

COGNITIVE BIAS IN FORENSIC DECISIONS

Dr. Itiel Dror

Itiel@cci-hq.com

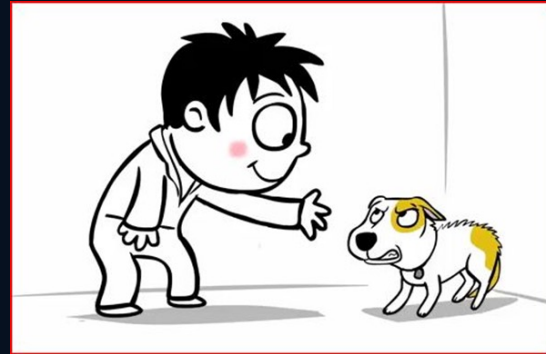
- Going to cover...:
 - Understanding what it is
 - Its implications
 - And what can be done about it
- A huge topic! (usually I do this over a 2- or 3-day workshop)
- If you want more information, materials, have questions, etc....
- Today we take a **BIG** first step in this long journey
- Before we start, also a BIG thank you to...

Transferring academic knowledge
of the brain into the real world

COGNITIVE BIAS IN FORENSIC DECISIONS

Dr. Itiel Dror
Itiel@cci-hq.com

- Be 'warned'... 😊
 - Some of it is 'controversial' (bias)
- Going to challenge you
- And I'll be going very fast
- as there is so much to cover
- So, let's go! (*fasten your seatbelts*)



Transferring academic knowledge
of the brain into the real world

COGNITIVE BIAS IN FORENSIC DECISIONS

Dr. Itiel Dror

- Going to cover...:
 - **Understanding what It Is**
 - Its implications
 - And what can be done about it

Transferring academic knowledge
of the brain **into the real world**

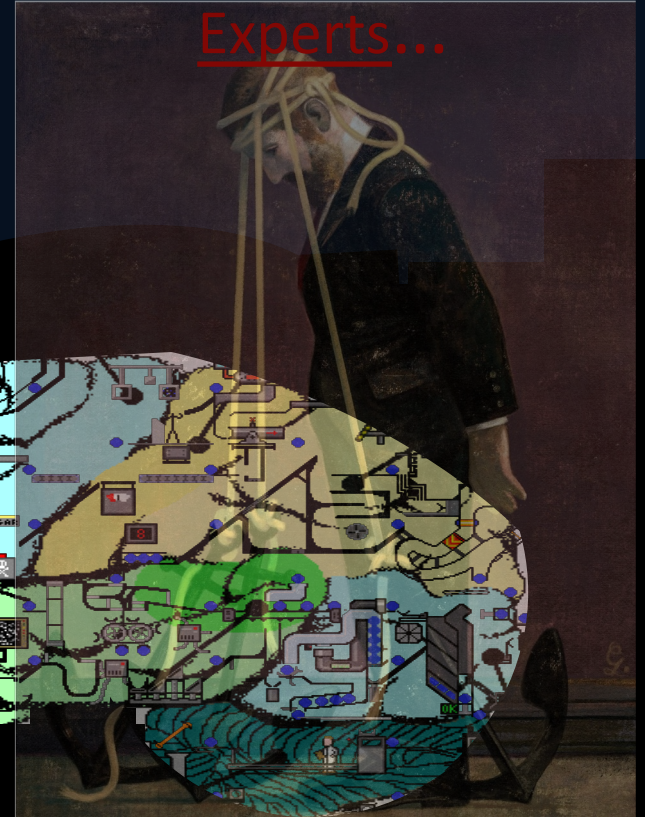
COGNITIVE BIAS IN FORENSIC DECISIONS

Experts...

Dr. Itiel Dror

WHY?

Experts...

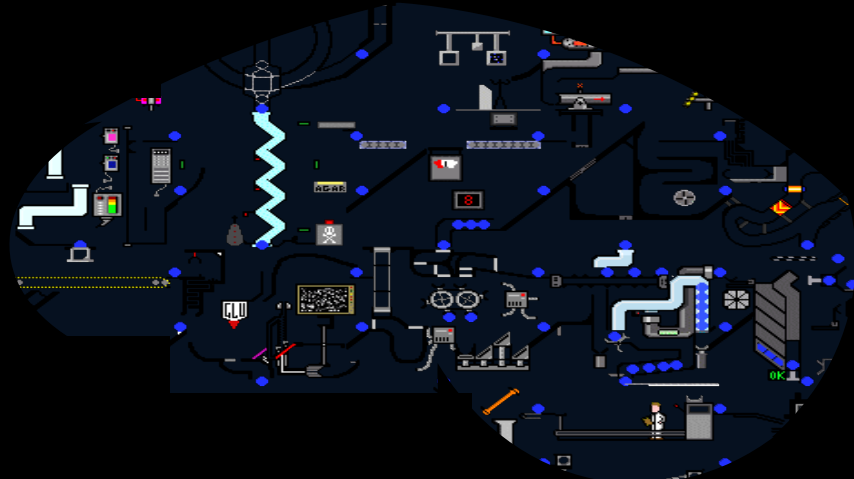
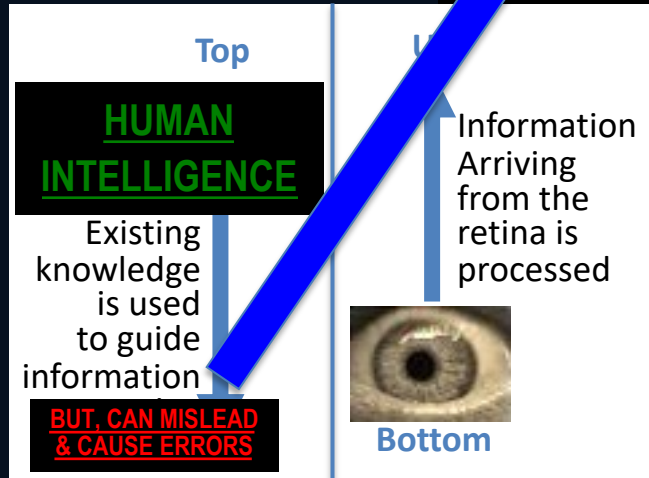


WHY SMART PEOPLE DO STUPID THINGS

(dedicated & competent forensic examiners can make mistakes)

COGNITIVE BIAS IN FORENSIC DECISIONS

- Information gets into the brain the 'input', the 'data' → "Bottom-up information"
- VS.
- What is already 'in the brain' (e.g., experiences, knowledge) → "Top-down information"
- These 'top-down' & 'bottom-up' interact.



