

MedEye: role of expertise in perceiving dynamic medical images

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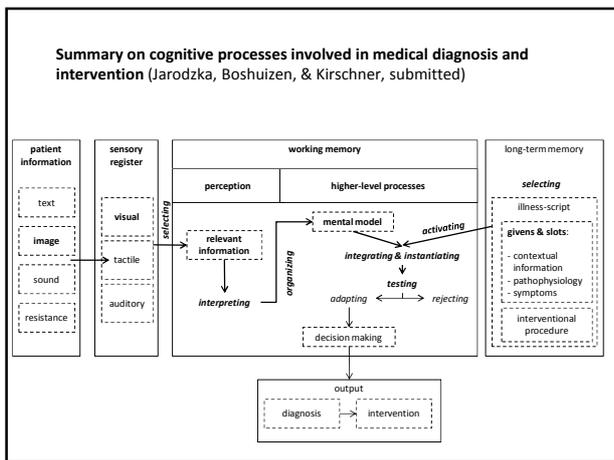
MedEye

Role of Expertise in Perceiving Dynamic Medical Images

Halszka Jarodzka, Els Boshuizen, & Kenneth Holmqvist



Theories & research findings
THEORETICAL PART OF THE MEDEYE PROJECT



Perceptual skills in pediatric neurology

(Bass & Chiles, 1990; Chi, 2006; Krupinski, 2010; Manning et al., 2005; Nodine & Krupinski, 1998)

1. Specifying <i>body parts</i> that might be affected by the disease	Visual search and identification of uncommonly moving body parts	 Diagnostic system: International League Against Epilepsy, 2010 Based on perceptual input, i.e., perceptual skills Differential diagnosis: Egger et al., 2003; Hansen & Balslev, 2009 Based on conceptual knowledge
2. Specifying the <i>motion pattern</i> of these body parts	Visual inspection of suspected body parts and interpretation of their motion	
3. Specifying infant's state of <i>consciousness</i>	Visually inspecting and interpreting facial indicators for consciousness	
4. Indicating the involvement of the <i>face</i>	Visual search and identification of uncommon motion or lack of it within the face	
5. Indicating a <i>change in motion</i> after touching	Visual search and identification of change in motion	
6. <i>Diagnosis</i> of the disease	Assignment of observations to the according diagnostic code	

Analysis of perceptual skills in dynamic images

- ... in classifying biological locomotion patterns.
Jarodzka, Schelter, Gerjets, & Van Gog (2010). *Learning and Instruction*
- ... in diagnosing epileptic seizures in infants.
Balslev, Jarodzka, Holmqvist, De Grave, Muijstens, Eika, Van Merriënboer, & Scherpbier (2011). *European Journal of Paediatric Neurology*
- ... in controlling air traffic.
Van Meeuwen, Jarodzka, Brand-Gruwel, Van Merriënboer, De Bock, & Kirschner (in prep)
- ... in diagnosing based on PET / CT.
Gegenfurtner, Jarodzka, Lehtinen, & Säljö (in prep.)







Characteristics of Visual Expertise

- Perceptual skills required for dynamic stimuli
 - efficient visually search within (equally) salient relevant and irrelevant elements and detection of relevant elements
 - correct interpretation of (the motion of) these elements
- Knowledge- and experience-based shortcuts (*fish only*)
 - increase with expertise & enable a fast and correct reaction
 - found in verbal and in eye tracking data
 - strategies become more diverse with increasing expertise (as measured by string-editing Levenshtein method of scanpaths) ← *may be different for the other tasks!*

EMPIRICAL PART OF THE MEDEYE PROJECT

Conclusions from pilot study

- Results show that it is easier to detect present general movement than detect the absence of it (i.e., true positive > true negative)
- Further analyses revealed that this result is not due to the visual search of the motion, but rather on its interpretation and evaluation.

For more questions on this talk,
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