


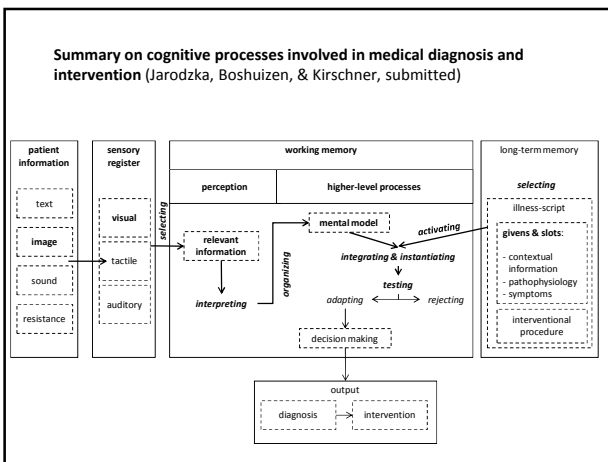
## MedEye

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

**Halszka.Jarodzka@OU.nl**