



OSF

# Juror Scientific Reasoning Skills and Discussion of Scientific Evidence During Deliberation

Kristen McCowan, Jake Plantz, Elizabeth Mathers, Jonathan Barcelo, and Tess M.S. Neal

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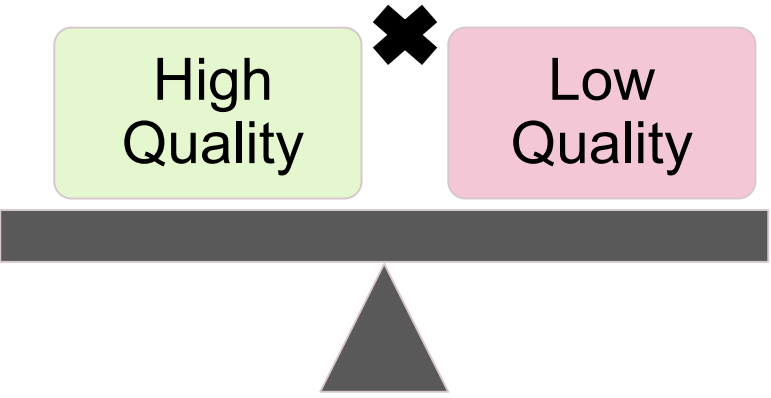
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UNIVERSITY of NEBRASKA  
LINCOLN

# Scientific Evidence

1.



2.



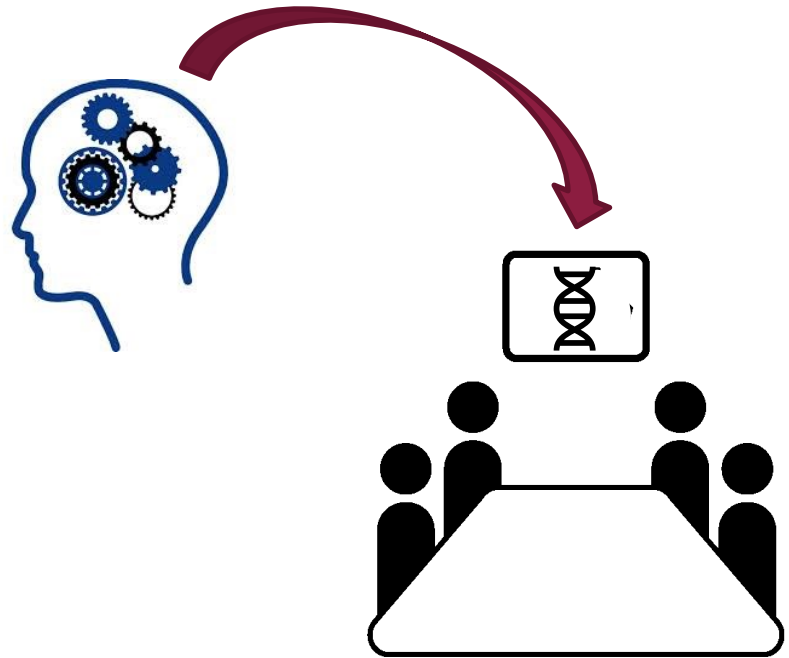
Scientific Reasoning



Scientific Understanding

# Role of Deliberation

- Importance of deliberation<sup>1,2</sup>
  - Lack of initial verdict preference<sup>3</sup>
  - Changes in verdict & monetary awards<sup>4,5</sup>
  - Correcting others & memory improvement<sup>6</sup>



Created by ProSymbols  
from Noun Project

1. Salerno & Diamond, 2010
2. Kovera, 2017
3. Hannaford-Agor, Hans, Mott, & Munsterman, 2002
4. Hastie et al., 1983
5. Schkade, Sunstein, & Kahneman, 2000
6. Pritchard & Keenan, 2002

