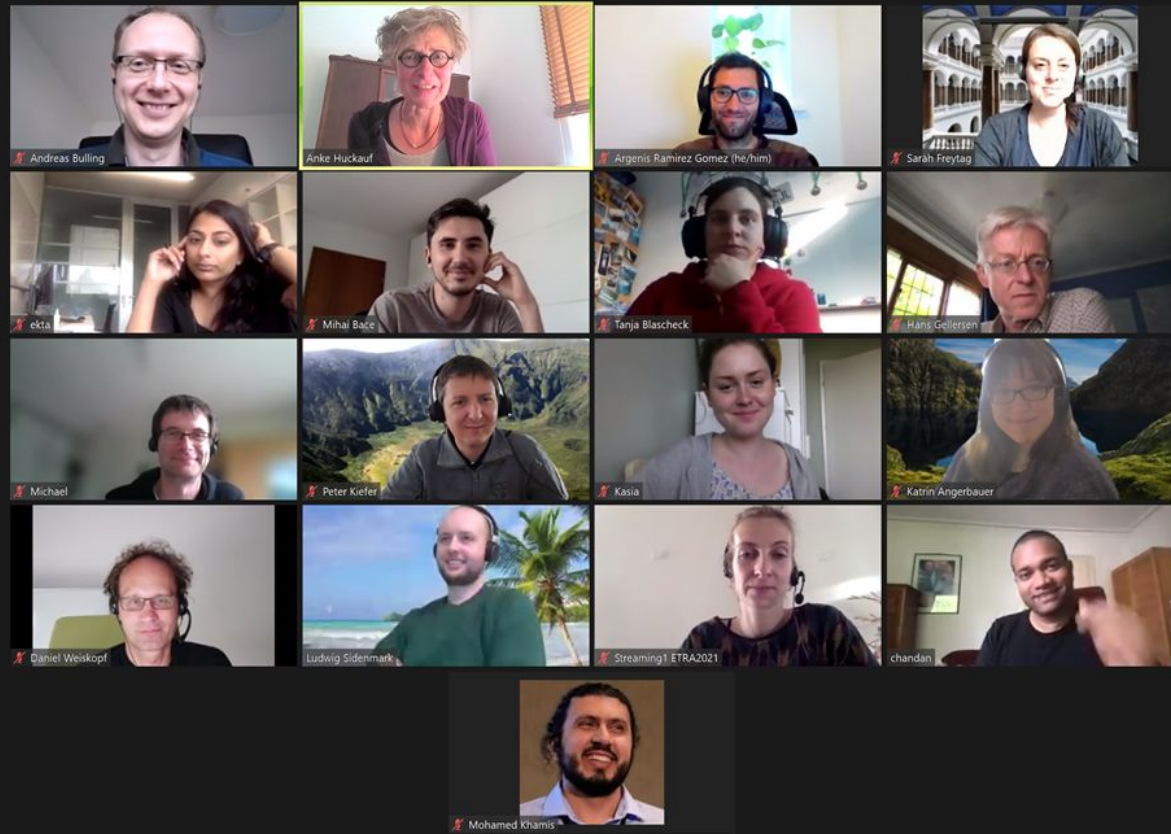


# Screenshots taken during ETRA 2021

A collaborative document

# organizing



# Organizing II



# Welcome

## Conference Platform: MeetAnyway

Make use of the social meeting facilities any time – it's fun!

Have a virtual coffee break with colleagues

Visit sponsor booths

Make new friends

**Enjoy!**






**ETRA** 2021

*BRIDGING COMMUNITIES*


| 24



# Sponsors1 EyeSquare



**ETRA 21**  
eye square  
Human Insight Technologies



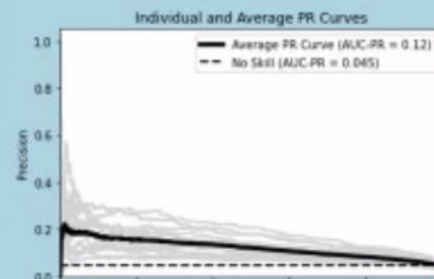
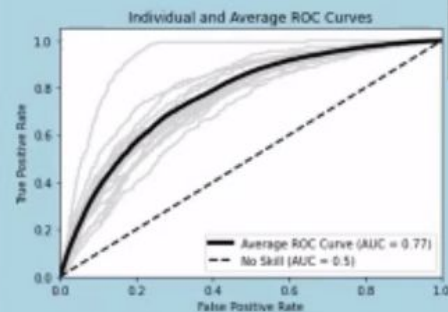
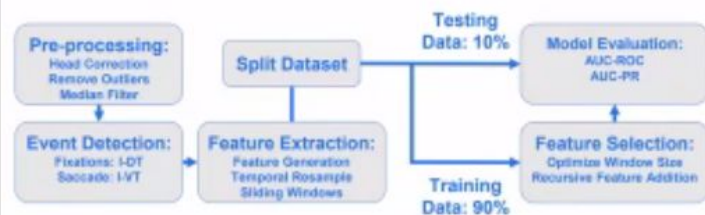
Teresa Hirzle

# Short Paper Previews

## Predicting intent to interact

Find us during the Poster Sessions for more details.