COGNITIVE BIAS IN FORENSIC DECISIONS

- We cannot move forward if we do not acknowledge (AND understand) the problems, the issues, the weaknesses.
- And be transparent about them!
- We all have them...
- Must dispel misconceptions and fallacies, and sacrifice 'holy cows' (e.g., 'zero error rates', 'infallibility', etc.).
 - They sound good
 - We may believe them
 - The court may believe them...
- BUT they are WRONG

COGNITIVE BIAS IN FORENSIC DECISIONS

- We cannot
- problems, t
- And be tran
- We all have
- Must dispel
- 'zero error r
- They so
- We may
- The cou
- BUT they a

Table 1. Six Fallacies about Cognitive Bias Commonly Held by Experts

More information at:

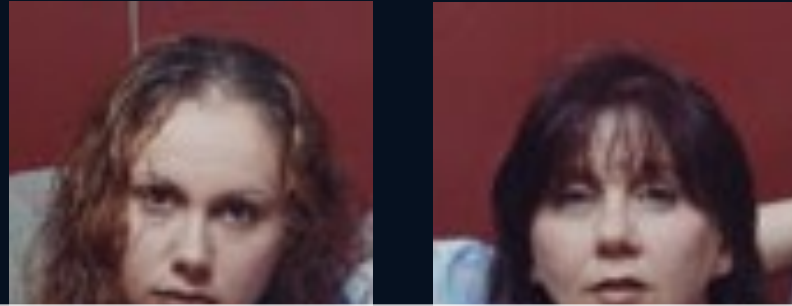
<https://pubs.acs.org/doi/10.1021/acs.analchem.0c00704>

Fallacy	Incorrect belief
1. Ethical Issues	It only happens to corrupt and unscrupulous individuals, an issue of morals and personal integrity, a question of personal character.
2. Bad Apples	It is a question of competency and happens to experts who do not know how to do their job properly.
3. Expert Immunity	Experts are impartial and are not affected because bias does not impact competent experts doing their job with integrity.
4. Technological Protection	Using technology, instrumentation, automation, or artificial intelligence guarantees protection from human biases.
5. Blind Spot	Other experts are affected by bias, but not me. I am not biased; it is the other experts who are biased.
6. Illusion of Control	I am aware that bias impacts me, and therefore, I can control and counter its affect. I can overcome bias by mere willpower.

derstand) the

cows' (e.g.,

COGNITIVE BIAS IN FORENSIC DECISIONS



Psychological SCIENCE

A Journal of the
Association for
Psychological Science

[Home](#)[OnlineFirst](#)[All Issues](#)[Subscribe](#)[RSS](#) [Email Alerts](#)

***Talis Pater, Talis Filius: Perceived
Resemblance and the Belief in Genetic
Relatedness***



COGNITIVE BIAS IN FORENSIC DECISIONS

Have you read this? **Famous Viking Warrior Was a Woman, DNA Reveals**

The New York Times
ing Warrior?

Viking
a woman, researchers confirm

New evidence forces reconsideration of a well-known gravesite.

 NATIONAL
GEOGRAPHIC

Scientists had long assumed the skeleton belonged to a man

 INDEPENDENT

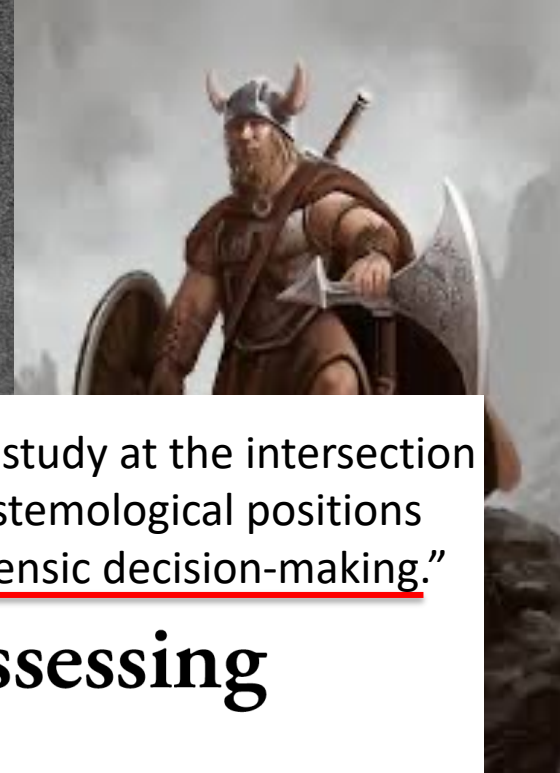
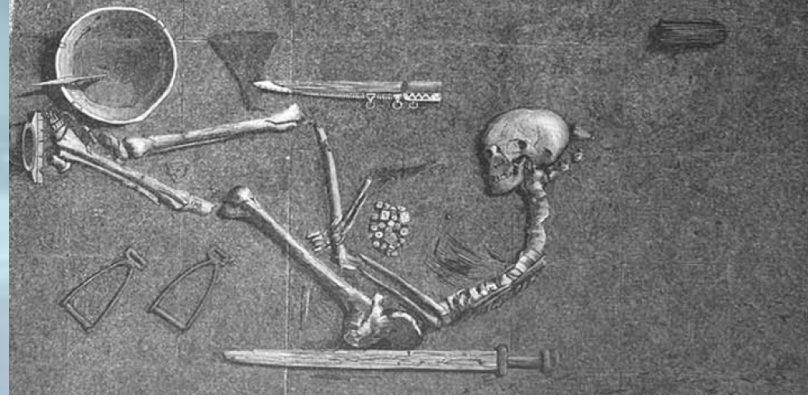
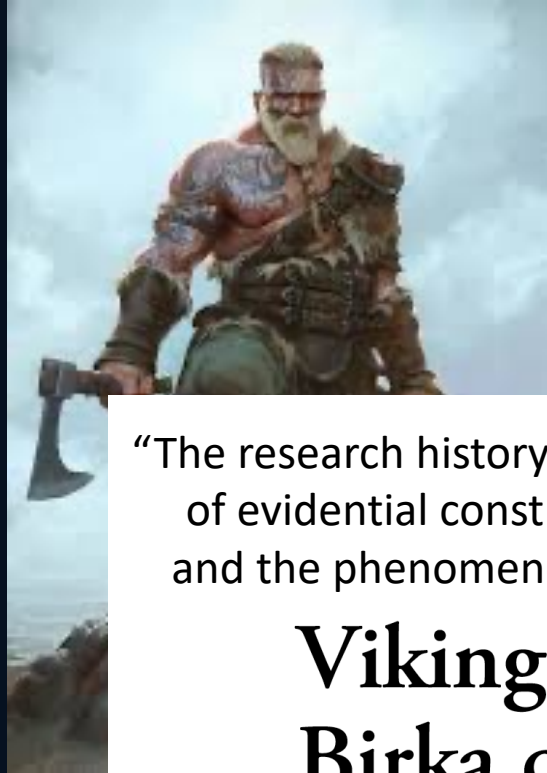
female, 120 years after its
discovery

