

# Putting Cognitive Bias on Trial

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# Overview

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- What is cognitive bias?
- What should forensic labs do to address bias?
- How to work with bias experts + non-experts?

# What isn't Cognitive Bias?

## Epic Drug Lab Scandal Results in More Than 20,000 Convictions Dropped

Five years ago, Massachusetts drug lab chemist Annie Dookhan was caught faking results. That led to Tuesday's dismissal of over 21,000 convictions.



— Annie Dookhan is escorted to a cruiser outside her home in Franklin, Massachusetts, in 2012. Bizuayehu Tesfaye / AP, file

Merriam-Webster SINCE 1828

bias

Dictionary Thesaurus

**bias** noun

Save Word

bi-as | \ ˈbi-əs \

**Definition of *bias* (Entry 1 of 4)**

1 **a** : an inclination of temperament or outlook  
*especially* : a personal and sometimes unreasoned judgment : [PREJUDICE](#)

**b** : an instance of such prejudice

Cognitive bias does NOT mean...

- ✗ Consciously prejudiced
- ✗ Fraudulent or dishonest
- ✗ Incompetent or careless

# Experts Are Human Too!

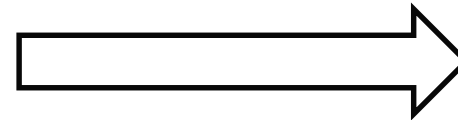
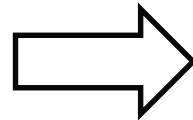
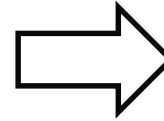
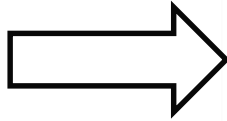
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clideo.com

# What is Cognitive Bias?

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SAME  
INFORMATION

DIFFERENT  
MINDSETS

DIFFERENT  
INTERPRETATIONS

# Simple Research Examples

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The same hill looks steeper if we're tired or wearing a heavy backpack.

(Bhalla & Proffitt, 1999)



The same bottle of water appears less far away if we're thirsty.

(Balcetis & Dunning, 2006)



The same faces look more similar if we believe the people are related.

(Bressan & dal Martello, 2002)