Contact: [brendanjohn@ufl.edu](mailto:brendanjohn@ufl.edu)



# Keynote I Peter König

Amazing introduction





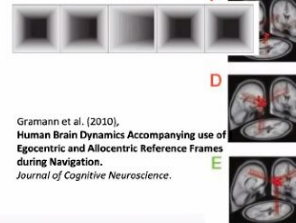
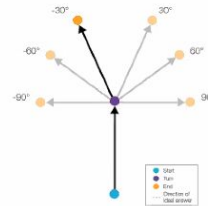
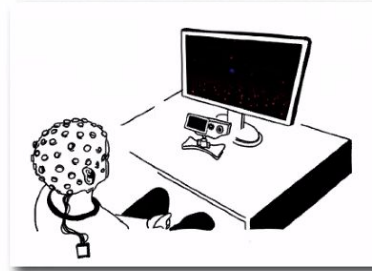
# Keynote Peter König 2

## On the role of embodied cognition



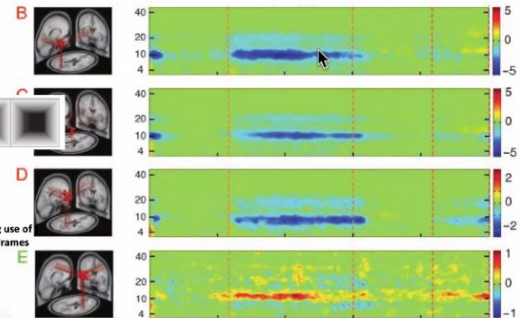
Recording

### 2 - MOVE



Gramann et al. (2010),  
Human Brain Dynamics Accompanying use of  
Egocentric and Allocentric Reference Frames  
during Navigation.  
*Journal of Cognitive Neuroscience.*

Previous EEG spatial navigation studies find alpha suppression in parietal and occipital areas during spatial updating. However, with few exceptions, they are conducted using stationary setups.

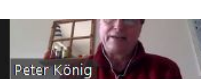


**Statements on the physiological mechanisms of real world navigation are often based on extrapolation.**



# KeyNote

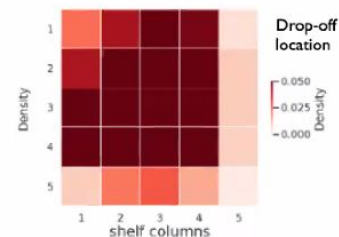
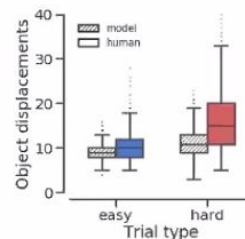
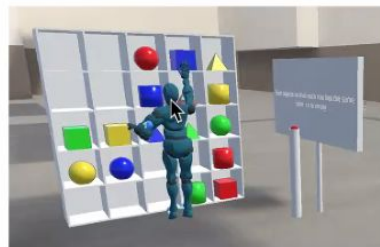
## 1 - Peter König



Recording

Keshava A et al. (2021) bioRxiv

### WHAT DO GAZE MOVEMENTS TELL ABOUT THE INTENDED ACTION?



Task and performance. In contrast to previous studies, we investigate non-overtrained tasks.

**Left:** In a virtual environment participants sorted objects based on color and/or shape while we measured their eye and body movements. Sorting objects based on just one object feature were considered EASY, whereas sorting based on both features was considered HARD.

**Middle:** Humans can do this task well and perform near optimal ( $\Delta \sim 1$ ) or at a moderate penalty ( $\Delta \sim 6$ ) in EASY and HARD trials respectively.

**Right:** Visualizing the drop-off locations reveals a strong bias to the 4 left most and 4 top most shelves. This is not part of the task and a voluntary decision by the subjects. We observe this bias in virtually all of our 60 subjects.

**Humans use task irrelevant constraints to reduce search space.**

# Keynote

## Peter König

### 3

## Comparison of Eye Trackers



Ehinger et al. (2019) PeerJ

### EQUIPMENT, EYE TRACKING

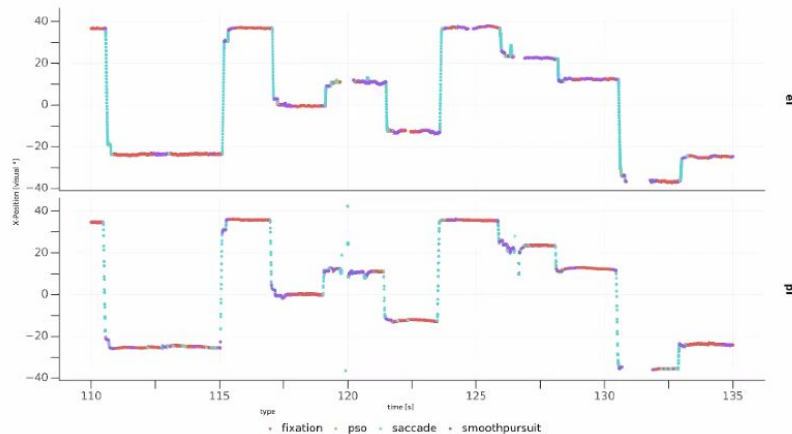
To validate our mobile eye tracker we perform simultaneous (!) recordings with a high quality lab standard eye tracker.



SR Research



Pupil Labs



The overall shape and even little details match in both recordings.

A quantitative evaluation (data not shown) confirms the subjective impression of these example data.