The Washington Post

Iconic Viking grave belonged to a
female warrior
How
written out of history



theguardian



“The research history of the grave provides an instructive case study at the intersection of evidential constraints, the influence of contemporary epistemological positions and the phenomenon of cumulative false assumptions in forensic decision-making.”

Viking warrior women? Reassessing Birka chamber grave Bj.581

Neil Price^{1,*}, Charlotte Hedenstierna-Jonson¹, Torun Zachrisson², Anna Kjellström³, Jan Storå³, Maja Krzewińska³, Torsten Günther⁴, Verónica Sobrado³, Mattias Jakobsson⁵ & Anders Götherström³

COGNITIVE BIAS IN FORENSIC DECISIONS

JOURNAL OF **FORENSIC
SCIENCES**



Dror (2012) Combating Bias:
The Next Step in Fighting Cognitive and
Psychological Contamination

J Forensic Sci, January 2012, Vol. 57, No. 1
doi: 10.1111/j.1556-4029.2011.01940.x
Available online at: onlinelibrary.wiley.com

“For forensic science to successfully take on the issue of **contextual bias**, it is important that one correctly considers the risks, that measures are taken when needed, and that they are proportionate and appropriate.”

A detailed, stylized illustration of a forensic laboratory. It shows various pieces of equipment like microscopes, computers, and storage units, along with a person in a lab coat working at a station. The scene is lit with blue and white lights, creating a professional and scientific atmosphere.

COGNITIVE BIAS IN FORENSIC DECISIONS

Dr. Itiel Dror

- Going to cover..:

- **Understanding what It Is**
- Its implications
- And what can be done about it

There are others (not me), that state that forensic examiners “deliberately render”

Reports that have a “pro-prosecution bias”.

That is not what I (or my data) say or talk about.

Recap:

- Top-down cognitive processes
- Without awareness or control
- “Cognitive contamination”
- Impacts hard working & dedicated experts

Transferring academic knowledge
of the brain into the real world

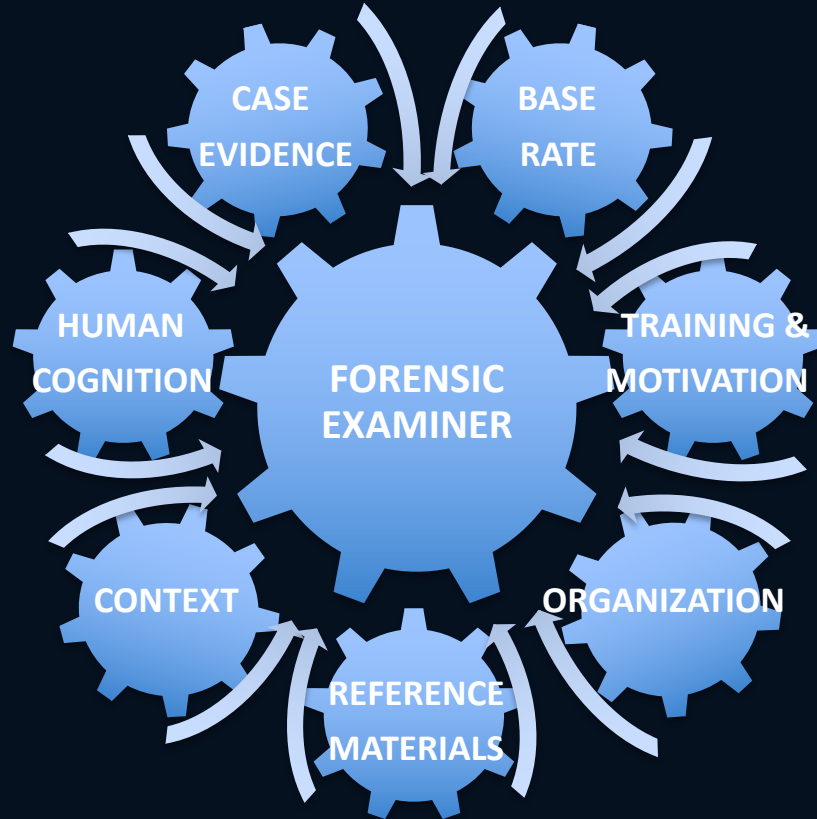
COGNITIVE BIAS IN FORENSIC DECISIONS

‘Powers’ working and influencing the mind of the forensic examiners (not only...)



COGNITIVE BIAS IN FORENSIC DECISIONS

‘Powers’ working and influencing the mind of the forensic examiners:



COGNITIVE BIAS IN FORENSIC DECISIONS

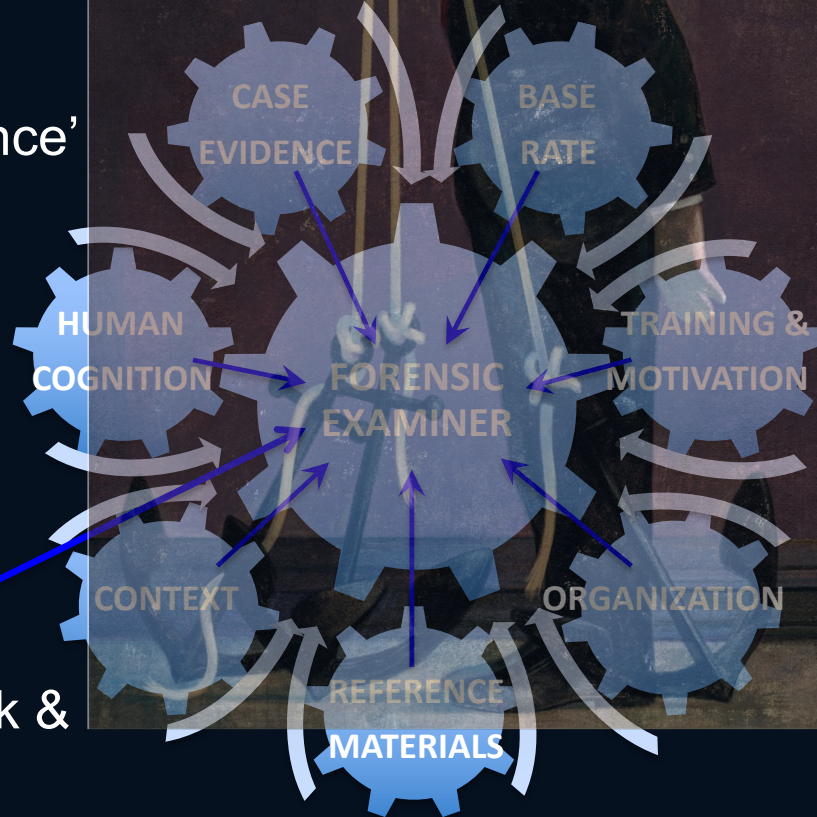
→ A HUGE shift...

Moving from the 'forensic evidence'
to the 'decision maker':

→ To how the decision maker
takes on board the evidence
is critical.

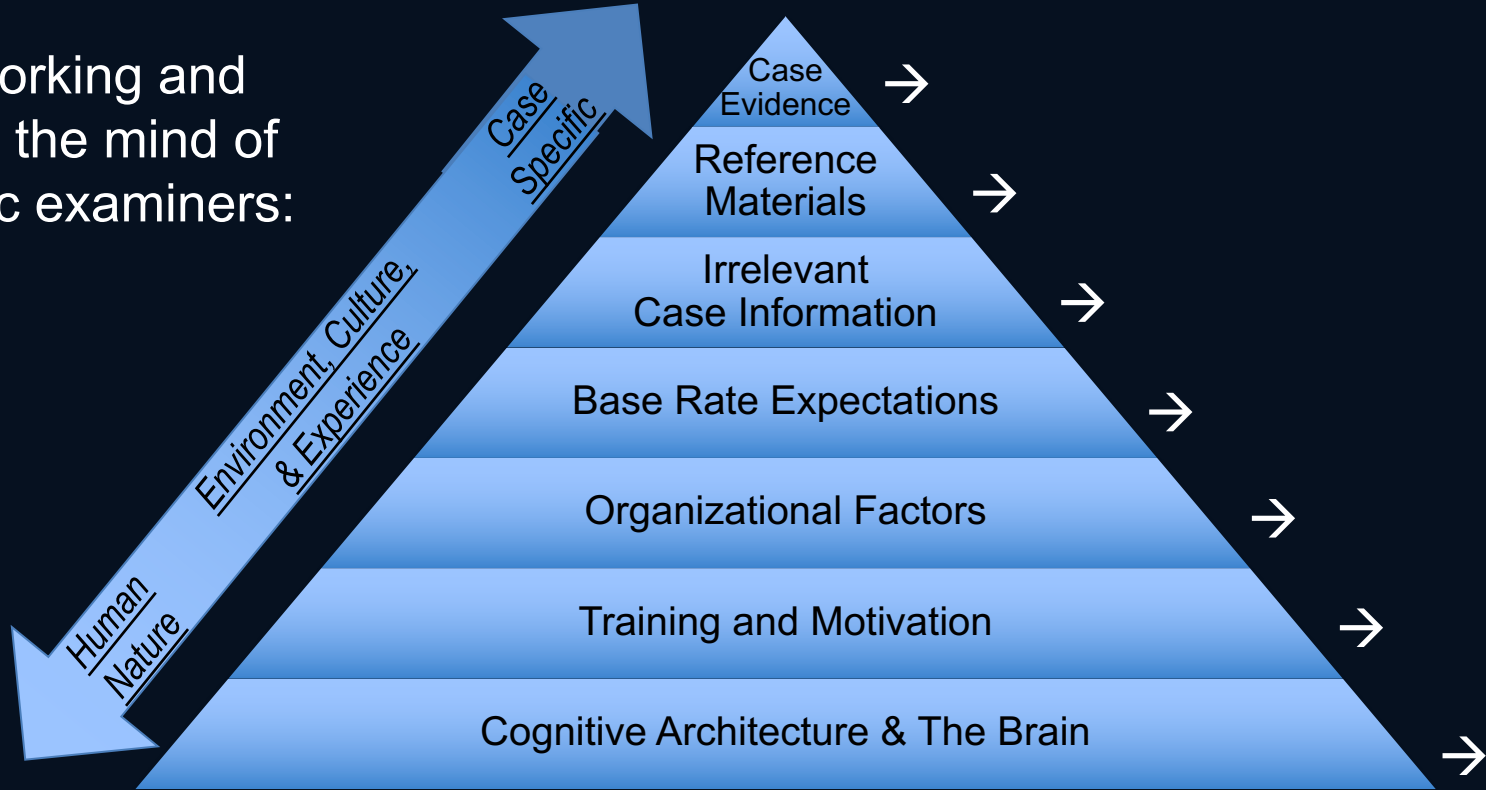
→ What decision is made!
(& how good it is) depends on
the decision maker (you)

On the 'powers'/factors that work &
influence your decisions.



COGNITIVE BIAS IN FORENSIC DECISIONS

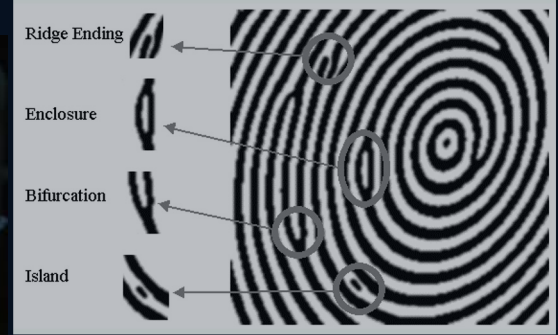
‘**Powers**’ working and
influencing the mind of
the forensic examiners:



THE IMPLICATIONS...:

WHAT IS YOUR CONCLUSION?






