

Eye tracking research at CELSTEC, OU

Dr. Halszka Jarodzka
 Free Hands-on Eye Tracking Workshop:
 SMI Eye Tracking Glasses on Tour in the Netherlands
 9th December 2011

Welcome at the Open University of the Netherlands!

- Public university with open admission and distance education
- Degree programmes (BA, MSc, PhD) in
 - Psychology, Law, Management, Cultural Studies, Informatics, Natural Sciences, Education
- Focus on life long learning
- In addition to this, the university has an expertise centre, which develops innovative teaching methods for distance education and higher education in general and is aimed to support the different schools of the OU...



Centre for Learning Sciences and Technologies - CELSTEC

- Four programs
 - Learning and Cognition
 - Learning Networks
 - Mobile Learning
 - Serious Gaming
- with three functions
 - Research
 - Open Laboratories
 - Solutions
- Our research focuses specifically on educational technology, i.e. the use of innovative methods and technologies at OU and other institutions of higher education.



Research methodologies and research labs



Prof. Paul Kirschner
Research & Methods



Prof. Marcus Specht
Labs & Innovations



Dr. Liesbeth Koster
L & C Lab Coordination



Dr. Halszka Jarodzka
ET Lab

Eye tracking equipment at CELSTEC

Mobile eye tracker: SMI HED



Monitor-mounted eye tracker that can be used as a stand-alone version:
 SMI RED 250

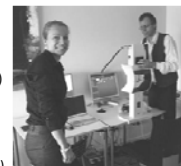


Monitor-integrated eye tracker:
 Tobii 1750



My relation to eye tracking ...

- **Ph.D.** on the characteristics and training of visual expertise investigated via eye tracking and verbal reports (2007-2010)
- **Research stays** in a large eye tracking lab in Sweden (Humanities Lab in Lund)
- **Assistant professor** at CELSTEC, OU with the task to expand eye tracking lab and the according research (since July 2010)
- **Research** on both applied (dynamic scenes, expertise differences, EMME, mental effort, web search, ...) and basic eye tracking topics (scanpath similarity measure, eye-hand measure)
- **Trainings** on the eye tracking methodology (IPN Kiel, JURE, ICO, Stanford, ...)
- **Co-author** of the eye tracking book: Holmqvist, Nyström, Andersson, Dewhurst, Jarodzka, van de Weijer (2011)
- Part of **Orga** team of the ECEM 2013

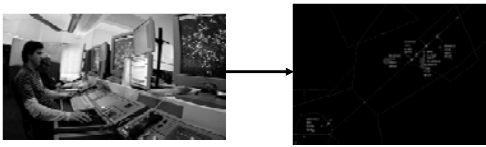


EYE TRACKING RESEARCH @ CELSTEC

- Eye tracking @ CELSTEC (previous research)**
- Cued Retrospective Reporting
 - Visual expertise
 - Eye Movement Modeling Examples


Triangulating eye tracking data: Cued Retrospective Reporting

- Eye tracking data tells us where a person looked at and for how long, but not **WHY**.
→ methodological triangulation with verbal data
- Replaying recordings of participants' own eye movements and asking them to tell what they were thinking while performing the task
- Van Gog et al., *Journal of Experimental Psychology: Applied*, 2005

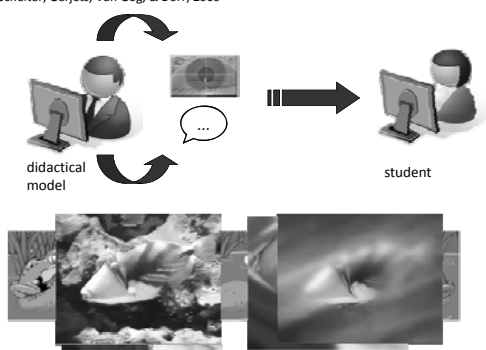


Investigating perceptual aspects of expertise

- ... in controlling electrical circuit
Van Gog, Paas, & Van Merriënboer (2005). *Applied Cognitive Psychology*
- ... in classifying biological locomotion patterns
Jarodzka, Scheiter, Gerjets, & Van Gog (2010). *Learning and Instruction*
- ... in diagnosing epileptic seizures in infants
Balslev, Jarodzka, Holmqvist, De Grave, Muijtjens, Eika, Van Merriënboer, & Scherpbier (2011). *European Journal of Paediatric Neurology*



