Cognitive Bias in Forensics

mjr. Ing. Martin Nežádal, V-OKTE KŘP Jmk

The Structure of the Police Laboratories in CR

OKTE Brno

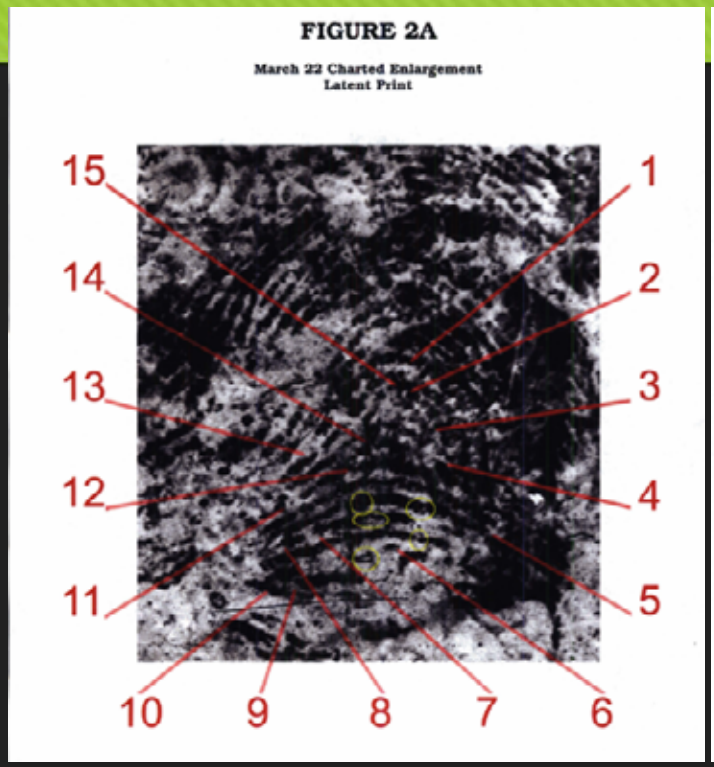
58 persons

88% police officers

90 % university degree

- 45 % Women, 55 % Men
- 40 Years Age Average
- The Full Spectrum of Criminalistic Expertises (from Fingerprints to DNA)
- 9 000 expertises per Year

Bomb Attacks in Madrid, Mayfield Case



U. S. Department of Justice
Office of the Inspector General

A Review of the FBI's Handling of the Brandon Mayfield Case

UNCLASSIFIED AND REDACTED

Office of the Inspector General
Oversight and Review Division
March 2006

STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES

A PATH FORWARD

Committee on Identifying the Needs of the Forensic Science Community

Committee on Science, Technology, and Law
Policy and Global Affairs

Committee on Applied and Theoretical Statistics
Division on Engineering and Physical Sciences

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

2009: NAS Report

The issues covered during the committee's hearings and deliberations included:

…the assessment of forensic methods and technologies—the collection and analysis of forensic data; accuracy and error rates of forensic analyses; sources of potential bias and human error in interpretation by forensic experts; and profciency testing of forensic experts…

Unfortunately, at least to date (2009), there is no good evidence to indicate that the forensic science community has made a suffcient effort to address the bias issue; thus, it is impossible for the committee to fully assess the magnitude of the problem

Cognitive Bias

- Cognition is "the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses". It encompasses processes such as attention, the formation of knowledge, memory and working memory, judgment and evaluation, reasoning and "computation", problem solving and decision making, comprehension and production of language. Cognitive processes use existing knowledge and generate new knowledge.
- 1972 – Daniel Kahneman, Amos Tversky

  Cognitive Bias

They are mostly the essence of prejudice and stereotypical thinking.