- Dentists...



- Diamonds...



CLARITY GRADING SCALE									
IF	VS ₁	VS ₂	VS ₁	VS ₂	SI ₁	SI ₂	I ₁	I ₂	I ₃
Internally flawless	Very, very slightly included 1 & 2		Very slightly included 1 & 2		Slightly included 1 & 2		Included 1, 2 and 3		

				
D - F Colorless	G - J Near Colorless	K - M Faint	N - R Very Light	S - Z Light

COLOR SCALE

VERY RARE					RARE					WIDELY AVAILABLE					PLentiful									
D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z		
COLORLESS					NEAR COLORLESS					FAINT					VERY LIGHT					LIGHT				

THE IMPLICATIONS....:

WHAT IS YOUR CONCLUSION?

- E.g., in fingerprinting: Identification, Inconclusive, or Exclusion
- **Expectations can bias your conclusion**

Contextual information renders experts vulnerable
to making erroneous identifications

Itiel E. Dror*, David Charlton, Ailsa E. Péron

A biased opinion: Demonstration of cognitive bias on a fingerprint
matching task through knowledge of DNA test results

Sarah V. Stevenage*, Alice Bennett

THE IMPLICATIONS....:

WHAT IS YOUR CONCLUSION?

- Same story with DNA...:
- Expectations can bias your conclusion

Subjectivity and bias in forensic DNA mixture interpretation ☆

Itiel E. Dror ^{a,b,*}, Greg Hampikian ^c

Strengthening forensic DNA decision making through a better understanding of the influence of cognitive bias

Amy M. Jeanguenat ^a, Bruce Budowle ^{b,c}, Itiel E. Dror ^{d,e,*}

THE IMPLICATIONS....:

WHAT IS YOUR CONCLUSION?

- Same story with DNA...:
- Expectations can bias your conclusion
- And, if it can bias conclusions in fingerprinting and in DNA, then it certainly applies to other forensic domains...
- E.g., BPA:
“the bloodstain interpretation process is vulnerable to contextual bias”

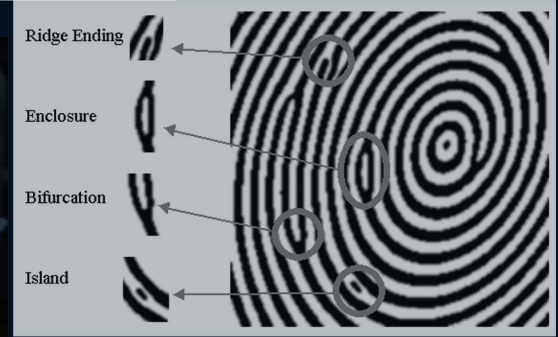
Bloodstain pattern classification: Accuracy, effect of contextual information and the role of analyst characteristics

Nikola K.P. Osborne ^{a,b}, Michael C. Taylor ^b, Matthew Healey ^c, Rachel Zajac ^{a,*}

WHAT ABOUT... THE IMPLICATIONS....:

WHAT DO YOU OBSERVE/PERCEIVE?

- Dentists...



- Diamonds...



CLARITY GRADING SCALE									
IF	VS ₁	VS ₂	VS ₁	VS ₂	SI ₁	SI ₂	I ₁	I ₂	I ₃
Internally flawless	Very, very slightly included 1 & 2		Very slightly included 1 & 2		Slightly included 1 & 2		Included 1, 2 and 3		

D - F Colorless	G - J Near Colorless	K - M Faint	N - R Very Light	S - Z Light

COLOR SCALE																							
VERY RARE			RARE			WIDELY AVAILABLE						PLENTYFUL											
D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
COLORLESS			NEAR COLORLESS			FAINT			VERY LIGHT			LIGHT											

WHAT ABOUT... THE IMPLICATIONS....:

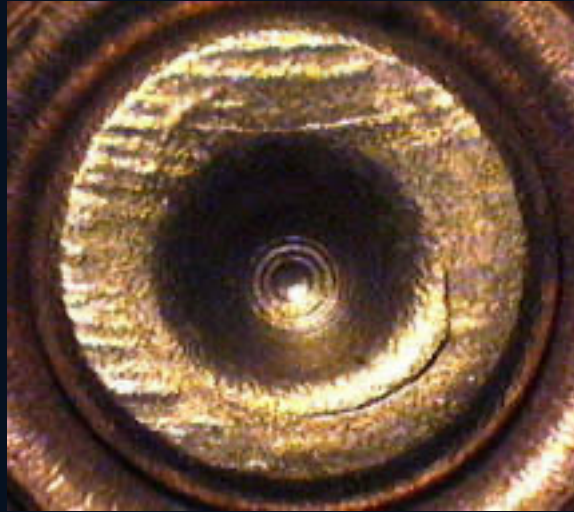
WHAT DO YOU OBSERVE/PERCEIVE?



WHAT ABOUT...

THE IMPLICATIONS....:

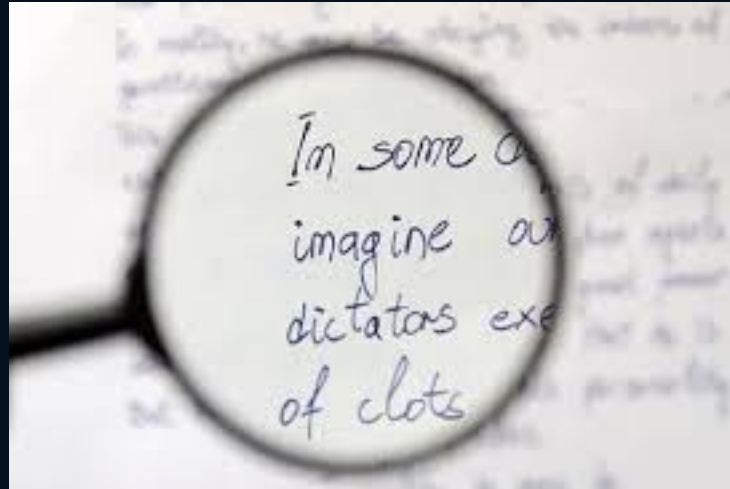
WHAT DO YOU OBSERVE/PERCEIVE?



