– Eye-Tracking –
Research in Learning and Instruction

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Eye tracking workshop
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Adapted from a workshop given at the JURE 2010 given by Van Gog & Jarodzka

Overview

<table>
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<th>What is eye tracking?</th>
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<td>Why do we look at certain areas?</td>
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<td>Eye Tracking in Research on Learning and Instruction</td>
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<td>What types of dependent variables are out there?</td>
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What is eye tracking?

• Tracking the movements of the eyeball(s) to learn where a person looked at, for how long, and in which order.

A brief history of eye tracking

from Tatler (2005)

Modern video-based eye tracking

Why do we look at certain areas?

Influences on eye movements

1. Free examination
2. Estimate material circumstances of the family
3. Give the age of the people
4. Surmise what the family had been doing before the arrival of the unexpected visitor
5. Remember the clothes worn by the people
6. Remember positions of objects and people in the room
7. Estimate how long the visitor had been away from the family

Eye Tracking in Research on Learning and Instruction

Main applications of eye tracking

- reading research
- commercials
- automobile industry
- disabled people
- etc.
Eye tracking as an **analysis** tool

Insight into underlying mechanisms of instructional design effects

**Split-attention effect:**

Requiring learners to divide their attention between two mutually referring information sources (e.g., text and picture) hampers information processing compared to an integrated format.

Investigating expertise differences on a process level

**Expertise differences in attention allocation**

Individuals with higher expertise attend faster and relatively more to relevant information than individuals with less expertise

- Charness et al., Memory and Cognition, 2001
- Jarodzka et al., Learning and Instruction, in press
- Van Gog et al., Applied Cognitive Psychology, 2005

Investigating Expertise Differences in Perceptual Tasks with Dynamism


1. "Please take a look at the way the fish swims."
   - Eye movements

2. Description of the locomotion pattern
   - Performance

3. "Please watch the replay and tell me what you were thinking during your first viewing."
   - Cued retrospective reports

Diagnosis in pediatric neurology


**Expertise Differences in Air Traffic Control**


<table>
<thead>
<tr>
<th>Knowledge Level</th>
<th>Task Difficulty</th>
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<tr>
<td>Experts (n=8)</td>
<td>x Easy</td>
</tr>
<tr>
<td>Intermediates (n=8)</td>
<td>Medium</td>
</tr>
<tr>
<td>Novices (n=15)</td>
<td>x Difficult</td>
</tr>
<tr>
<td>measures</td>
<td>Performance</td>
</tr>
<tr>
<td>Eye movements</td>
<td>Thinking aloud</td>
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<tr>
<td>Spatial ability</td>
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Eye tracking as an **input** device

**Cued Retrospective Reporting**

- However, eye tracking data do not tell us anything about **why** someone was looking at something
- Replaying record of **own** eye movements
- Better results than retrospective reporting without cue
- Equal results to concurrent reporting (thinking aloud)

*Van Gog et al., Journal of Experimental Psychology: Applied, 2005*

**Eye Movement Modeling Examples**

Show learners a record of eye movements of the model in the examples


**What types of dependent variables are out there?**

- Prerequisites: Types of eye movements
- Basic measures: not stimulus related
- AOs
- Basic measures: stimulus related
- Complex measures
For questions on eye tracking workshops, please contact me:

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