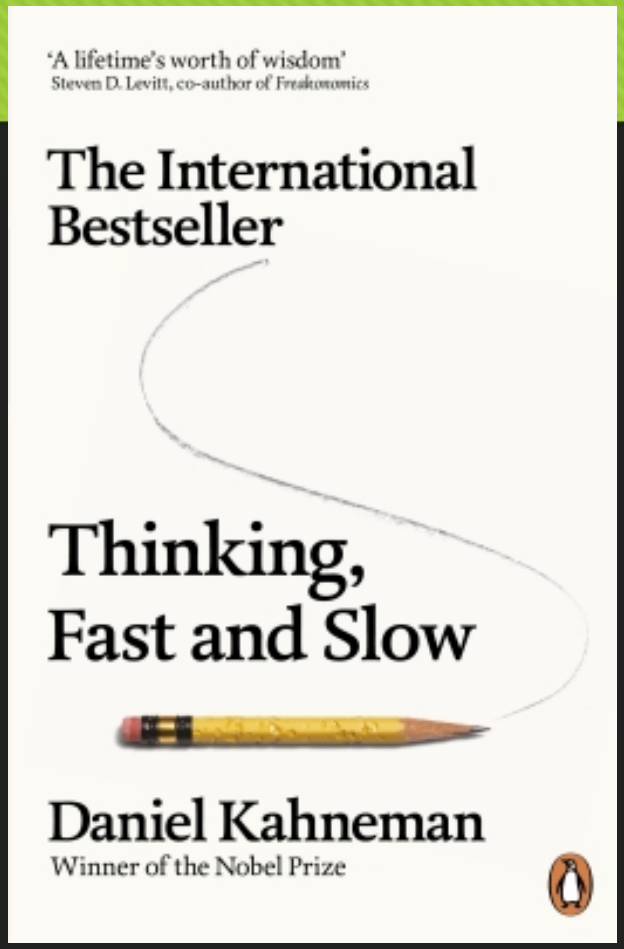
Cogntive Bias

- Cognitive biases are systematic patterns of deviation from norm or rationality in judgment
- They are mostly the essence of prejudice and stereotypical thinking.
- They are natural, not pathological
- They help us to survive

Bias – Where It Comes From?

- Fast mind – System 1
  - Low energy consumption,
  - un-stoppable, very emotional, not exact
- Slow mind – System 2
  - High energy consumption – Thinking is hard
  - Limited time, exact? results

- Primary is Fast Mind but Slow Mind observes itself as VIP
- The key role is to survive not to analyse



COGNITIVE BIAS CHEAT SHEET

BECAUSE THINKING IS HARD

1 TOO MUCH INFO

SO ONLY NOTICE...

- CHANGES
- BIZARRENESS
- REPETITION
- CONFIRMATION

2 NOT ENOUGH MEANING

SO FILL IN GAPS WITH...

- PATTERNS
- GENERALITIES
- BENEFIT OF DOUBT
- EASIER PROBLEMS
- OUR CURRENT MINDSET

3 NOT ENOUGH TIME

SO ASSUME...