WHAT ABOUT...

THE IMPLICATIONS....:

WHAT DO YOU OBSERVE/PERCEIVE?



WHAT ABOUT...

THE IMPLICATIONS....:

WHAT DO YOU OBSERVE/PERCEIVE?



WHAT DO YOU OBSERVE/PERCEIVE?



Forensic Science International 208 (2011) 10–17

Contents lists available at ScienceDirect

Forensic Science International

journal homepage: www.elsevier.com/locate/forensiint



Cognitive issues in fingerprint analysis: Inter- and intra-expert consistency and the effect of a ‘target’ comparison

Itiel E. Dror^{a,b,*}, Christophe Champod^c, Glenn Langenburg^{c,d}, David Charlton^{e,f}, Heloise Hunt^a, Robert Rosenthal^g

THE IMPLICATIONS....:

LATENT FINGERPRINT

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>	<u>I</u>	<u>J</u>
LPE1	22	9	15	8	9	3	8	11	7	10
LPE2	21	11	25	7	10	9	9	10	6	5
LPE3	19	9	18	10	7	9	15	19	6	6
LPE4	21	21	29	14	12	9	8	9	4	8
LPE5	17	16	15	11	16	9	7	12	5	5
LPE6	20	14	22	9	10	7	13	18	7	9
LPE7	22	17	15	10	10	8	11	24	8	11
LPE8	9	9	19	6	9	8	18	16	9	10
LPE9	30	15	25	10	12	12	19	22	12	17
LPE10	25	13	18	13	12	10	13	15	7	10

<u>LPE</u>		<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>	<u>I</u>	<u>J</u>
1	Time 1	27	15	17	9	9	7	16	13	7	13
	Time 2	26	14	21	10	8	5	13	15	7	12
2	Time 1	31	16	14	9	10	7	12	13	6	9
	Time 2	23	13	19	10	9	9	10	8	8	11
3	Time 1	19	11	13	5	9	5	8	12	6	10
	Time 2	18	8	16	8	15	9	17	21	7	12
4	Time 1	20	12	17	6	10	8	7	8	6	7
	Time 2	22	9	19	11	10	9	8	8	6	8
5	Time 1	19	11	19	6	10	13	9	14	8	12
	Time 2	25	13	21	9	14	12	12	11	8	9
6	Time 1	34	16	21	12	13	13	12	11	8	12
	Time 2	25	12	23	11	17	7	12	16	9	13
7	Time 1	21	9	19	9	12	9	10	18	6	10
	Time 2	21	13	14	7	8	6	7	11	6	10
8	Time 1	19	14	14	10	9	6	12	13	7	11
	Time 2	22	13	18	10	15	8	13	17	5	11
9	Time 1	19	11	11	7	9	4	8	15	5	2
	Time 2	23	14	20	7	13	8	11	14	4	5
10	Time 1	19	10	9	8	4	2	10	8	6	5
	Time 2	20	10	9	7	8	3	6	7	6	5

COGNITIVE BIAS IN FORENSIC DECISIONS

Dr. Itiel Dror

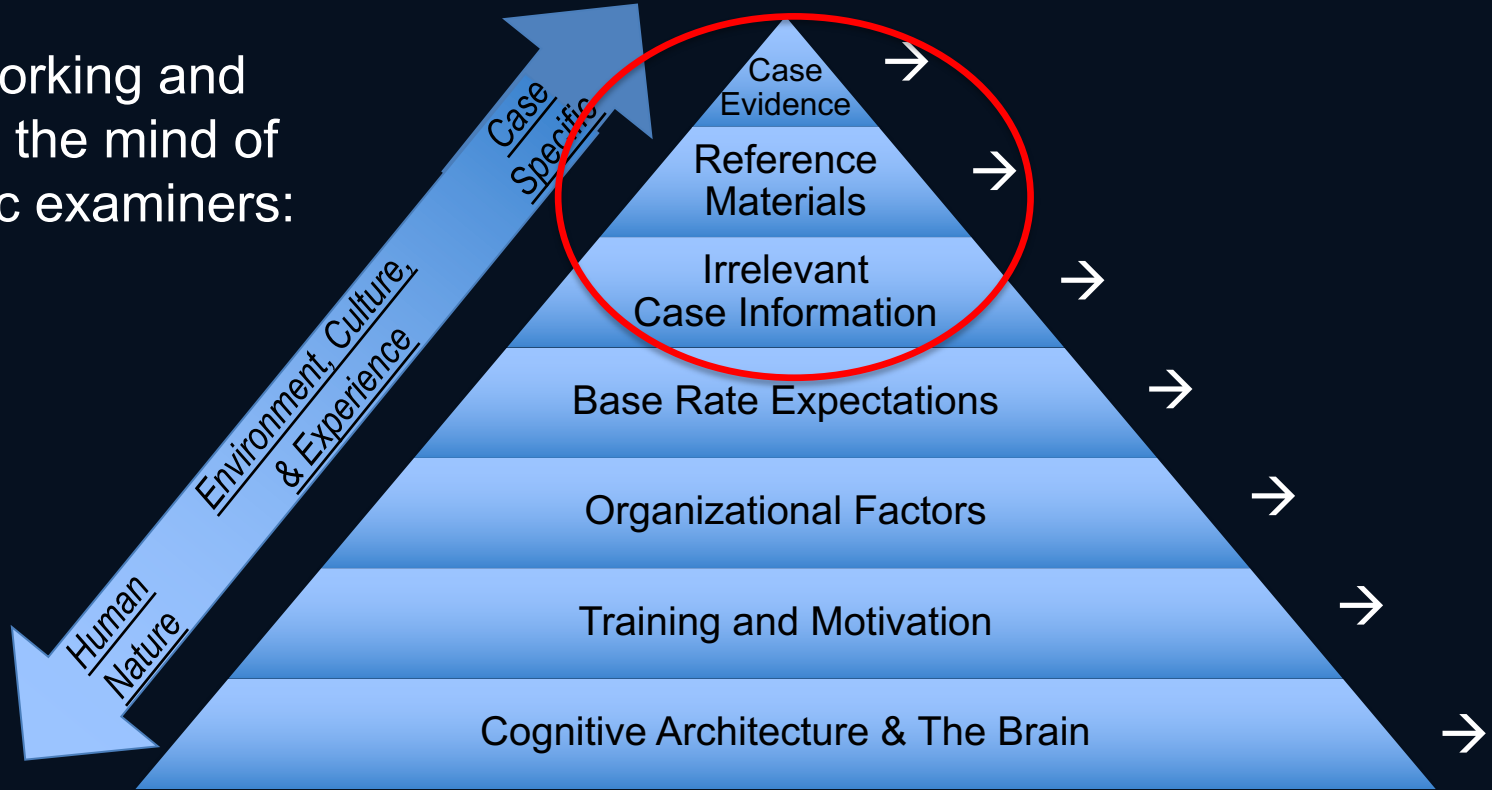
- Going to cover...:
 - Understanding what It Is
 - **Its implications**
 - And what can be done about it

Recap:

- It can bias how we interpret the evidence and our conclusions.
- It can even bias how/what we observe/see/perceive, i.e., bias what the evidence is.