**The quality and congruence of the two eye trackers is high.**

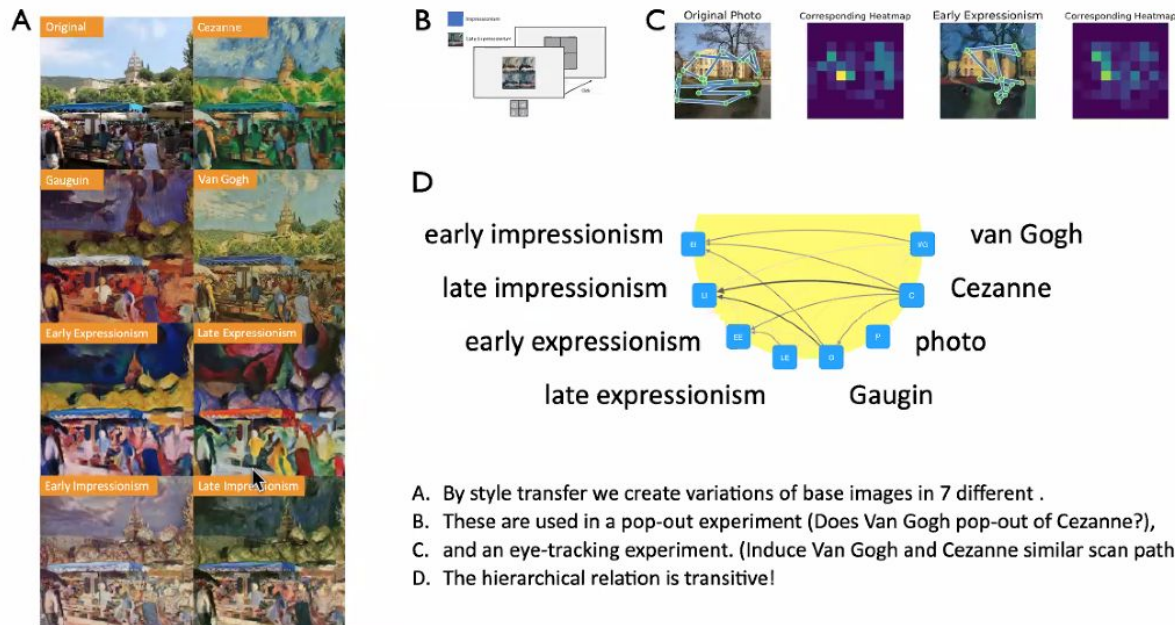
# Keynote 1

## Peter König



Clay V et al. (2020) JEMR

### A QUANTITATIVE ANALYSIS OF THE TAXONOMY OF ARTISTIC STYLES



- A. By style transfer we create variations of base images in 7 different .
- B. These are used in a pop-out experiment (Does Van Gogh pop-out of Cezanne?),
- C. and an eye-tracking experiment. (Induce Van Gogh and Cezanne similar scan paths?).
- D. The hierarchical relation is transitive!

**We can use measurement of eye movements (and pop-out) for an objectively defined taxonomy of artistic styles.**

# Session 2

The image is a composite of three screenshots from a virtual conference session.

**Left Screenshot (Presentation Slide):** The slide is from the University of Tübingen and is titled "Compare Dictionaries". It compares two methods: "Too Large" (marked with a red X) and "MinHash" (marked with a green checkmark). Below the comparison, it states: "The minimal response of a set of has functions over the dictionary → repeated comparison of randomly subsequences of two scanpaths".

**Middle Screenshot (Q&A Chat Window):** This window is titled "Fragen und Antworten". It shows a question from user "nuzuzono" asking about the possibility of classifying skill levels based on simpler features. A response from "Thomas Gau..." is partially visible, mentioning "Hi Nora, interesting presentation..." and "These Frage wurde live beantwortet".

**Right Screenshot (Zoom Meeting Interface):** This is a Zoom meeting window for the "ICMI ETRA 2021" virtual conference. The main content area displays a Zoom advertisement with the text "Build Forward with Confidence" and "Hear from top thought leaders and gain the skills you need to enable the everywhere workforce." The right sidebar shows a list of 67 participants, including Arker Harkout, Sayan Sencer, Makko Atoms, Sarah Frying (Web Chair), Fabrizio Narciso, Jennifer Sulbany, Jung-Mac Kim, Thomas Berger, and Amalia González. The bottom of the window shows the Zoom toolbar with icons for chat, video, and other controls.

# Awesome keynote by Päivi Majaranta

Aufnahme

Sie sehen den Bildschirm von Päivi Majaranta

Optionen anzeigen

Thank you for  
your attention!