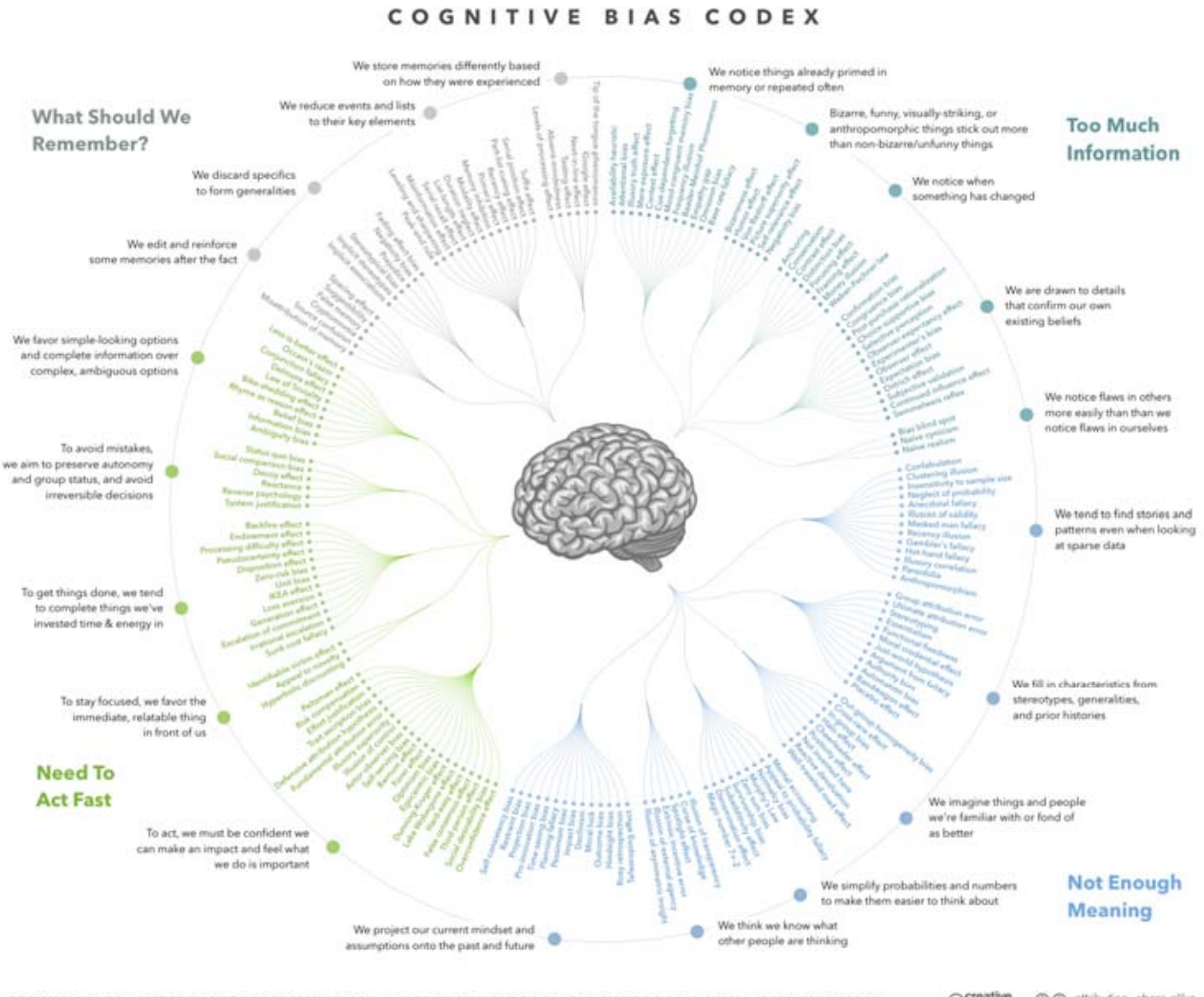
- WE'RE RIGHT
- WE CAN DO THIS
- NEAREST THING IS BEST
- FINISH WHAT'S STARTED
- KEEP OPTIONS OPEN
- EASIER IS BETTER

4 NOT ENOUGH MEMORY

SO SAVE SPACE BY...

- EDITING MEMORIES DOWN
- GENERALIZING
- KEEPING AN EXAMPLE
- USING EXTERNAL MEMORY

BY @BUSTER
HTTP://BIT.LY/THINKING-IS-HARD


COGNITIVE BIAS CODEX
What Should We Remember?
We store memories differently based on how they were experienced
We reduce events and lists to their key elements
We discard specifics to form generalities
We edit and reinforce some memories after the fact
We favor simple-looking options and complete information over complex, ambiguous options
To avoid mistakes, we aim to preserve autonomy and group status, and avoid irreversible decisions
To get things done, we tend to complete things we've invested time & energy in
To stay focused, we favor the immediate, relatable thing in front of us
Need To Act Fast
To act, we must be confident we can make an impact and feel what we do is important
We project our current mindset and assumptions onto the past and future
We think we know what other people are thinking
We simplify probabilities and numbers to make them easier to think about
Not Enough Meaning
We imagine things and people we're familiar with or fond of as better
We fill in characteristics from stereotypes, generalities, and prior histories
We tend to find stories and patterns even when looking at sparse data
We notice flaws in others more easily than than we notice flaws in ourselves
We are drawn to details that confirm our own existing beliefs
We notice when something has changed
Bizarre, funny, visually-striking, or anthropomorphic things stick out more than non-bizarre/unfunny things
We notice things already primed in memory or repeated often
Too Much Information
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APPLIED COGNITIVE PSYCHOLOGY
Appl. Cognit. Psychol. **19**: 799–809 (2005)
Published online 10 May 2005 in Wiley InterScience
(www.interscience.wiley.com) DOI: 10.1002/acp.1130