COGNITIVE BIAS IN FORENSIC DECISIONS

‘**Powers**’ working and
influencing the mind of
the forensic examiners:



Empathy and sympathy biases



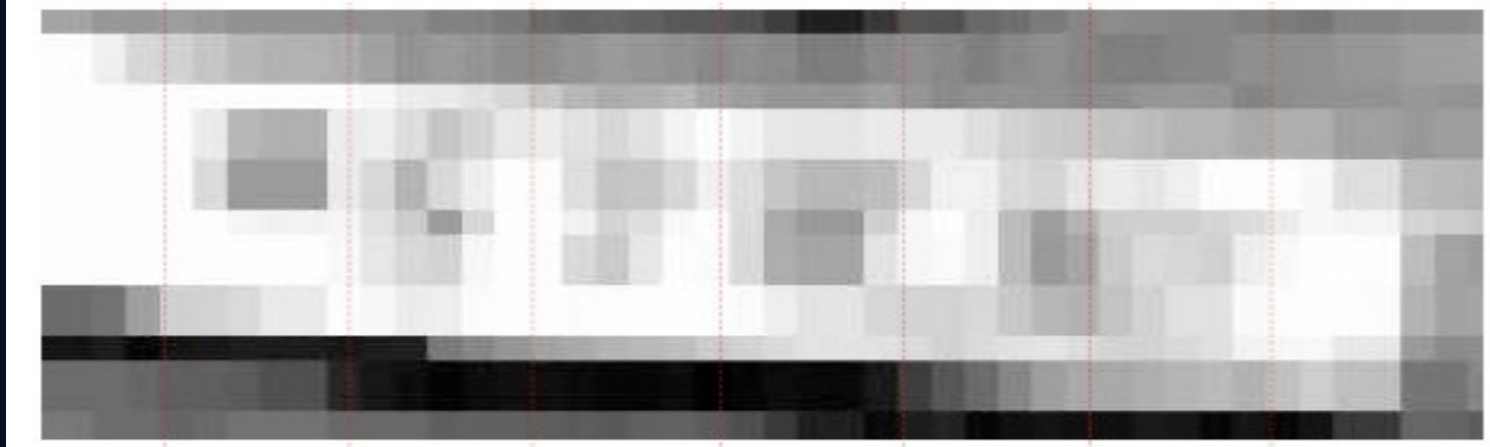
Empathy and sympathy biases

Simple take away message:
Remove irrelevant information,
when possible.

Dave Nobody

Dave Nobody

GOING BACKWARDS...



The image of the car, taken from camera #6 at 00:17.20.

This is the only frame that includes the registration plate of the car.

Linear Sequential Unmasking (LSU)

More information at:

<https://www.sciencedirect.com/science/article/pii/S2589871X21000310?via%3Dihub>

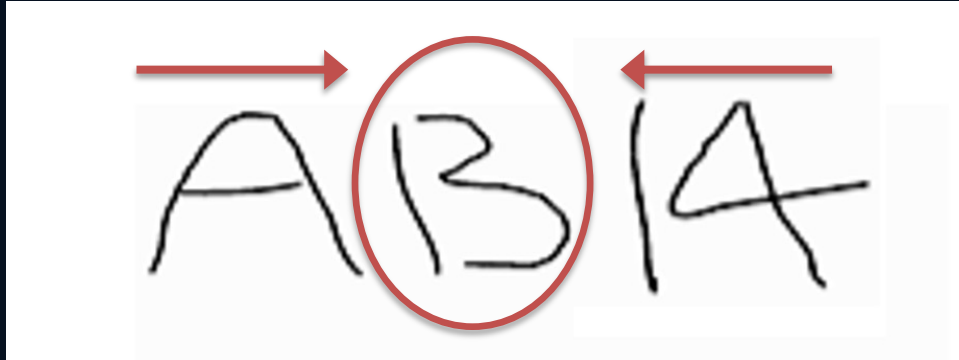
- LSU is aimed:
 - To make sure the data/evidence drive the forensic decision making process.
 - To avoid ‘suspect/target driven bias’
 - To avoid working backward, circularly

Linear Sequential Unmasking (LSU)

A SIMPLE TAKE AWAY MESSAGE:


As much as practically possible, experts should—at least initially—form their opinion based on the raw data itself before being provided with any further information that could influence their opinion.

Illustration:



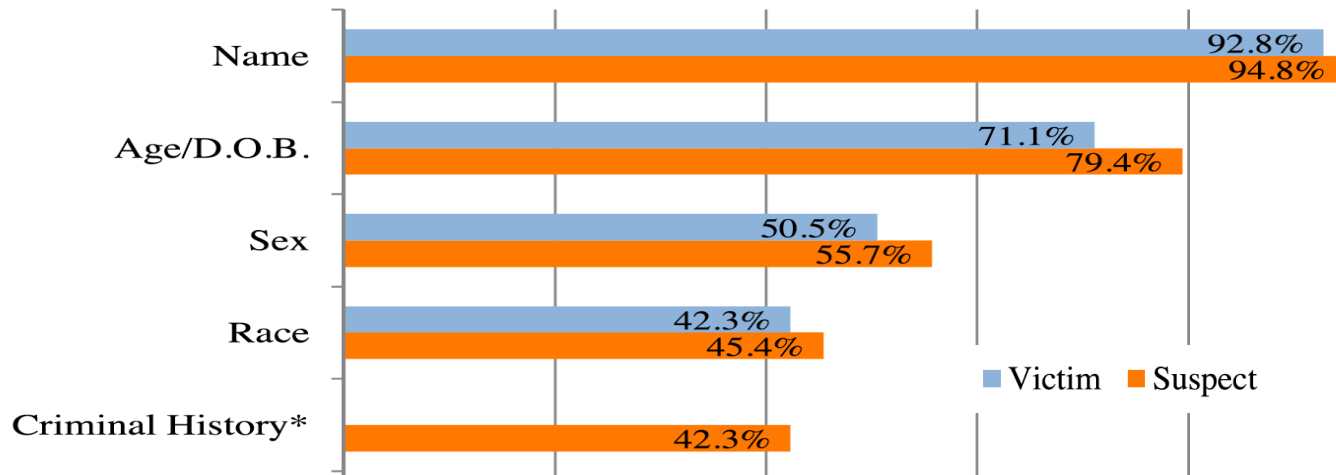
Transferring academic knowledge
of the brain into the real world