Pupils labs tracker's image of the eye. More info: pupils-labs.com

Päivi Majaranta

Andreas Bulling

Audio-Einstellungen

Chat

Hand heben

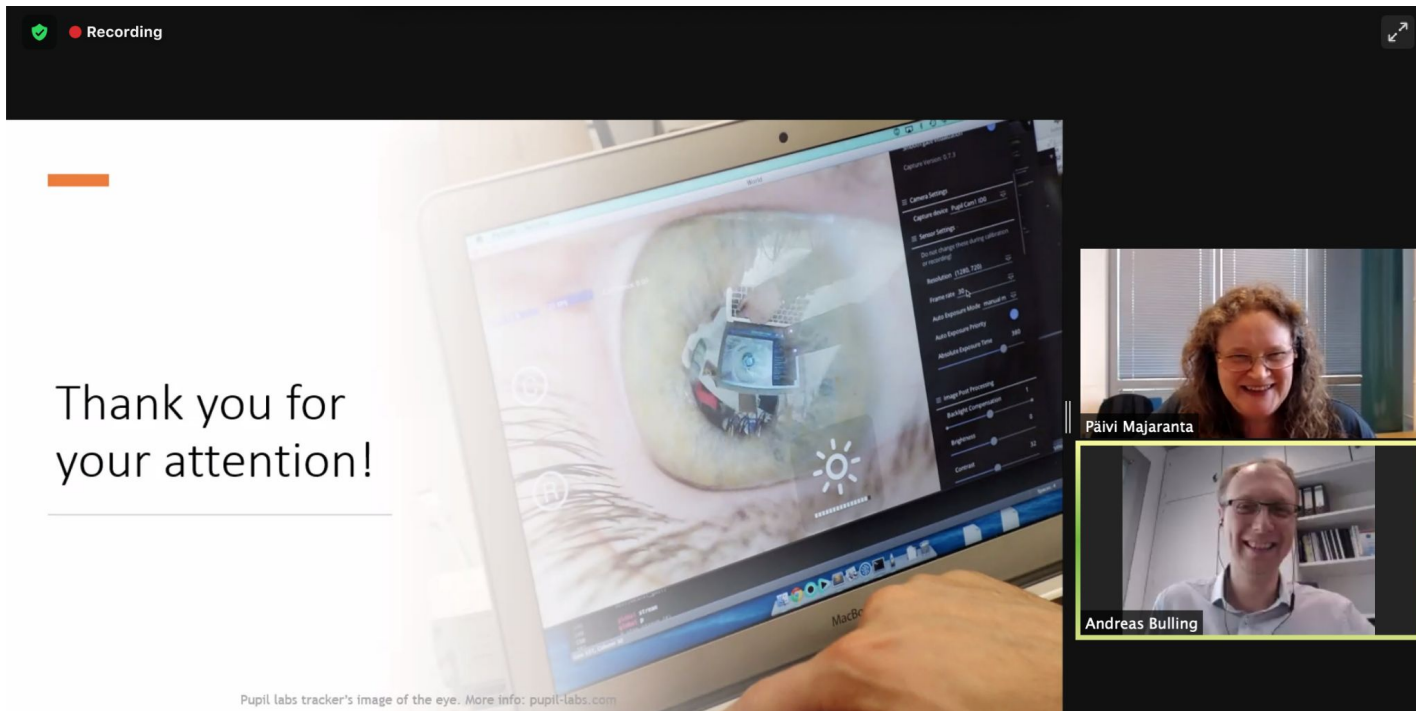
F&A

Verlassen

The screenshot shows a Zoom video conference interface. The main window displays a presentation slide with the text 'Thank you for your attention!' and a background image of a laptop screen showing a Pupil Labs eye-tracking application. The laptop screen displays a large eye graphic with a small car icon inside the pupil. The presentation slide also includes a small orange horizontal bar and a link to 'Pupils labs tracker's image of the eye. More info: pupils-labs.com'. In the top right corner of the Zoom window, there is a green status bar indicating 'Sie sehen den Bildschirm von Päivi Majaranta' and a button 'Optionen anzeigen'. In the bottom right corner, there is a red button labeled 'Verlassen'. Two video thumbnails are visible on the right side of the screen. The top thumbnail shows Päivi Majaranta, a woman with curly hair and glasses, wearing a headset. The bottom thumbnail shows Andreas Bulling, a man with glasses, wearing a headset. At the bottom of the Zoom window, there is a toolbar with icons for 'Audio-Einstellungen', 'Chat', 'Hand heben', and 'F&A'.

# Awesome keynote by Päivi Majaranta

Thank you for  
your attention!





# Awesome keynote by Päivi Majaranta

## User Experience

- Usability
- Customizability
- Social norms
  - ability to maintain gaze contact
  - dwelling on people might be rude
- Acceptability
  - abnormal eye movements in public
  - self-consciousness
  - privacy, safety, etc.

More research on the UX aspects is needed!





# Our sponsor floor


The screenshot shows a web browser window with the URL `meetanyway.com/events/acm-etra-2021-rf9z/space/613f99c4-4868-4528-8a1e-c92be7d456ed`. The page header includes the event title "ACM ETRA 2021" with dates "Mon. 24 - Thu. 27. May 2021" and navigation tabs for "Conference Area" and "Sponsor Booths". A horizontal menu lists various sponsors: iMotions, Facebook Reality Labs Research, Tobii Pro, Eyevido, Gazepoint, Blickshift, eye square, FOVE, SR Research, Eyeware, Neuroiconica, EyeLogic, Smart Eye, and Pupil Labs. The iMotions booth is highlighted on the left, featuring the company logo, name, "Platinum Sponsor" status, a brief description, a "Show more" link, a 3D cube graphic with a "JOIN" button, and a "Videos & Documents" section with links to an "iMotions Webinar @ ETRA 2021" and an "Explainer Video", both with "OPEN" buttons. The main content area on the right displays a large eye logo with a plus sign inside, the event title "ACM ETRA 2021", and a call to action: "← Click JOIN to participate".

ACM ETRA 2021  
Mon. 24 - Thu. 27. May 2021

Conference Area Sponsor Booths

iMotions Facebook Reality Labs Research Tobii Pro Eyevido Gazepoint Blickshift eye square FOVE SR Research Eyeware Neuroiconica EyeLogic Smart Eye Pupil Labs


**iMOTIONS**  
iMotions  
Platinum Sponsor  
iMotions is a software company that provides tools for the next generation of behavioral ...  
Show more ▼

 JOIN

Videos & Documents

iMotions Webinar @ ETRA 2021 OPEN

Explainer Video OPEN

  
ACM ETRA 2021  
← Click JOIN to participate

# Session V



# Full Papers 5

## Discussion

Zoom Webinar

View

CHI PLAY 2021  
18 - 21 October 2021  
VIRTUAL

Fabian Göbel

Arzu Çöktekin

Gunter Wallner (he/him)

Maurice Koch

Kuno Kurzthal | University of Stuttgart |  
Visualisation Research Center (VRC) |  
kuno.kurzthal@visus.uni-stuttgart.de  
Universität Stuttgart

Lena Stubbemann

Unmute Start Video

Participants 93

Q&A Polls Chat Share Screen Raise Hand Record

Leave

15:46

# Full Papers 5

## Talk 1

Zoom Webinar

You are viewing Streaming3 ETRA2021's screen View Options

Streaming1 ETRA2021

Arzu Çeltikin


Maurice Koch

Klino Kurzhals


Fabian Göbel

Ludwig Sidenm...

View

 **University of Stuttgart**  
**Visualization Research Center (VISUS)**

**Thank you!**



**Maurice Koch**

e-mail [maurice.koch@visus.uni-stuttgart.de](mailto:maurice.koch@visus.uni-stuttgart.de)

[www.visus.uni-stuttgart.de/institut/team/Koch-00016](http://www.visus.uni-stuttgart.de/institut/team/Koch-00016)

University of Stuttgart  
**Visualization Research Center (VISUS)**  
Allmandring 19, 70569 Stuttgart

Unmute Start Video

Participants 95

Q&A 1

Polls

Chat

Share Screen

Raise Hand

Record

Leave

# Full Papers 5

## Talk 2

Zoom Webinar

You are viewing Streaming3 ETRA2021's screen View Options

Arzu Çoltekin, Guenter Wallner (he/..., Maurice Koch, Kuno Kurzha..., Lena Stubbemann, Fabian Gobel

### Interface

The screenshot displays the 'Visual Eyetracking Dashboard' for the file '07\_Moskau\_S1.jpg'. The interface is divided into two main panels. The left panel, titled '2D DENSITY PLOT', shows a map of Moscow with concentric density contours indicating areas of high user attention. The right panel, titled 'SCARF PLOT', displays a heatmap where rows represent individual participants (p1, p12, p13, p14, p17, p20, p21, p24, p25, p28, p29, p32, p33, p36, p37, p4) and columns represent time segments. The color intensity in the SCARF plot corresponds to the density levels shown in the 2D plot. Below the plots, there are controls for 'Selector Mode', 'Add to AOI color', 'New AOI', and 'Remove all AOIs'. A 'SAVE' button is present. At the bottom, there are sliders for 'Weighted by duration', 'Bandwidth', and 'Threshold'. A 'Time frame in seconds' slider is set to 00:00.0/00:06.7. The bottom of the screen shows the Zoom interface with 98 participants, a Q&A section, and a 'Leave' button.