# Current Study

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Need for Cognition

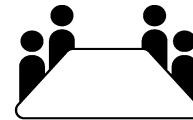
Weller's Numeracy

Scientific Reasoning  
Skills

Attitudes Toward  
Science



Scientific  
Evidence  
Discussion  
During  
Deliberation



# Design

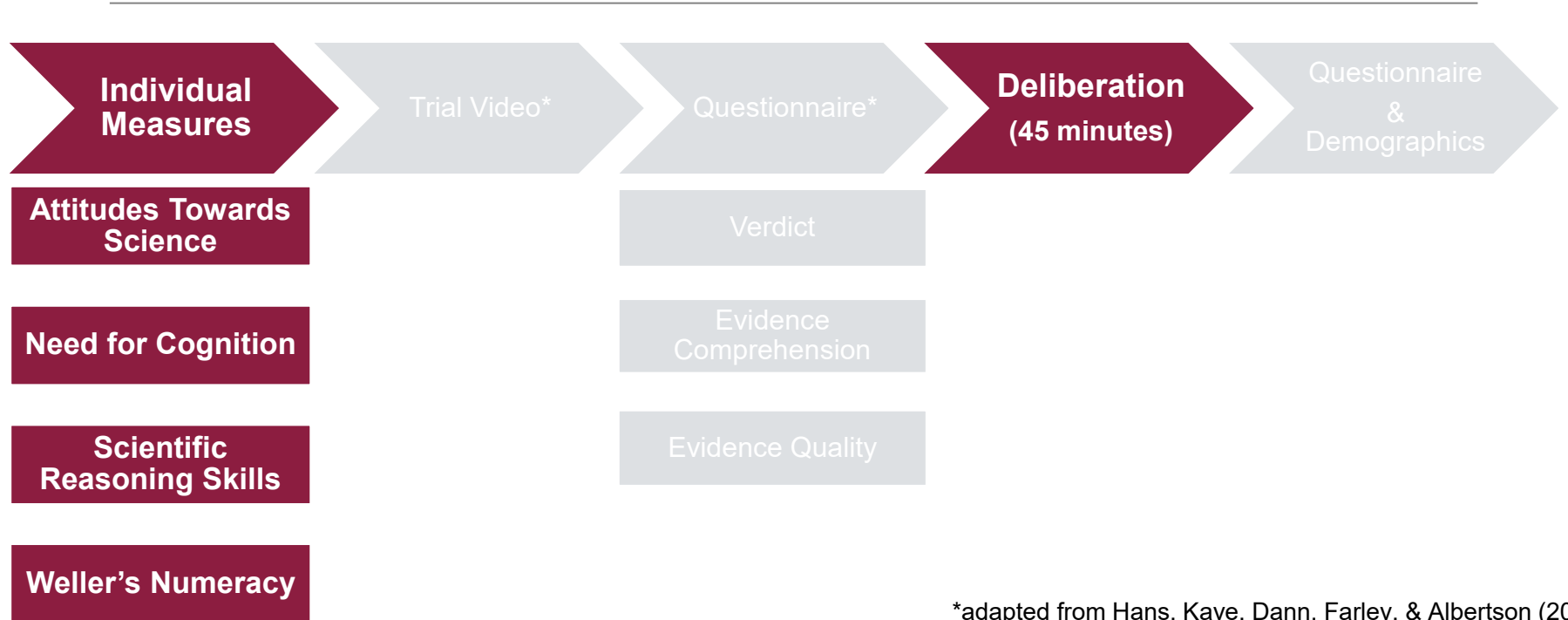
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## Decision Aid

Quality of scientific evidence

	With Gist/Aid	No Gist/Aid
High	High quality, with gist/aid	High quality, no gist/aid
Low	Low quality, with gist/aid	Low quality, no gist/aid

# Procedure



\*adapted from Hans, Kaye, Dann, Farley, & Albertson (2011)

# Participants

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## Sub-sample analyzed:

- n = 221 jurors
- 43 transcribed juries
- ASU community members

## Full sample:

- N = 466
- 90 juries
- ASU and UNL community members

## Jury-eligible

# Coding

1. Coded for scientific discussion, three coders. A portion double coded. Kappa = .36

Coder 1

And for time's sake. What did you think of the expert testimony.

That jacket could be a lot of people along with the DNA evidence and how we just hashed it out being as it is and I think that's it.

Coder 2

And for time's sake. What did you think of the expert testimony.

That jacket could be a lot of people along with the DNA evidence and how we just hashed it out being as it is and I think that's it.