COGNITIVE BIAS IN FORENSIC DECISIONS

<i>Information</i>	Task relevant	Task irrelevant
Biasing	??? (LSU)	
Not biasing		Don't waste your time...

We study race in the labor market by sending fictitious resumes to help-wanted ads in Boston and Chicago newspapers. To manipulate perceived race, resumes are randomly assigned African-American- or White-sounding names. White names receive 50 percent more callbacks for interviews. Callbacks are also more respon-

Percentage of Forms Requesting Suspect and Victim Information



Forensic Science International

Volume 297, April 2019, Pages 236-242



Do evidence submission forms expose latent print examiners to task-irrelevant information?

Brett O. Gardner  , Sharon Kelley, Daniel C. Murrie, Kellyn N. Blaisdell



REMARKS:

The above listed suspect is the person who pulled the trigger, making every effort to place him in the truck. One witness riding in the truck was too drunk to make an identification.

NAME OF PERSON REQUESTING EXAMINATION:

Det.

DATE

- This is a formal request...!



- Informal....!!! (bigger problem!)



10371540

REQUEST FOR EXAMINATION
OF PHYSICAL EVIDENCE
SP-997-C (Rev. 10/83)

Department of Public Safety
Division of State Police
Forensic Laboratory

FOR LABORATORY USE ONLY
Lab # FD9010971
Receipt # 43028

SUBMITTING AGENCY:
ADDRESS:
TELEPHONE NUMBER:
CASE NUMBER:
CASE PREVIOUSLY SUBM
IF YES, LAB ID#:
VICTIM(S) NAME
SUMMARY OF CASE: A & B
vehicle, which
prints and his

Homicide

HER AGENCY?
D.O.B. RACE SEX
2/25/7 R M
st in his
The victims
the vehicle.

THE SOLUTION

LIST ITEMS SUBMITTED BELOW (NOTE: Each item must bear an evidence tag or label.)

ITEM #	NAME AND DESCRIPTION OF ITEM TO BE EXAMINED	EXAMINATION REQUESTED
5	Prints to be compared to cards supplied of the suspect To be enhanced if possible.	Comparison of suspect s

(IF THIS SPACE IS INSUFFICIENT, CONTINUE LIST ON THE REVERSE SIDE OF THIS FORM.....)

REMARKS:
The above listed suspect is the person who pulled the trigger, making every effort to place him in the truck. One witness riding in the truck was too drunk to make an identification.

NAME OF PERSON REQUESTING EXAMINATION: Det. [REDACTED] DATE: [REDACTED]



NATIONAL COMMISSION ON FORENSIC SCIENCE

NIST
National Institute of
Standards and Technology
U.S. Department of Commerce

**Ensuring That Forensic Analysis Is Based
Upon Task-Relevant Information**



Forensic Science Regulator
O v e r s e e i n g Q u a l i t y

Cognitive Bias Effects

Relevant to Forensic Science Examinations

FSR-G-217

COGNITIVE BIAS IN FORENSIC DECISIONS

Dr. Itiel Dror

- Going to cover...:
 - Understanding what It Is
 - **Its implications**
 - And what can be done about it
- Recap:
 - Avoid, as much as possible, irrelevant contextual information
 - Start with the actual evidence to minimize going 'backwards'
 - Optimize the sequence of information (LSU)

COGNITIVE BIAS IN FORENSIC DECISIONS



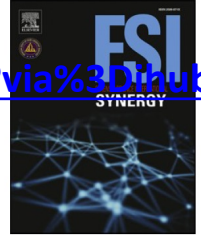
ELSEVIER

More information at: Contents lists available at ScienceDirect

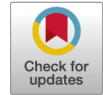
<https://www.sciencedirect.com/science/article/pii/S2589871X21000310?via%3Dihub>

Forensic Science International: Synergy

journal homepage: www.sciencedirect.com/journal/forensic-science-international-synergy



Linear Sequential Unmasking–*Expanded* (LSU-E): A general approach for improving decision making as well as minimizing noise and bias



A practical tool for information management in forensic decisions: Using Linear Sequential Unmasking-Expanded (LSU-E) in casework

COGNITIVE BIAS IN FORENSIC DECISIONS

Reducing the impact of cognitive bias in
decision making: Practical actions for forensic
science practitioners

Kimberly S. Kunkler^a  , Tiffany Roy^b 

Toward better AFIS practice and process in the
forensic fingerprint environment

Caroline Gibb^{a b}  , John Riemen^c

COGNITIVE BIAS IN FORENSIC DECISIONS

Dr. Itiel Dror

- Going to cover...:
 - Understanding what It Is
 - **Its implications**
 - And what can be done about it
- Recap:
 - Avoid, as much as possible, irrelevant contextual information
 - Start with the actual evidence to minimize going 'backwards'
 - Optimize the sequence of information (LSU)

COGNITIVE BIAS IN FORENSIC DECISIONS

- Just as effort and attention is taken to minimise
‘physical contamination’,
→ Effort & attention should also be given to minimise
‘cognitive contamination’

Thank you very much!

COGNITIVE BIAS IN FORENSIC DECISIONS

Dr. Itiel Dror

Itiel@cci-hq.com

- Going to cover...:
 - ✓ – Understanding what It Is
 - ✓ – Its implications
 - ✓ – **And what can be done about it**

Transferring academic knowledge
of the brain **into the real world**