Training of visual expertise: Eye Movement Modeling Examples
Dorr, Jarodzka, & Barth, 2010; Van Gog, Jarodzka, Scheiter, Gerjets, & Paas 2009; Jarodzka, Balslev, Holmqvist, Nyström, Scheiter, Gerjets, & Eika, 2010; Jarodzka, Scheiter, Gerjets, Van Gog, & Dorr, 2009



- Eye tracking @ CELSTEC (ongoing studies)**
- Visual expertise
 - ATC (Van Meeuwen, Jarodzka, Brand-Gruwel, Kirschner, de Bock, & Van Merriënboer)
 - MedEye / Eye of the master (Jarodzka, Jaarsma, & Boshuizen)
 - Methodological aspects of ET
 - WebQuest (Argelagos, Brand-Gruwel, Jarodzka, & Pifarre)
 - Mental effort measures with ET
 - MousEyeME (Van Mierlo, Jarodzka, Kirschner, & Kirschner)
 - Testing design (Jarodzka, Janssen, Kirschner, & Erkens)
 - Neuro-psychological ET studies
 - Gym2Learn / Eat2Learn (De Groot, Jarodzka, & Kirschner)

Van Meeuwen, Jarodzka, Brand-Gruwel, Van Merriënboer, De Bock, & Kirschner

Processes mediating expertise in air traffic control



Amsterdam Airport Schiphol









MedEye / Eye of the master: visual expertise in medicine


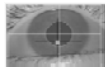

WU medisch centrum
Lund University Humanities Lab

Two scenarios

Diagnosing *dynamic* ultrasound videos of foetuses

Diagnosing *interactive* histological slides

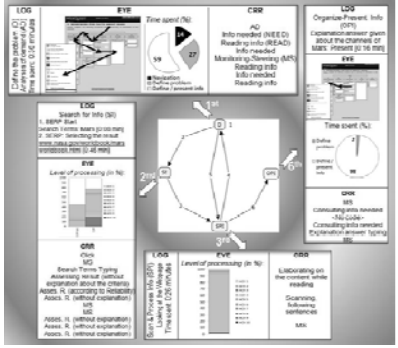




Jarodzka, Jaarsma, Holmqvist, & Boshuizen




Jaarsma, Jarodzka, Boshuizen, & Van Merriënboer

Argelagos, Brand-Gruwel, Jarodzka, & Pifarre

WebQuest: Methodological triangulation of LOG, EYE, and CRRR






Universidad de Lleida

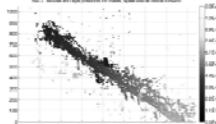
Van Mierlo, Jarodzka, Kirschner, & Kirschner

MousEyeME: Eye-mouse error & delay as indicators for mental effort

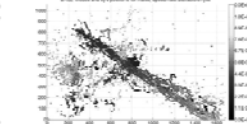
Tracking motion of objects with the eyes and the mouse

easy (slow & no distractors)




difficult (fast & distractors)





Jarodzka, Janssen, Kirschner, & Erkens

Testing made easier: Avoiding split attention



vs.

Two different types of mental effort?

explicit

self-reports


explicit utterances

implicit

silent pauses

fixation durations



pupil dilations



De Groot, Jarodzka, & Kirschner

Gym2Learn / Eat2Learn: Influence of physical activity and nutrition on learning

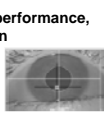



Brein, Leefstijl & Leren

t₁ → t₂ → t₃

t₁ → t₂ → t₃

DV: learning performance, perception

For more information on
this talk:

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