# A Simple Analogy

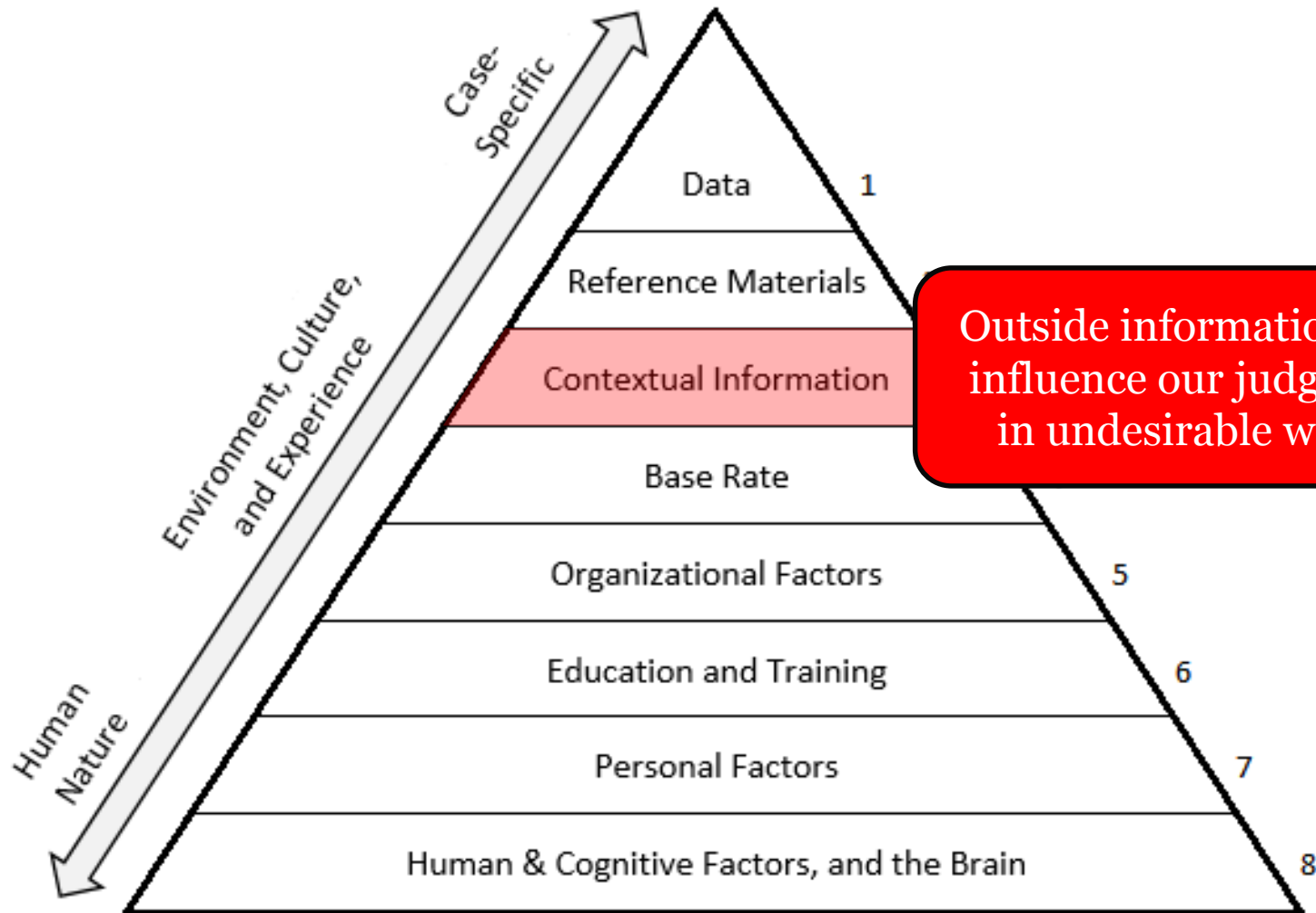
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Cognitive bias is like *sneezing*...

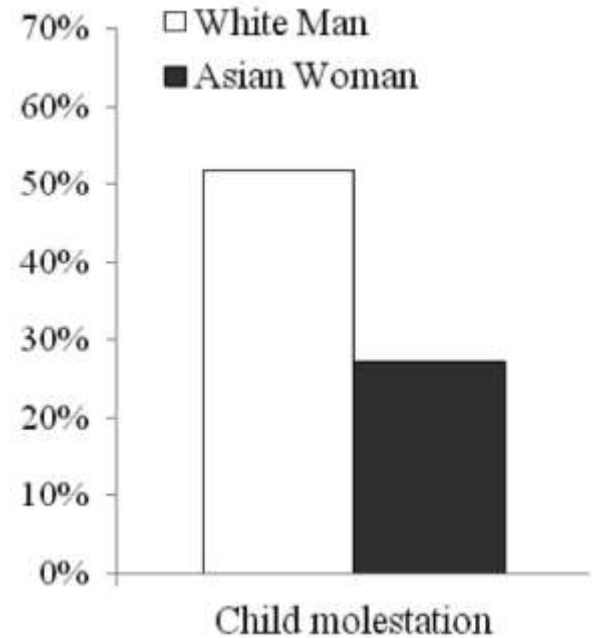
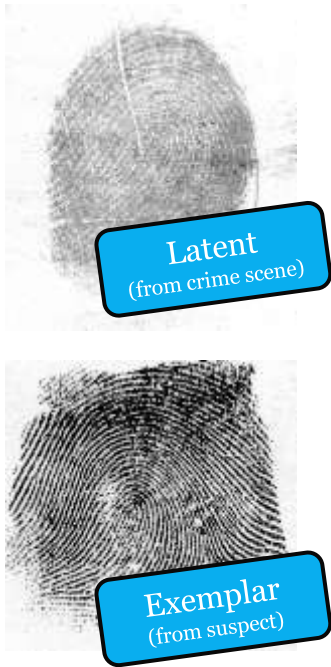
- Our brains automatically make us do it; we can't just choose not to do it.
- It can be helpful, but it's a problem if we do it too much or at the wrong time.
- Although we can't control it, we can take steps to protect against it.
- *Did this expert remember to take their allergy medicine?*

# Sources of Bias



Outside information can influence our judgment in undesirable ways!