# Coding

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1. Coded for scientific discussion:

mtDNA vs. Nuclear

“based on not having the nuclear DNA, and being uniquely identified, there’s doubt”

# Coding

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# Coding

1. Coded for scientific discussion:

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Quality

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**Exclusion Rates**

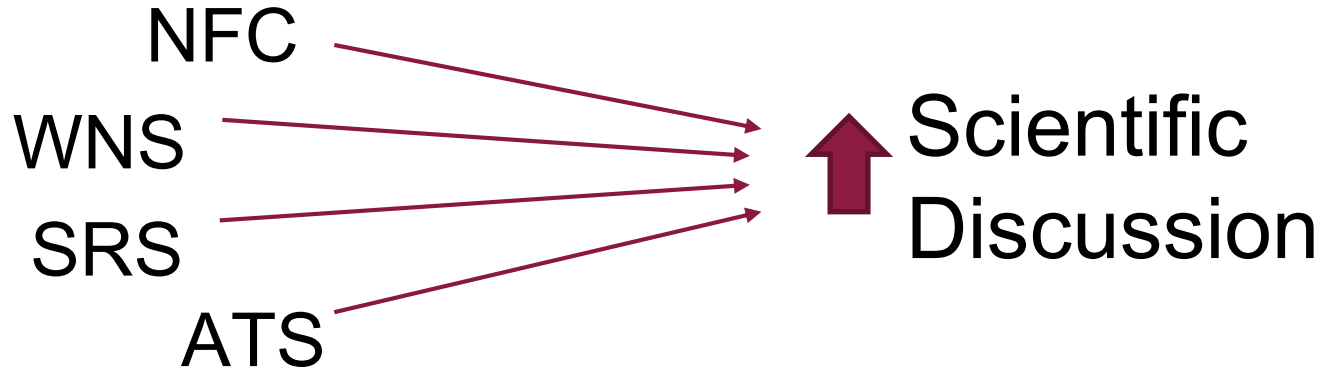
“also will depend on if you choose to go with the defense’s number of 1% or the prosecution’s of .004%”

2. Proportion of time each juror spent discussing the science

$$\frac{\text{Juror's Scientific Evidence word count}}{\text{Total Jury Word Count}}$$

# Pre-registered Hypotheses

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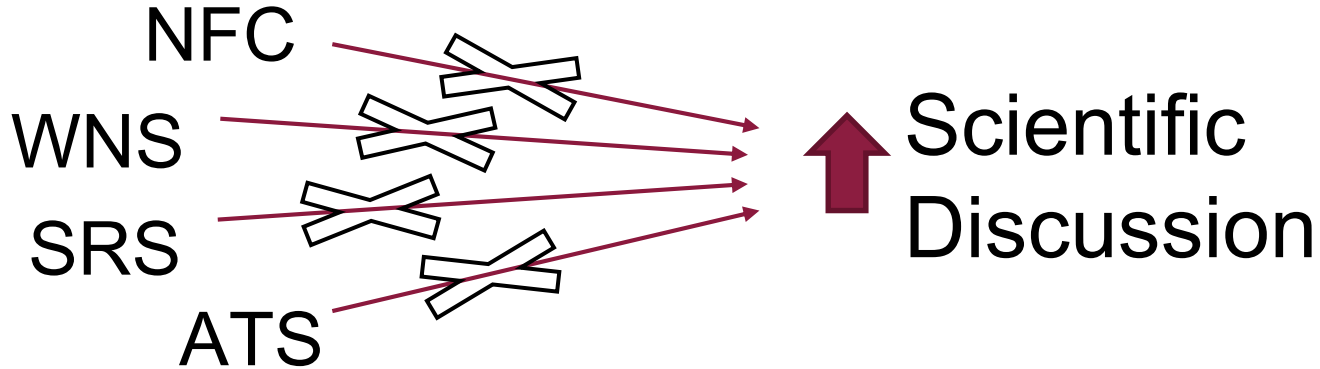