# Full Papers 5

## Talk 3

Zoom Webinar

You are viewing Streaming3 ETRA2021's screen View Options

Arzu Çöktürk, Günter Wallner (he/..., Maurice Koch, Kuno Kurzahls, Lena Stübnermann, Fabian Gobel

### Examples

#### Personal encounters

outside inside

Anya Jack

Steve 1 John Russel Steve 2

Jack

Steve 2 Chris

Oliver

Dylan Oliver

Kuno Kurzahls and Daniel Weiskopf, "Eye tracking for personal visual analytics."

Unmute Start Video Participants 92 Q&A Polls Chat Share Screen Raise Hand Record Leave

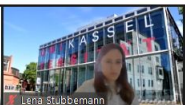
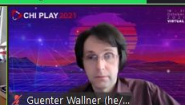
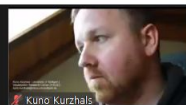
# Full Papers 5

## Talk 4

Zoom Webinar

You are viewing Streaming3 ETRA2021's screen

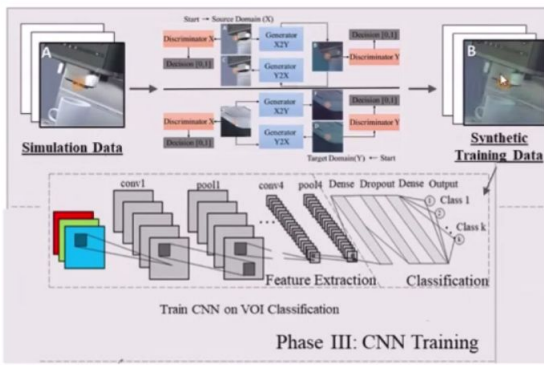
View Options



### Our Approach

III

Use synthetic data set to train convolutional neural network (CNN)



UNIKASSEL  
VERSITÄT

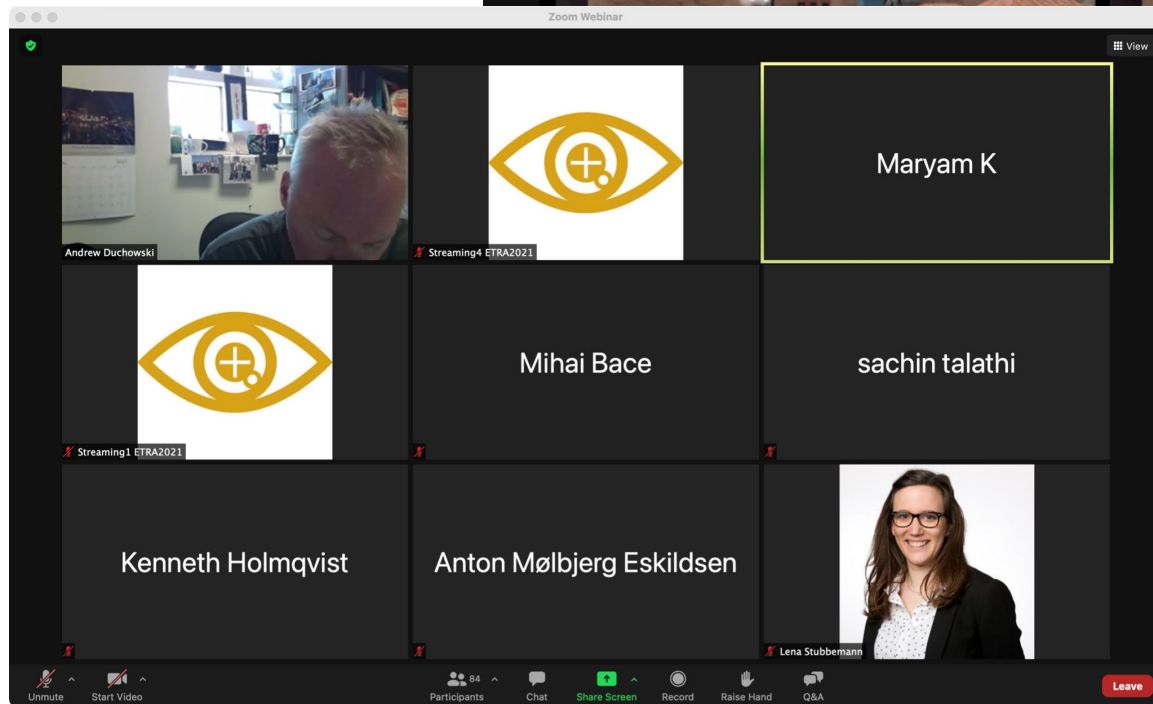
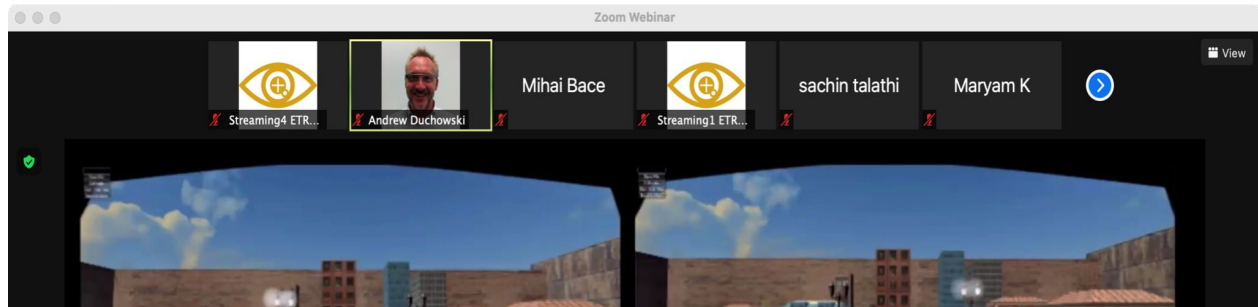
ETRA 2021, Virtual Event, 25-27 May | 8