# Fingerprint Comparisons



Same  
evidence

+

Different  
suspect

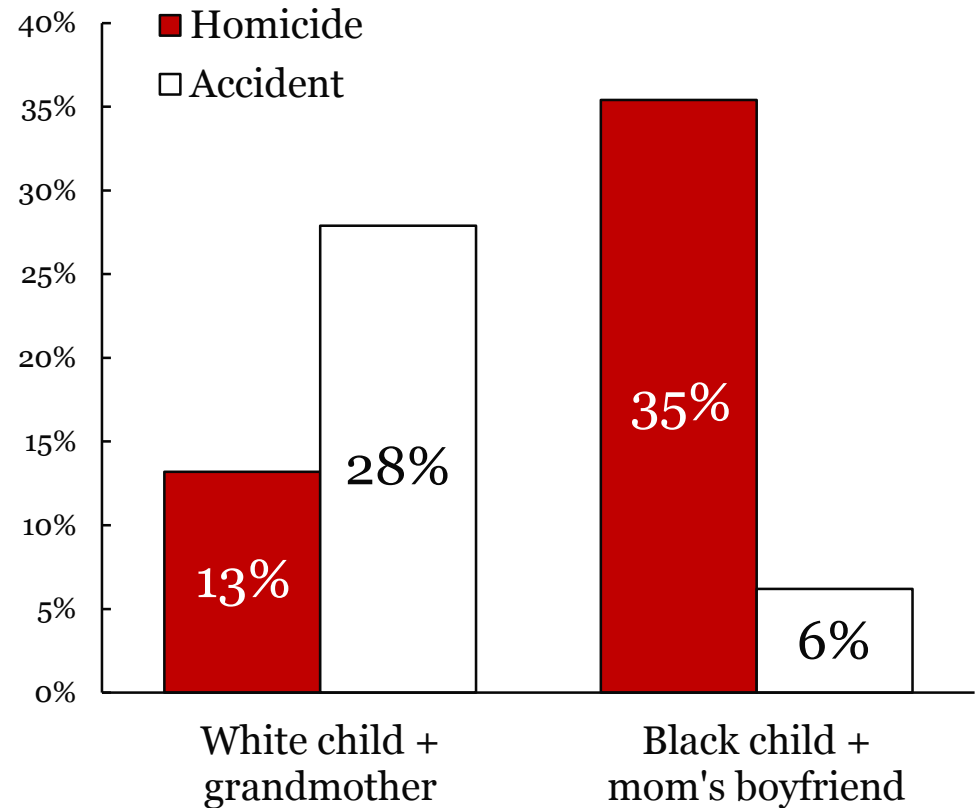
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**Different opinion**  
**(52% vs. 27%)**

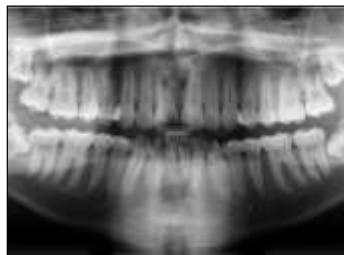
# Manner of Death Decisions

- 3.5 year-old **White** child
- Found unresponsive by **maternal grandmother**
- Occipital contusion
- Subgaleal hemorrhage
- Linear skull fracture

- 3.5 year-old **Black** child
- Found unresponsive by **mother's boyfriend**
- Occipital contusion
- Subgaleal hemorrhage
- Linear skull fracture



# Task-Irrelevant Information



**Extraneous info has been shown to affect expert judgments of...**

- Forged documents (Miller, 1984)
- Latent fingerprints (Dror & Charlton, 2006)
- DNA mixtures (Dror & Hampikian, 2011)
- Crime scenes (van den Eeden et al., 2016)
- Bloodstain patterns (Osborne et al., 2016)
- Burn patterns (Bieber, 2012)
- Digital evidence (Sunde & Dror, 2021)
- Toxicology results (Hamnett & Dror, 2020)
- Skeletal remains (Nakhaeizadeh et al., 2014)
- Shoeprints (Sneyd et al., 2020)
- Dental X-rays (Chiam et al., 2021)
- Manner of death (Dror et al., 2021)
- Bullet comparisons (Kerstholt et al., 2010)