# Results

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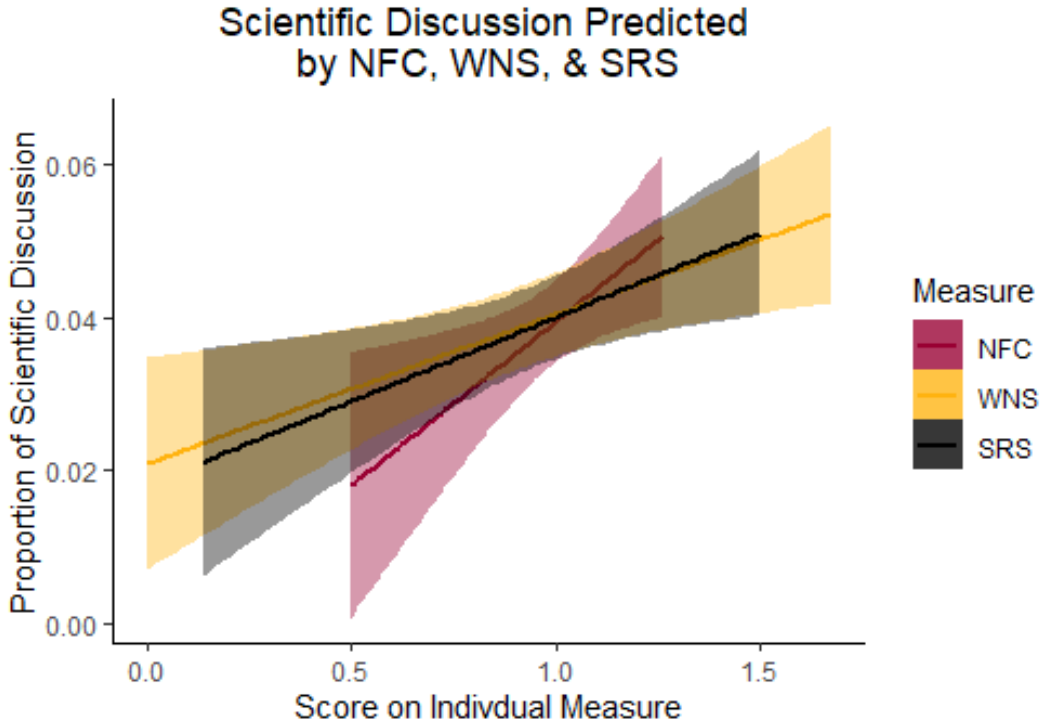
✓ Linear Model: NFC + WNS + SRS + ATS

$$R^2 = .045, F(4, 216) = 3.63, p = .01$$



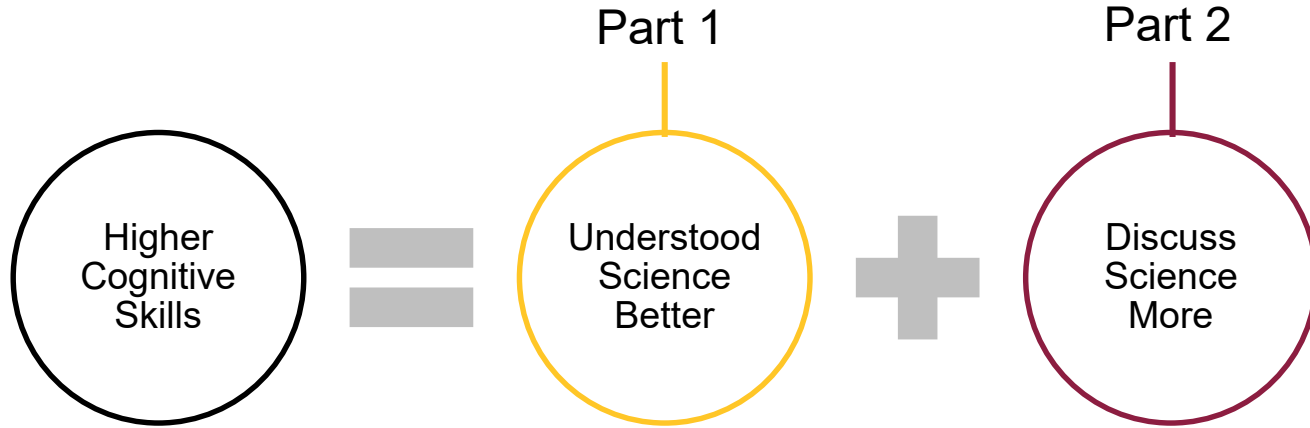
# Exploratory Analyses

NFC\* :  $b = .001$ ,  $R^2 = .02$   
WNS\*\* :  $b = .005$ ,  $R^2 = .03$   
SRS\* :  $b = .003$ ,  $R^2 = .02$   
~~ATS~~ :  $b = .001$ ,  $R^2 = .01$