# Full Papers 6

## Talk 1



# Full Paper

## VI

### Talk 2



# Full Papers 6

## Talk 2



# Full Papers 6

## Talk 3

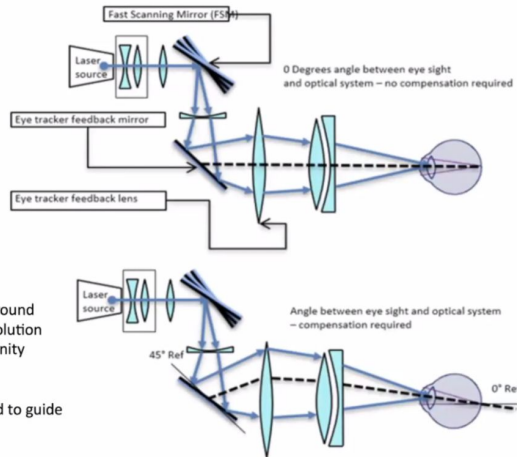
### Direct Retinal Projection

Printing with laser on the retina

Resulting experience is top-notch:

- Photorealistic colours
- Can be used in bright sunlight
- Can see black against bright background
- Very high spatial and temporal resolution
- Varifocal (continuous) 20 cm to infinity
- Very low power consumption

However, a *good* eye tracker is needed to guide the laser beam as the eye moves



Kenneth Holmqvist



# Full Papers VI

## Talk 3



# Full Papers 6

## Talk 4



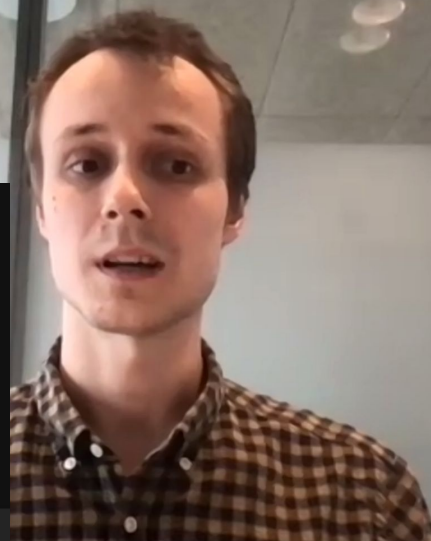
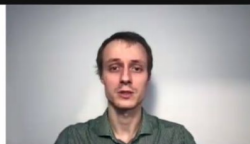
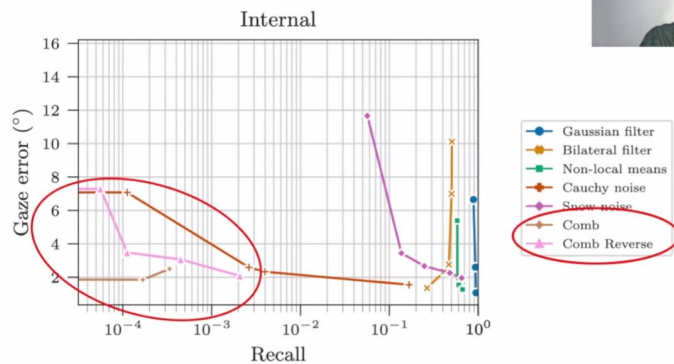
Anton Melbjerg Eskildsen