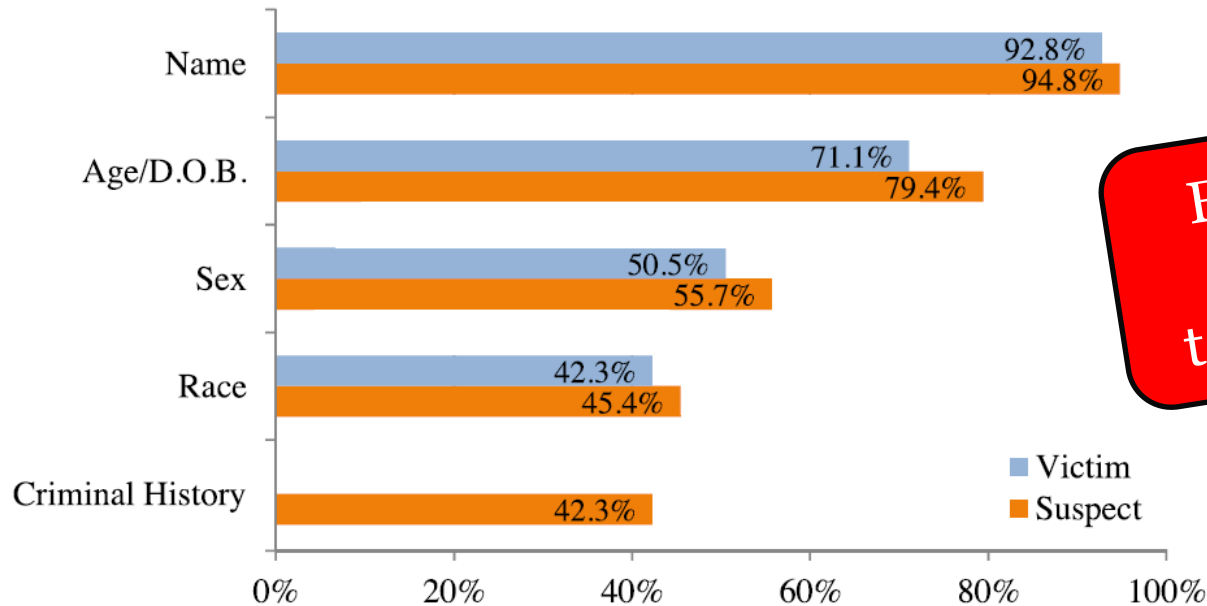
# Evidence Submission Forms



It is the view of the National Commission on Forensic Science that:

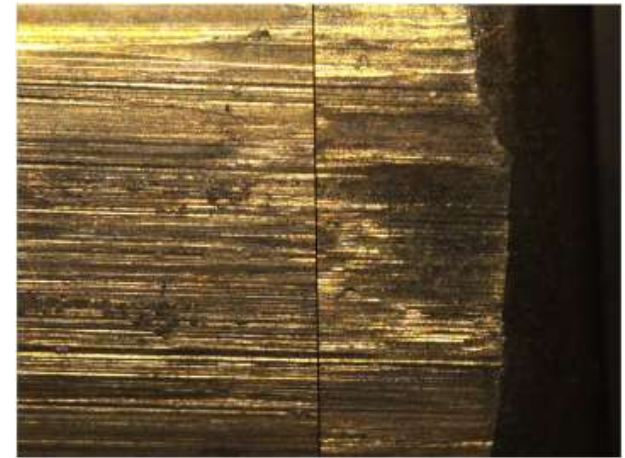
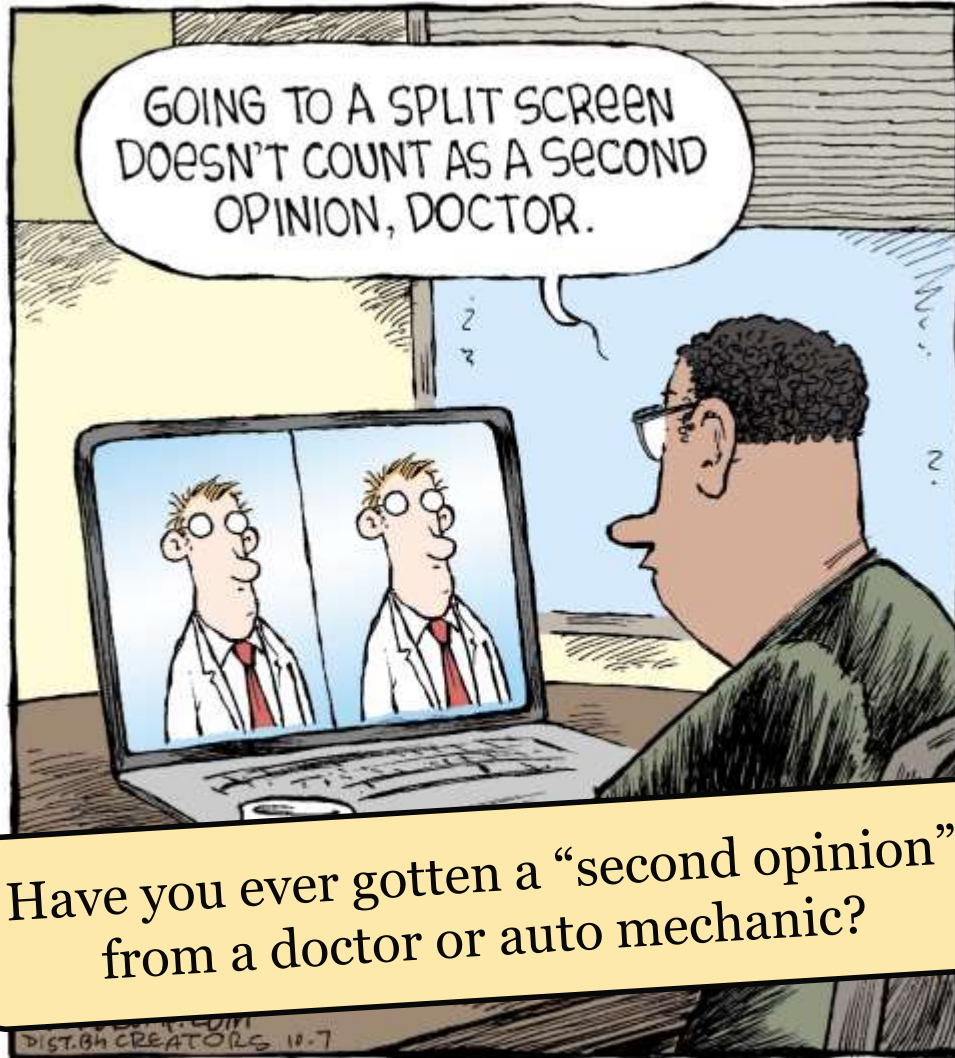
1. FSSPs should rely solely on task-relevant information when performing forensic analyses.
3. Forensic laboratories should take appropriate steps to avoid exposing analysts to task-irrelevant information through the use of context management procedures detailed in written policies and protocols.

Percentage of Forms Requesting Suspect and Victim Information



**Examiners should be shielded from task-irrelevant info!**

# Non-Blind Verification



Non-blind verifiers  
disagreed **12.5%** of the time

Blind verifiers  
disagreed **42.3%** of the time

Mattijssen et al. (2020)

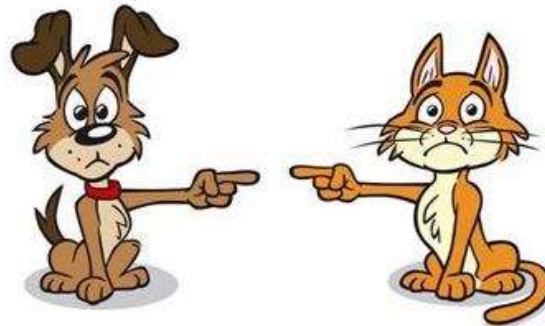
# Why Don't Labs Change?