When Emotions Get the Better of Us: The Effect of Contextual Top-down Processing on Matching Fingerprints

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Itiel E. Dror


MINIMIZING
BIAS IN
FORENSIC
DECISION
MAKING
PRESENTED BY:
DR. ITIEL DROR

Itiel E Dror: Why Experts Make Errors

Journal of Forensic Identification 56(4):600, 2006

Expert latent fingerprint examiners were presented with fingerprints taken from real criminal cases. Half of the prints had been previously judged as individualizations and the other half as exclusions. We re-presented the same prints to the same experts who had judged them previously, but provided biasing contextual information in both the individualizations and exclusions. A control set of individualizations and exclusions was also re-presented as part of the study. The control set had no biasing contextual information associated with it. Each expert examined a total of eight past decisions. Two-thirds of the experts made inconsistent decisions. The findings are discussed in terms of psychological and cognitive vulnerabilities.

Contextual bias

- Contextual bias occurs when well-intentioned experts are vulnerable to making erroneous decisions by extraneous influences
  - the trace evidence itself (Level 1),
  - the reference samples (Level 2),
  - the case information (Level 3),
  - examiners' base rate expectations that arise from their experience (e.g., when the examiner expects a particular result (Level 4),
  - and organizational and cultural factors (Level 5).

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Subjectivity and bias in forensic DNA mixture interpretation☆

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ABSTRACT

The objectivity of forensic science decision making has received increased attention and scrutiny. However, there are only a few published studies experimentally addressing the potential for contextual bias. Because of the esteem of DNA evidence, it is important to study and assess the impact of subjectivity and bias on DNA mixture interpretation. The study reported here presents empirical data suggesting that DNA mixture interpretation is subjective. When 17 North American expert DNA examiners were asked for their interpretation of data from an adjudicated criminal case in that jurisdiction, they produced inconsistent interpretations. Furthermore, the majority of 'context free' experts disagreed with the laboratory's pre-trial conclusions, suggesting that the extraneous context of the criminal case may have influenced the interpretation of the DNA evidence, thereby showing a biasing effect of contextual information in DNA mixture interpretation.

Confirmation Bias

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Cognitive bias in forensic anthropology: Visual assessment of skeletal remains is susceptible to confirmation bias

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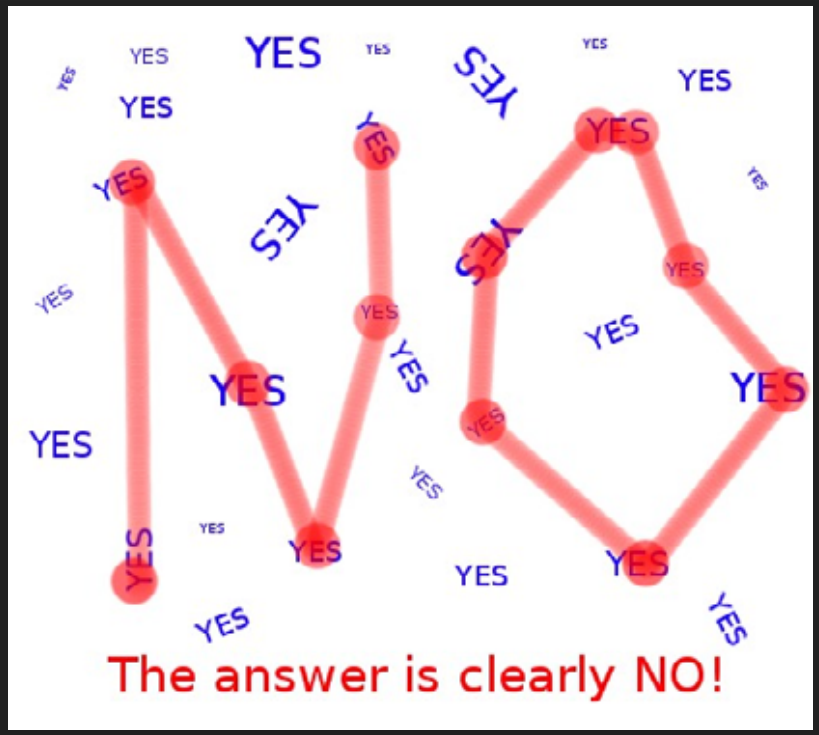
ABSTRACT