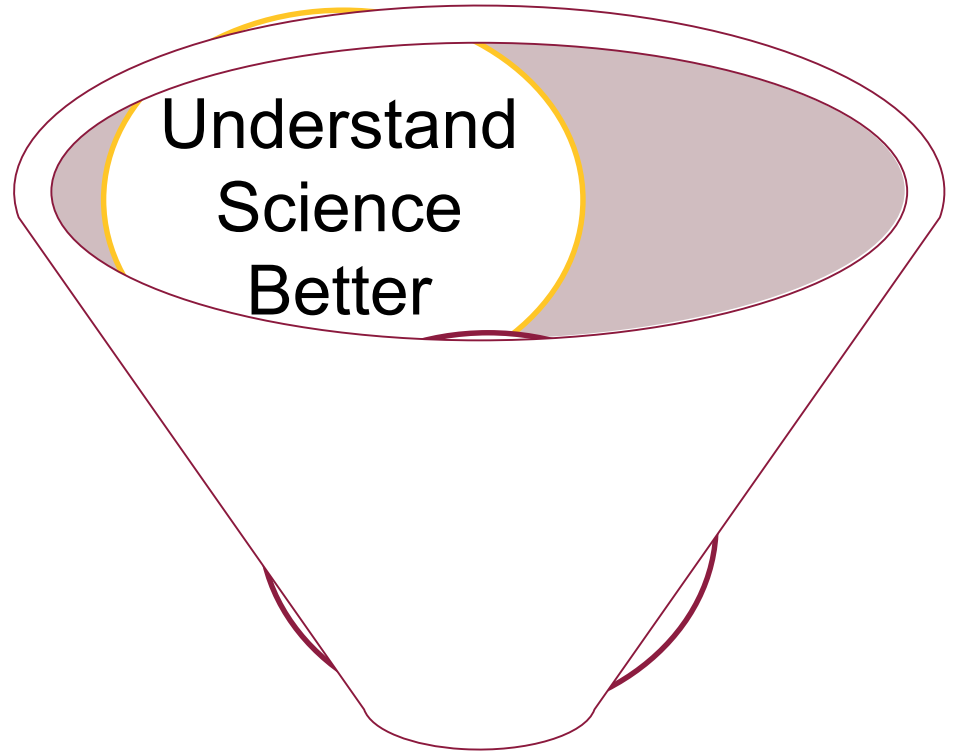


\* $p < .05$ , \*\* $p < .01$

# Discussion



# Discussion



Better Quality Discussions



# Discussion

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## Limitations:

- Word count rather than duration
- Reliability

## Our Next Steps:

- Clearer criteria for scientific content
- Code videos directly for content

- **Scientific Evidence**
  - This code is used when jurors discuss the scientific evidence that was presented in the trial video. Below are examples of components mentioned in the video, but also refer to the trial transcript if there is any uncertainty if something counts as scientific evidence used in the trial. Examples include:
    - **Discussion of DNA**
      - mtDNA vs nDNA, general comments on the accuracy of each, mostly will have to do with the first expert that goes over what DNA is in the slides that include a visual representation of the nucleus and DNA strands
        - **EXAMPLE:** *"And then, just the fact that you know, like, the whole mitochondrial DNA and nuclear DNA it's just that - it's just, um... Yes, they did everything correctly, I feel. But it's just so much..."*

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- **EXAMPLE** *"So there's more DNA evidence that he did do it- or there's more proof on the DNA side."*
  - **DNA analysis and matching process**
    - The process of analyzing DNA, how to determine if it is a match, the precautions to take while comparing DNA samples, etc.
      - **EXAMPLE** *"I don't think with the statistics that there's beyond a reasonable doubt that it was him given how many other men in the city could have similar DNA, like mitochondrial DNA."*
  - **Heteroplasmy**
    - General information on what this is and how it relates to the case
      - **EXAMPLE** *"So there was the thing about like it being groups of people and then the heteroplasmy or- is about the mutation which was what you were talking about."*
  - **Database size**
    - How many people were used, any reference to whether it was small vs large, how representative it was, etc.
      - **EXAMPLE** *"Given everything that they've given us I don't think anything directly like- cause the DNA it's like close but they're*