**Table 1**  
*Beliefs (%) about the Scope of Bias*

## The “Bias Blind Spot”

	Yes	No	Don't know
In your opinion, is cognitive bias a cause for concern in the forensic sciences <i>as a whole</i> ?	70.97	17.37	11.66
In your opinion, is cognitive bias a cause for concern in <i>your specific domain</i> of forensic science?	52.36	36.97	10.67
In your opinion, are <i>your own judgments</i> influenced by cognitive bias?	25.69	54.11	20.20

“They’re the problem,  
not me!”



“They’re the problem,  
not me!”

# How to Avoid Bias?

**Table 2**  
*Frequencies (%) of Beliefs about the Nature of Bias*

	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
3. An experienced examiner is less likely than a new examiner to be influenced by prior beliefs and expectations.	8.8	<b>24.0</b>	14.0	21.8	11.8	15.5	4.3
4. An examiner who makes a conscious effort to set aside his or her prior beliefs and expectations is less likely to be influenced by them.	2.0	6.8	6.0	14.0	71.3%		
7. To the extent possible, examiners in my domain should be shielded from irrelevant contextual information.	5.8	16.3	9.3	20.0	48.8%		
10. Cognitive bias is generally less of a problem in my specialty domain than in other domains of forensic science.	7.7	15.2	9.2	<b>23.6</b>	12.7	21.6	10.0

*Note.* Modal responses are shown in bold.

# Linear Sequential Unmasking



Instead of considering all information  
in a random or incidental order...



... make thoughtful *a priori* decisions about  
what information to consider and when.



Most relevant  
Most objective  
Least biasing

Least relevant  
Least objective  
Most biasing

Irrelevant

# Success Stories

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## The management of domain irrelevant context information

*Melanie S. Archer,<sup>1</sup> B.Sc. (Hons), Ph.D., M.B.B.S.; and James F. Wallman,<sup>2</sup> B.Sc.(Hons), Ph.D.*

### Context Effects in Forensic Entomology and Use of Sequential Unmasking in Casework

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**ABSTRACT:** Context effects are pervasive in forensic science, and are being recognized by a growing number of disciplines as a threat to objectivity. Cognitive processes can be affected by extraneous context information, and many proactive scientists are therefore introducing context-minimizing systems into their laboratories. Forensic entomologists are also subject to context effects, both in the processes they undertake (e.g., evidence collection) and decisions they make (e.g., whether an invertebrate taxon is found in a certain geographic area). We stratify the risk of bias into low, medium, and high for the decisions and processes undertaken by forensic entomologists, and propose that knowledge of the time the deceased was last seen alive is the most potentially biasing piece of information for forensic entomologists. Sequential unmasking is identified as the best system for minimizing context information, illustrated with the results of a casework trial ( $n = 19$ ) using this approach in Victoria, Australia.

Examination Unit of the Victoria Police Forensic Services Department. Existing laboratory wide evidence submission procedures were modified in the scheme such that, as far as was agreed to be practical, all handwriting cases were stripped of all but essential information for carrying out examination and comparison tasks. As yet no negative outcomes have been reported as a result of the scheme implementation.

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# LSU-E Worksheet

Goal = Transparency in decision-making

LSU-E Worksheet

Form completed by: \_\_\_\_\_ Role: \_\_\_\_\_ Location/Laboratory: \_\_\_\_\_

Case Identifier \_\_\_\_\_ Date: \_\_\_\_\_

Information Type	Source of Information	Guiding Principles: Circle one number for each principle*	Explanation of any potential for bias	Steps taken to prevent, mitigate, or identify the effects of bias
		<i>Biasing power:</i> none - 1 2 3 4 5 - a lot <i>Subjectivity:</i> none - 1 2 3 4 5 - a lot <i>Irrelevance:</i> none - 1 2 3 4 5 - a lot		
		<i>Biasing power:</i> none - 1 2 3 4 5 - a lot <i>Subjectivity:</i> none - 1 2 3 4 5 - a lot <i>Irrelevance:</i> none - 1 2 3 4 5 - a lot		
		<i>Biasing power:</i> none - 1 2 3 4 5 - a lot <i>Subjectivity:</i> none - 1 2 3 4 5 - a lot <i>Irrelevance:</i> none - 1 2 3 4 5 - a lot		

*Biasing power:* The extent to which this information can influence judgments and decisions – does it suggest a particular decision or outcome is best?

