Toward an integrated analysis of verbal and visual data

the quest for expertise indicators

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Goal

• Develop a theory of medical expertise development in visual domains

• … with the aim to develop instruction and support for different levels of development
What is the problem?

• Expertise theories have been developed in non-visuals domains and paradigms
  – Problem solving in these studies departed from ‘pre-digested’ information, using terms taught to students
• Isolated facts about expertise effects in indicators of visual information processing
  – Nothing or little about processes of information extraction
• Hardly any examples of combined analysis of visual and verbal information processing data
Encapsulation

- Large numbers of detailed, biomedical concepts are ‘encapsulated’ under higher order concepts
- that link biomedical and applied sciences
Structure of medical expert knowledge

Illness scripts

Enabling conditions

Fault

Consequences

Integrated knowledge network

Diagnosis

Management

Enabling conditions

Fault

Integrated knowledge network

Diagnosis

Management
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Perception and expertise

- Decreased entry time
- Fewer fixations
- Longer fixation duration; larger visual span/larger functional visual field
- Anticipatory
- Increased eye-hand span
Perception and expertise

- Decreased entry time
- Fewer fixations
- Longer fixation duration; larger visual span/larger functional visual field
- Anticipatory
- Increased eye-hand span
  - But susceptible to many other influences as well (e.g., age-related) that are not fully documented so far
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Complications

• Problem representation
  – Outcomes and explanation tasks

• Problem solving process
  – Perception & thinking
Toward a solution

- Reinvent encapsulations
- Develop visual-verbal coordination measures
Reinvent encapsulations

- Increased coherence
- Step skipping (compared to model)
- Disappearance of low level concepts, but which??
- Appearance of high level concepts
- Time
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Develop visual-verbal-manipulation coordination measures

• On scarfs and transition matrices

Daniel Richardson

Presented at ASC2012 Using eye tracking to design and evaluate education and training methods

http://tinyurl.com/CELSTEC-ASC2012
cross recurrence plots

Recurrence
Recurrence at a particular time lag = density along a diagonal

49 Dyads - Superimposed CRP
THANK YOU