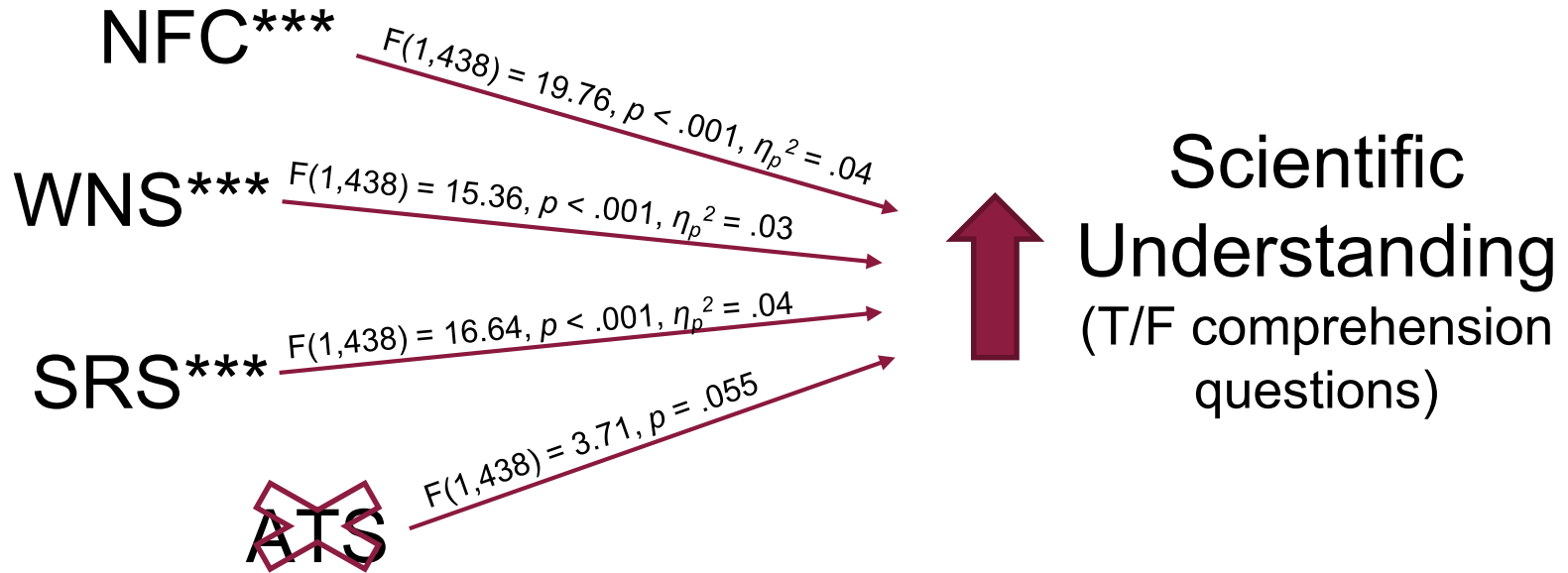
“A researcher finds that American states with larger parks have fewer endangered species. True or False? These data show that increasing the size of American state parks will reduce the number of endangered species.”

Attitudes Toward Science

“Science and technology are making our lives healthier, easier, and more comfortable.”

1 = *Strongly Disagree*, 4 = *Strongly Agree*

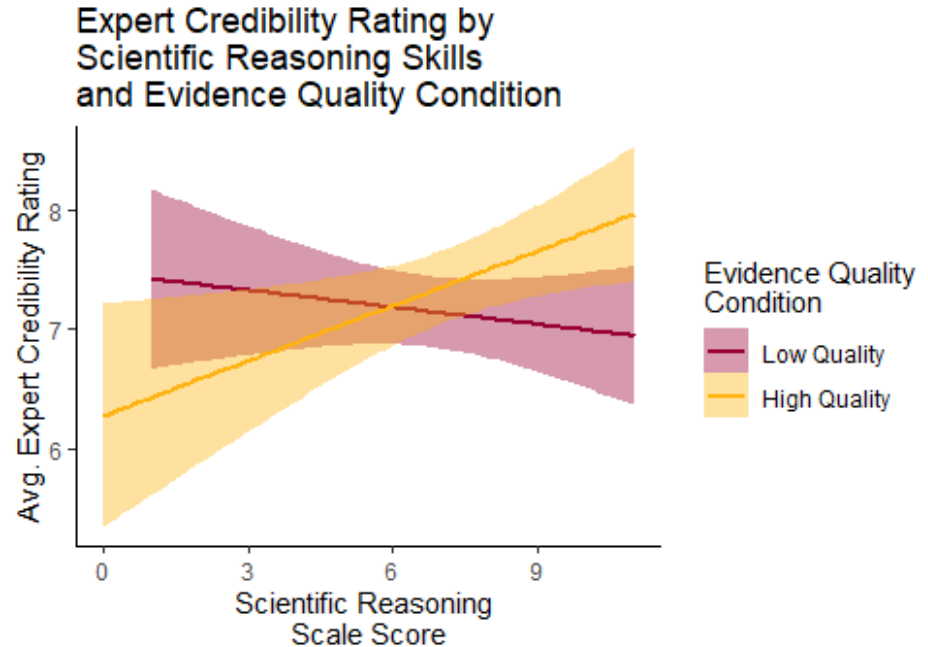
Results: Individual Measures & Comprehension



*** $p < .001$

Individual Measures & Scientific Quality

- No main effects ✕
- Evidence Quality x SRS ✓
 - DV: Expert Credibility
 - $F(1, 438) = 5.91, p = .02, \eta_p^2 = .01$



Discussion & Future Directions

- Jurors may have trouble accurately assessing scientific evidence
- Decision aids did not improve their judgments
- Need for new approaches
- Scientific reasoning skills and cognitive abilities
 - Implications for decision-making process