*Subjectivity:* The extent to which this information could support different interpretations or evaluations based on someone’s personal opinions or feelings.

*Irrelevance:* Some information is essential to perform a forensic analysis correctly, but some is merely helpful or even irrelevant to the analyst’s task.

**Checklist of information to consider:**

- Case-specific information – e.g., the samples to be analyzed, the question the analyst is tasked with answering.
- Experience/Environment information – e.g., relevant expected base rates, lab culture and protocols.
- Human factors – e.g., conversations with investigator, media.

# Do Attorneys Challenge?

SIMON, JACK

There are no apparent abrasions. Fingernail beds are blue. Tattoos.

## INTERNAL EXAMINATION:

**HEAD:** Autopsy shows an intact hyoid bone. The brain weighs 1,289 grams, which is within normal limits. There is evidence of subdural hemorrhaging measuring approximately 8-10cc over the surface of both the parietal and occipital lobes. Inflammation is present consistent with head trauma. The contusion pattern is consistent with what would be expected from contact with a brick wall, as described in Mr. Thompson's confession. There is a thick film of subarachnoid hemorrhage overlying the entire left cerebral hemisphere. On the left cerebral hemisphere underlying the previously mentioned linear skull fracture is an extensive linear area of purple contusion extending from the parietal region and into the occipital area. This area of contusion measures 20 inches in length with a width of up to 3.75 inches. At the tip of the left temporal lobe is a one-quarter by one-quarter inch similar appearing purple contusion. The cerebral vasculature contains no evidence of atherosclerosis. Multiple coronal sections of the cerebral hemispheres, brain stem and cerebellum disclose no additional abnormalities. Examination of the base of the brain discloses no additional fractures.

Sections from the areas of contusion disclose disrupted blood vessels of the cortex with surrounding hemorrhage. Subarachnoid hemorrhage is also identified. Cortical neurons are surrounded by clear halos, as are glial cells.

**RESPIRATORY SYSTEM--THROAT STRUCTURES:** The oral cavity shows no lesions. The mucosa is intact and there are no injuries to the lips, teeth or gums.

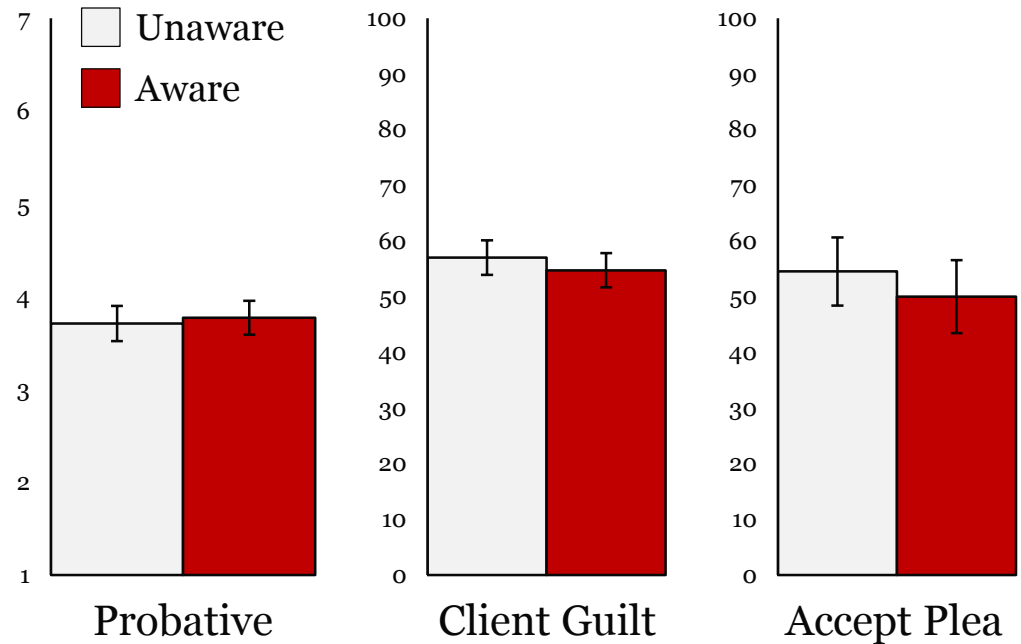
There is no obstruction of the airway. The mucosa of the epiglottis, glottis, piriform sinuses, trachea and major bronchi are anatomic. No injuries are seen and there are no mucosal lesions.