Kenneth Holmqvist

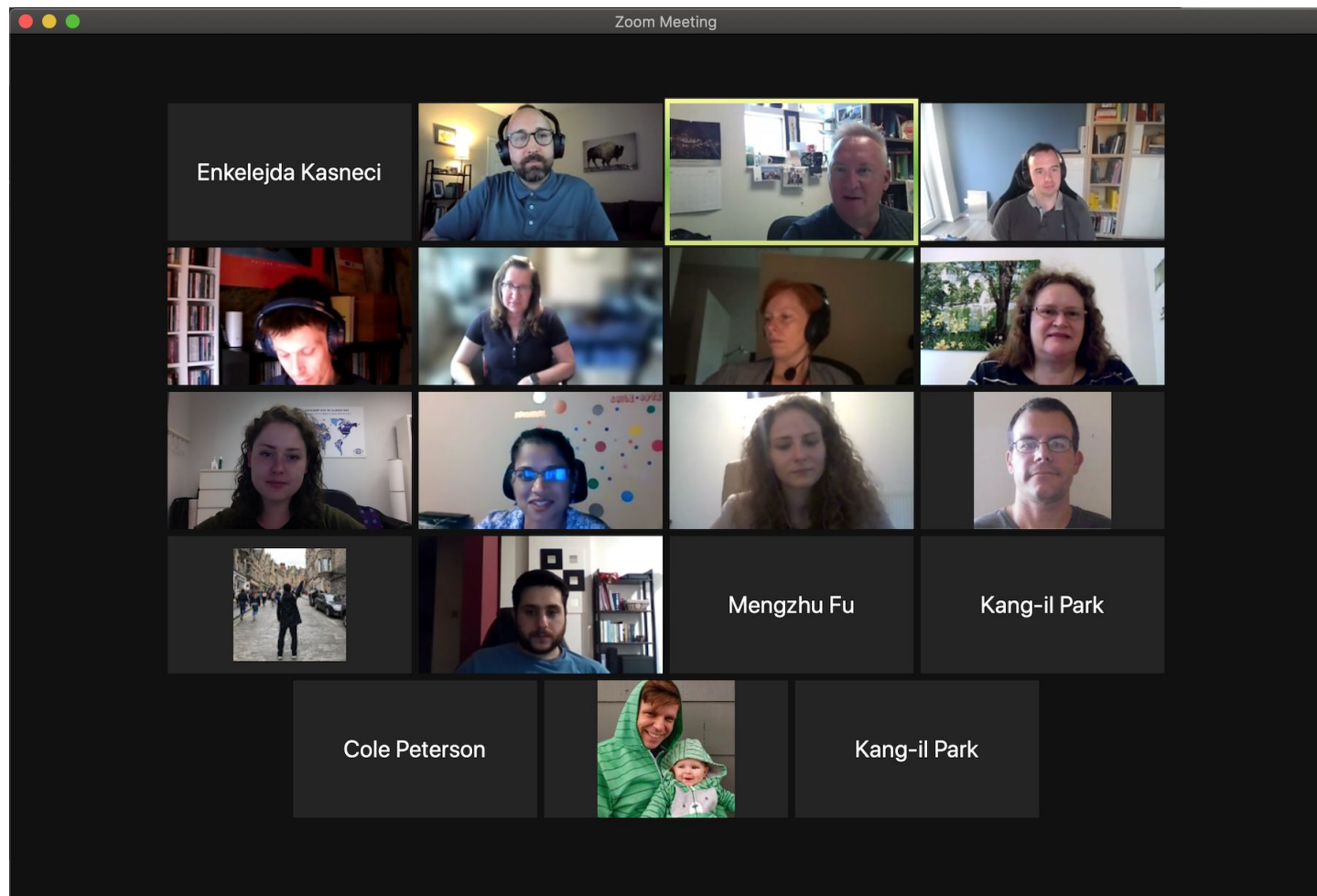
sachin talathi

### Results





# Doctoral Symposium





# Doctoral Symposium

## Mentor Panel



# Doctoral Symposium Keynote

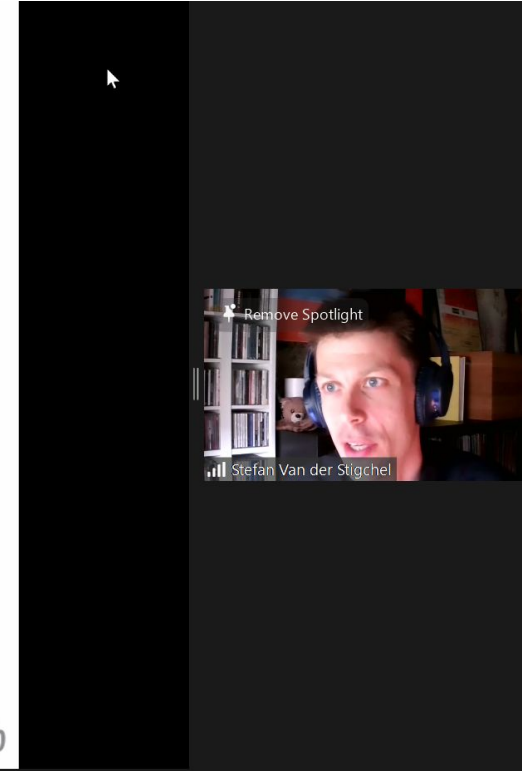
Visual Working Memory  
as a fundamental  
component of the  
eye movement system

Stefan Van der Stigchel

Helmholtz Institute, Utrecht University



AttentionLab



# Doctoral Symposium Keynote

## Experimentation in Software Engineering: The New Frontier



Janet Siegmund



Norman Peitek



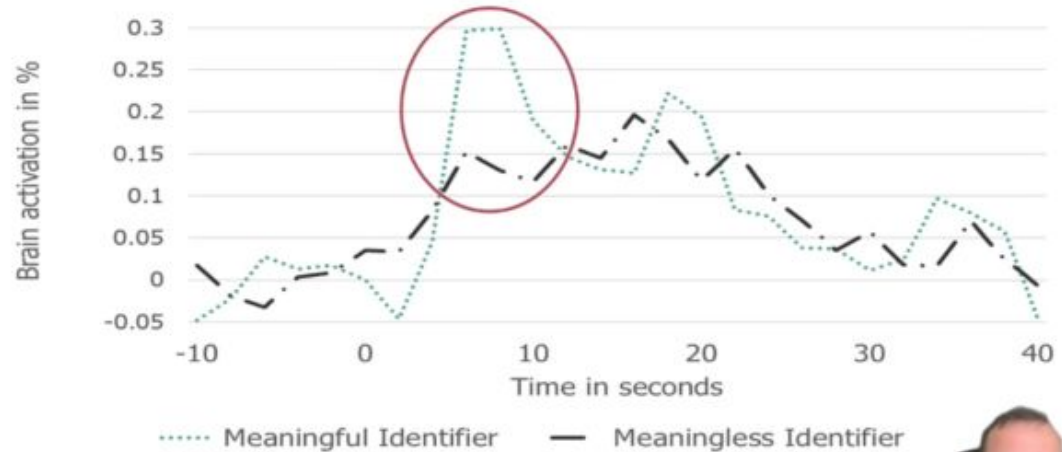
# Doctoral Symposium Keynote

Norman Peitek

Experimentation in Software Engineering: The New Frontier

27

## Bottom-Up vs. Top-Down Comprehension



# Doctoral Symposium Quiz - Who am I?

## WHO AM I?



# Workshops: COGAIN and Deep learning

Augusto Esteves (Lisbon)	Anke Huckauf	Ken Pfeuffer	The 2021 COSAIN Symposium ETRS 2021	Ludwig Sidenmark
M. Nakayama	Mateusz Duszel	Eiona Biddulvey	Per Berggaard	Carolin Henke
Marco Picchi	Tomomi Okano	Ard Kastrati	Sheikh Radiah Rahim Riva	Yasmom Abdrazau
John Paulin Han...	Tanya Bafna	Streamingas...	Päivi Majaranta	Yaxiong Lei
	Sucheta Ghosh	Thomas (EyeLog...	FuY	





Streaming BTAA001



Paweł Kasprowski

Deep Learning in the Eye Tracking World

[pawel@kasprowski.pl](mailto:pawel@kasprowski.pl)



