Cognitive Effects and Cognition of Forensic Experts

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<u>Agenda</u>

- 1. Who am I?
- 2. My research
- 3. Some problems and their possible solutions
- 4. The BIG problem

1. Who am I?

- Itiel Dror
- Got my Ph.D. at Harvard in cognitive psychology
- Do mainly theoretical work on human performance: decision making, expertise, and visual cognition
- Application to a variety of real world domains, such as military (US Air Force), policing, medical, and forensics (mainly fingerprints)

2. My research (in forensics)

- Examining a variety of issues that pertain to cognition of forensic experts:
 - Visual-mental representation
 - Decision model (really how they do it, not ACE-V)
 - Top-down effects on perception and judgment
 - Contextual influences (perceptual and conceptual)
 - Psychological state (e.g., motivation, emotion, state of mind)
 - Bias & error (confirmation bias is only one!)
 - → forensic decision making

Examples published articles:

- Applied Cognitive Psychology (2005)
- Forensic Science International (2006)
- Journal of Forensic Identification (2006)
- Journal of Forensic Sciences (in press, 2008)
 "Meta-analytically Quantifying the Reliability and Biasability of Forensic Experts"
- Examine the potential of context (perceptual and conceptual) as influencing the determinations made by forensic experts.
- →Application of a known phenomena to the domain of forensics
- → Used a within-subject experimental design
- → Covert, ecologically valid, data collection

3. Some problems & their possible solutions

- Generally, lack of scientific underpinning and guidance:
 - Selection (paper)
 - Training (paper)
 - Procedures
 - Use of technology
 - → Guided by psychological research and empirical experimentation (properly done!)

Examples:

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Visual-Spatial Abilities of Pilots

Itiel E. Droi, Stephon M. Kosslyn, and Wayne L. Waag

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Object Identification as a Function of Discriminability and Learning Presentations: The Effect of Stimulus Similarity and Canonical Frame Alignment on Aircraft Identification

Alan R. S. Ashworth III

United States Air Frence Research Faharmory
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Biel E. Dror University of Southampton

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APPLIED COGNITIVE PSYCHOLOGY Appl. Cognit Psychol. (in press)
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Helping the Cognitive System Learn: **Exaggerating Distinctiveness and Uniqueness**

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Discrimination of the caricature adounting demonstrates that performance is better when exaggerated stimuli are presented rather than statistical image. This can be understood with respect to a theoretical framework in which caricaturing maximines the disarctiveness and then antimines any perceptual or representational confusion. In this study we examine the possibility to humans caricatures to enhance distances the contractive of the study and respect to the possibility to humans caricatures to enhance distances reasons of the kannel antiented. This in turn helps to construct representation that correctly direct attention to the critical information. We trained 115 participants to identify aircraft across any orientation and found that the use of caricature is advantageous. However, the caricature advantage was most effective in complex learning where it is difficult to differentiate among different sizerall. Furthermore, the caricature advantage for subsequent recognition is attenuated when a strength of the contractive contractive to the contractive contractive and the laborate given and the strength of the contractive contractive to the contractive contractive of the laborate given and the contractive contr

To maximise the potential of learning one must consider the workings of the human cognitive system. Understanding and correctly tapping into the human cognitive mechanisms involved in learning should enable to construct more efficient learning (Dror, 2007; Dror, in press). By efficient learning we mean that maximum knowledge is learned and remembered with minimal time and cognitive investment. The complicated and tricky step is how to connect and translate our understanding of the cognitive system to practical implications in learning. In this paper we try to do just that; namely to take the 'caricature advantage' effect and see if and how it can be utilised to enhance learning.

Within the face processing literature, a phenomenon known as the 'caricature advantage has emerged. This describes the situation in which the processing of a familiar face is achieved more quickly or more accurately when presented with a distorted image of the person than when viewing an accurate image (see Rhodes, 1996 for a review). On the face of it, the fact that performance is improved despite the presentation of an image that is no longer faithful would seem to be counter-intuitive, especially given evidence which suggests that a mere change in viewpoint or expression can adversely affect subsequent ognition performance (Bruce, 1982). Nevertheless, the effect remains strong, and is

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3. Some problems & their possible solutions

- Generally, lack of scientific psychological research and empirical validation:
 - Selection (paper)
 - Training (paper)
 - Procedures
 - Use of technology

However, these issues are:

- 1.Not unique to forensics
- 2.Solvable

4. The BIG problem

- Not the bias, nor the findings, etc.
- But the responses and attitude to research, the lack of openness and willingness to take on challenges
- In contrast to other real 'life and death' domains (such as medical and military), forensics (and in particular fingerprint) are resistant and even resentful to criticism, examination, scrutiny, etc.
 - necessary tool for any field to advance

- As if they are in court, in an adversarial set-up, where different sides have a priori positions and are against one another.
 Rather than we are all on the same side, wanting to advance and promote reliable, valid, and widely used forensics.
- The response and attitude of the forensic community (not all), and in particular fingerprint (not all), is the biggest obstacle in the advancement of this field.

Dias is an oid and established

Some, not all, references:

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- Zhaoping, L. and Guyader, N. (2007) Interference with bottom-up feature detection by higher-level object recognition. Current Biology 17, 26-31
- Scientific (and even non-scientific) domains have been addressing it, e.g., blind ratings,

Examples to illustrate the problem:

1. SWGFAST:

Does not have, never had, a single cognitive psychologist.

Not that having one will 'solve' the problems, but what does it reflect that the body that establishes procedures to 'combat' bias and other cognitive effects (e.g., Mayfield) has resisted having any expertise in this area

(or even properly learning about these issues). (result, e.g. → naive view that 'knowing' and 'being aware' by itself is sufficient).

- 2. The Friction ridge Sourcebook. Cognitive and contextual bias have led to erroneous identification (e.g., Mayfield), they are discussed in courts (e.g., Maryland vs. Rose)
 - → You would think that a sourcebook would emphasise and bring to the forefront such issues...

Well, think again!

In fact, attempts to hide/bury/censor these issues!

3. The letter of the Head of the Fingerprint Society, published in their professional journal:

Any forensic experts that may be susceptible to cognitive bias or/and contextual effects are "immature", "incapable" and "should seek employment in Disneyland"!

Those who collaborate should "know better", etc.

It is also important to stress that it is not all 'bad news'; there is change and there is openness by some. However, these are limited, slow, and unsystematic.

I want to thank the National Academia of Science committee for inviting me and listening, and I hope the committee will do the right things to deal with these issues and advance this important domain.

Thank you,

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