An experimental study was designed to examine cognitive biases within forensic anthropological non-metric methods in assessing sex, ancestry and age at death. To investigate examiner interpretation, forty-one non-novice participants were semi randomly divided into three groups. Prior to conducting the assessment of the skeletal remains, two of the groups were given different extraneous contextual information regarding the sex, ancestry and age at death of the individual. The third group acted as a control group with no extraneous contextual information. The experiment was designed to investigate if the interpretation and conclusions of the skeletal remains would differ amongst participants within the three groups, and to assess whether the examiners would confirm or disagree with the given extraneous context when establishing a biological profile. The results revealed a significant biasing effect within the three groups, demonstrating a strong confirmation bias in the assessment of sex, ancestry and age at death. In assessment of sex, 31% of the participants in the control group concluded that the skeleton remains were male. In contrast, in the group that received contextual information that the remains

Confirmation bias

Is the tendency to search for, interpret, favor, and recall information in a way that confirms one's preexisting beliefs or hypotheses.



Bias blind Spot

- *Blind spot bias* is the failure to notice your own cognitive biases
- **Matthew 7:3:**

  Why do you look at the speck in your brother's eye but don't notice the log in your own eye? [e] [4] Or how can you say to your brother, 'Let me take the speck out of your eye,' and look, there's a log in your eye? [5] Hypocrite! First take the log out of your eye, and then you will see clearly to take the speck out of your brother's eye

Role Playing Effect

Policemen or forensic scientist?

- The *role* of *police officers* is to help citizens, protect property and preserve the quality of life in the communities they serve. This leads them to arrest criminals and allow them to be convicted in court
- The role of forensic expert is to find evidencies, collect them, test them and summarize his findings and conclusions in a written report.

Anchoring

The Risk of Bias

Zdroj rizika	Low risk of Bias	High risk of Bias
The quality of result	When results are clear	Results are unclear, space for subjective evalutation
Methodological approach	Well defined standards, based on verfified methods	Ad-hoc approach, absence of research
Experince of expert	Never ending education,	Experts are not well trained, lack of control, development of own methods
Control	Completely independence control	Abesence of control or „group“ controlling
Time	Appripriate time frame	Working under pressure

How to Combat Bias

Combating Bias

- To Identify danger of kognitive bias – permanent education
- To Accept Bias

Bias Danger Zone

Combating Bias

- Take part in interlaboratory tests
- Blind testing
- Clear and well defined methodology
- Independence of laboratory and expert
- Education of External Customer

Combating Bias

- Context management
  - Context blinding
  - Needs active „filtration“ system

Combating Bias

- Linera Sequential Unmasking
- Documentation of all steps of expertise (date and time stamp, all changes of opinion
- Act of expert should be
  - Balanced – it is necessary to mention alternative scenarios and contra-arguments
  - Robust – based on data
  - Logical – Occama razer
  - Transparent – documentated and revision enabled

Combating Bias

- ACE-V metoda
  - A – Analysis
  - C – Comparsion
  - E – Evaluation
  - **V - Verification**

You Are Biased!

Thank you for your attention

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