Role and Development of Perceptual Skills in Medical Education

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Perceptual Skills (cf. CN, 2006; Manning et al., 2005)

1. Visual search of relevant elements
   - Which body parts are affected by the disease?
   - Is the face diseased?

2. Interpretation of relevant elements
   - How do these body parts move?
   - Level of consciousness?
   - Change of movement after touching?

3. Assignment of observations to the according technical term
   - Diagnosis of a disease

Research Questions of this Project

1. Analyzing the role of perceptual skills on different expertise levels.
   - Expertise difference study with eye tracking and thinking aloud while diagnosing patient video cases.


2. Developing and testing a method to teach perceptual skills.
   - Instructional design study with eye tracking and performance data on diagnosing patient video cases.

Conveying Perceptual Skills

Many instructional material use expert knowledge to convey skills to learners.

Two prototypical instructional methods for initial skill acquisition are:

1. Worked examples
2. Cognitive modeling
Novel Instructional Approach

Eye Movement Modeling Examples

![Diagram showing expert and student with sensors and gaze tracking]


Research Questions

1. Does EMME guide the students’ attention?
2. Does EMME lead to a more efficient visual search?
3. Does EMME lead to a better interpretation performance?

Learning Phase: Attention Guidance

Two single infants aged 3 weeks and 7 months; prototypical cases of epilepsy

2 Videos

“Please take a look at the way the infant behaves.”

Which body parts are affected by the disease?
How do those body parts move?
Do the movements change after touching the infant?
Is the face diseased?
What is the infant’s level of consciousness?

Testing Phase: Visual Search of Relevant Elements

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Design & Sample Size

N = 60 medical students in their final year

Eye movement modeling examples during learning

Control | Circle display | Spotlight display
---|---|---
20 | 20 | 20

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Testing Phase: Interpretation of Relevant Elements

- Two videos of infants aged 3 weeks and 7 months, prototypical cases of epilepsy
- Please take a look at the way the infant behaves.

Which body parts are affected by the disease?
How do these body parts move?
Do the movements change after touching the infant?
Is the face diseased?
What is the infant’s level of consciousness?

17-50 sec
Blank

Research Questions

1. Does EMME guide the students’ attention?
2. Does EMME lead to a more efficient visual search?
3. Does EMME lead to a better interpretation performance?

Results: Does EMME Guide the Student’s Attention?

- Euclidean distance over time between model’s and student’s gaze points
- Dwell time on relevant areas

Results: Does EMME Guide the Student’s Attention?
Research Questions

1. Does EMME guide the students’ attention?

2. Does EMME lead to a more efficient visual search?

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Multiple-choice questionnaire

Summary

1. Successful attention guidance:
The Euclidean distance over time between the expert’s and the student’s gaze points is smaller for the spotlight display group compared to the other two groups.

2. More efficient visual search:
Students, who learnt with the spotlight EMMEs had higher dwell times on relevant areas compared to the other two groups.

3. Better Interpretation performance:
Students, who learnt with the spotlight EMMEs had higher correctness scores in the MCQs compared to the other two groups.

Thank you for your attention!

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