# Video Coding – Noldus Observer XT

- Detailed Coding Scheme

Behavior Name	Code	Modifier	Modifiers
<b>Content of Discussion (Mutually exclusive)</b>			
Scientific Evidence	s	s	Accuracy
Non-Scientific Evidence	e	e	<Click here to add Modifier groups>
Application of outside knowledge/personal life/tangential	a	a	Case Related, Scientific?
Non-Trial Information	n	n	<Click here to add Modifier groups>
Trial/case related (non-evidence)	t	t	<Click here to add Modifier groups>
Fuzzy Trace/Aide	f	f	<Click here to add Modifier groups>
<b>Correcting Someone (Mutually exclusive)</b>			
Juror 1	1		Accuracy
Juror 2	2		Accuracy
Juror 3	3		Accuracy
Juror 4	4		Accuracy
Juror 5	5		Accuracy
Juror 6	6		Accuracy
Juror 7	7		Accuracy
Juror 8	8		Accuracy
<b>Tangent/Outside Information (Inactive) (Mutually exclusive)</b>			
Scientific (Inactive)	X	X	
Non-Scientific (Inactive)	Y	Y	
<b>Condition (Start-Stop)</b>			
Condition Number	c		Condition
Low Quality	l		<Click here to add Modifier groups>
High Quality	h		<Click here to add Modifier groups>
Gist Aid	g		<Click here to add Modifier groups>
NO Gist Aid	o		<Click here to add Modifier groups>
<b>Start/Stop (Mutually exclusive)</b>			
start	b		<Click here to add Modifier groups>
start_stop	d	d	<Click here to add Modifier groups>




# Video Coding – Noldus Observer XT

Content of Discussion (Mutually exclusive)

Scientific Evidence	s	s	Accuracy
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Application of outside knowledge/personal life/tangential	a	a	Case Related, Scientific?
Non-Trial Information	n	n	<Click here to add Modifier group
Trial/case related (non-evidence)	t	t	<Click here to add Modifier group
Fuzzy Trace/Aide	f	f	<Click here to add Modifier group

# Video Coding

ASU\_July 42 Pt 1.mp4



Playback Control

Time	Subject	Behavior	Modifier	Comment
03:19.93	3	▶ Non-Scientific Evi		
03:20.63	3	■ Non-Scientific Evi		
03:22.93	3	▶ Non-Scientific Evi		
03:24.87	3	■ Non-Scientific Evi		
03:26.90	3	▶ Non-Scientific Evi		
03:27.07	2	■ Non-Scientific Evi		
03:32.77	3	■ Non-Scientific Evi		
03:32.77	6	▶ Scientific Evidenc	NA	
03:42.45	6	▶ Scientific Evidenc	Correct	
03:48.49	6	■ Scientific Evidenc	Correct	
03:49.69	6	▶ Non-Scientific Evi		
04:00.67	3	▶ Non-Scientific Evi		
04:03.24	3	■ Non-Scientific Evi		
04:03.51	6	■ Non-Scientific Evi		
04:04.44	3	▶ Non-Scientific Evi		
04:13.88	3	■ Non-Scientific Evi		
04:13.88	3	▶ Non-Scientific		
04:55.76	3	■ Non-Scientific		
04:56.06	3	▶ Non-Scientific Evi		
05:14.24	3	■ Non-Scientific Evi		
05:14.24	1	▶ Non-Scientific		

# Video Coding

Time	Subject	Behavior	Modifier	Comment
03:42.45	6	▶ Scientific Evidenc	Correct	
03:48.49	6	■ Scientific Evidenc	Correct	
03:49.69	6	▶ Non-Scientific Evi		

# Future Directions

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- Larger sample
- Improved reliability and methods
- Calibration after deliberation

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*Thank you...*

*Questions?*