The lungs weigh: right, 355 grams; left 362 grams. The left lung is punctured by the third rib.

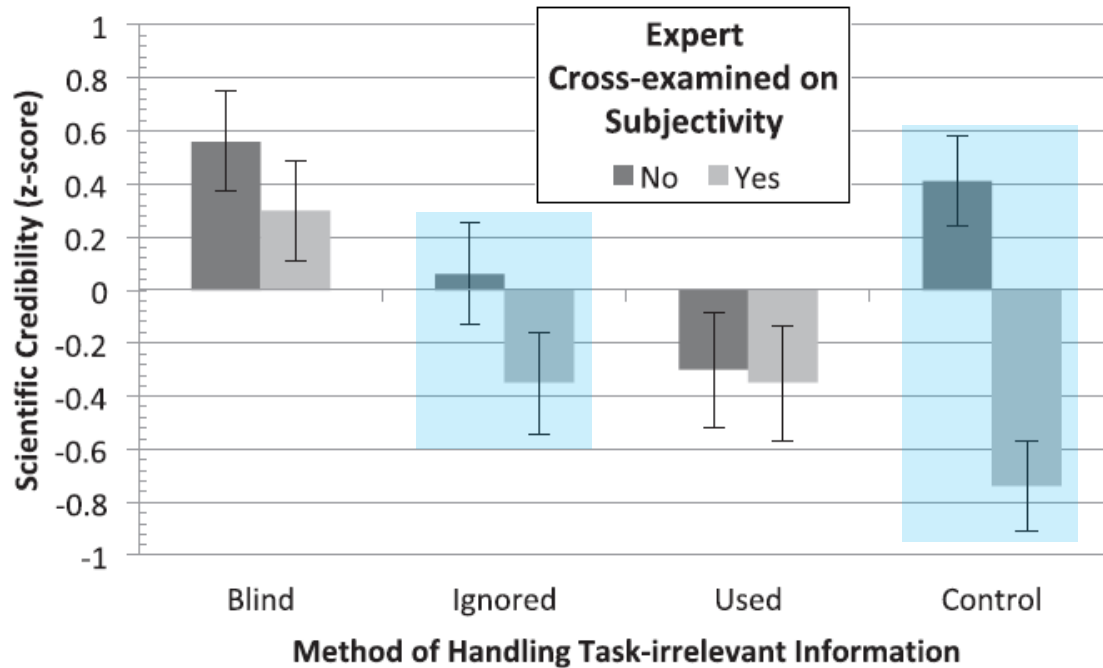
**CARDIOVASCULAR SYSTEM:** The heart weighs 246 grams, and has a normal size and configuration. No evidence of atherosclerosis or other pathology.

**GASTROINTESTINAL SYSTEM:** The mucosa and wall of the esophagus are intact and gray-pink, without lesions or injuries. The gastric mucosa is intact and pink without injury. Approximately 75 ml of partially digested semisolid food is found in the stomach. The mucosa of the duodenum, jejunum, ileum, colon and rectum are intact.

with head trauma. The contusion pattern is consistent with what would be expected from contact with a brick wall, as described in Mr. Thompson's confession. There is a thick film of subarachnoid



# Who Do Jurors Trust?



Cross-examining on *subjectivity* may be effective.

# Bias Experts

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*When working a case, I want to review...*



*What did the expert know and when?*

*Did the expert follow appropriate procedures?*

# Cross and Redirect

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But you're not a forensic scientist!

You can't prove this judgment was biased!

So you admit that you're biased too!



# Summary

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- Cognitive bias affects everyone, like a reflex.
- Avoid biasing info and strive for transparency.
- Use familiar analogies + practice what we preach!

# Contact Info

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