# Deep Learning in the Eye Tracking World

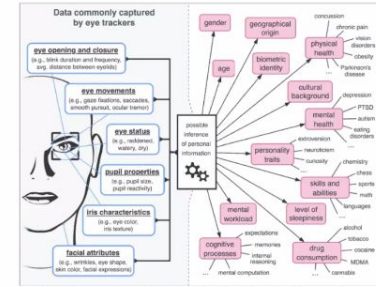
Paweł Kasprowski  
Silesian University of Technology  
Gliwice, Poland



# Keynote 3: Philipp Reiter, eye square



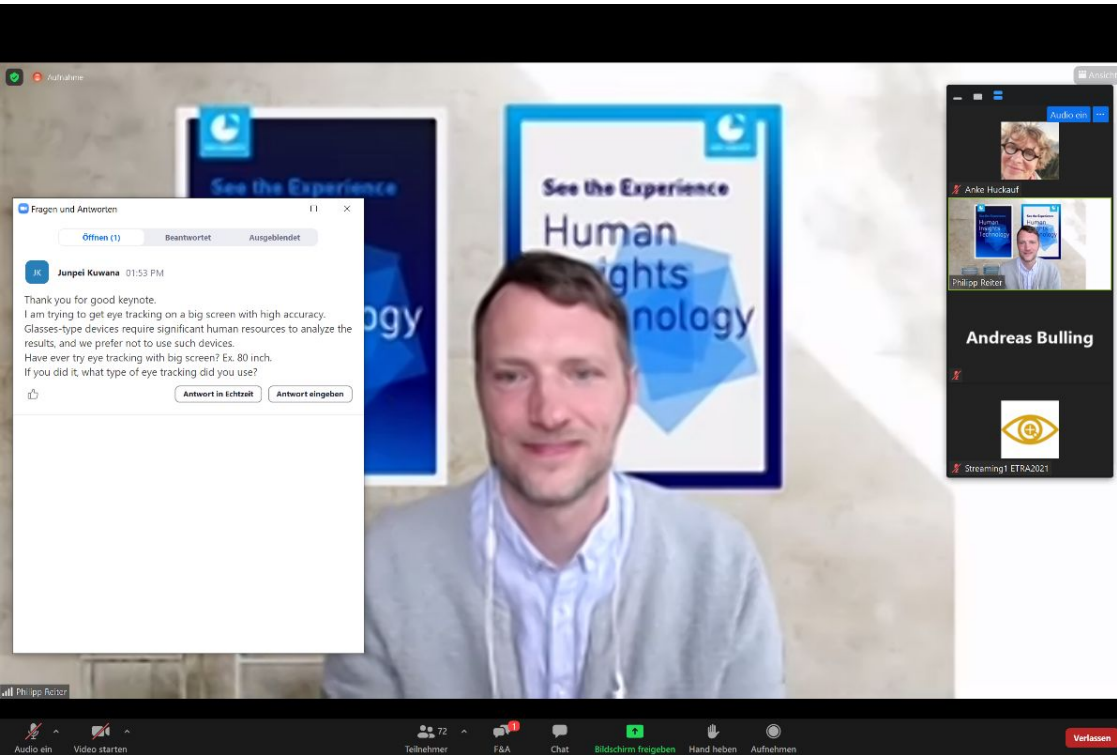
## Eye-Tracking and privacy



Eye-tracking devices can see much more than just what people are looking at, and infer a huge amount of sensitive information. (Source: Loren Krüger, Oliver Hahn, Martin Lenz, Florian Müller)

<https://newatlas.com/science/science/eye-tracking-privacy/>

# Keynote 3: Philipp Reiter, eye square



The screenshot shows a Zoom meeting interface. In the foreground, Philipp Reiter is visible. Behind him are two posters for 'See the Experience Human Insights Technology'. A chat window is open on the left with the following content:

**Fragen und Antworten**

**Öffnen (1)** Beantwortet Ausgeblendet

**Jumpei Kuwana** 01:53 PM

Thank you for good keynote.  
I am trying to get eye tracking on a big screen with high accuracy.  
Glasses-type devices require significant human resources to analyze the results, and we prefer not to use such devices.  
Have ever try eye tracking with big screen? Ex. 80 inch.  
If you did it, what type of eye tracking did you use?

**Antwort in Echtzeit** **Antwort eingeben**

At the bottom of the Zoom window, there is a toolbar with icons for Audio ein, Video starten, Teilnehmer (72), F&A, Chat, Bildschirm freigeben, Hand heben, and Aufnehmen. A red button labeled 'Verlassen' is on the right.

Think with Google:  
Kantar Australia



Intro eye-tracking 3:30min with Pupil Invisible Glasses  
<https://kantar.com/australia/eng/insights/modular-digital/>

# Keynote 3: Philipp Reiter, eye square

**Fragen und Antworten**

Öffnen (2) Beantwortet Ausgeblendet

**JK Jumpel Kuwana** 01:53 PM

Thank you for good keynote.  
I am trying to get eye tracking on a big screen with high accuracy.  
Glasses-type devices require significant human resources to analyze the results, and we prefer not to use such devices.  
Have ever try eye tracking with big screen? Ex. 80 inch.  
If you did it, what type of eye tracking did you use?

Antwort in Echtzeit Antwort eingeben

**AD Andrew Duchowski** 02:11 PM

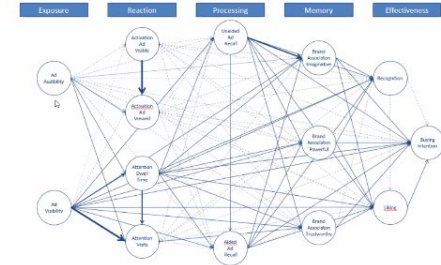
I'm curious about eye tracking in large stores. Did you find any strange reactions from other customers or store owners (e.g., do you need permission to bring an eye tracker into the store)?

Antwort in Echtzeit Antwort eingeben

**Participants:** Anke Huckauf, Philipp Reiter, Andreas Bulling, Streaming1 ETRA2021

**Bottom Bar:** Audio ein, Video starten, Teilnehmer (71), F&A, Chat, Bildschirm freigeben, Hand heben, Aufnehmen, Verlassen

## USM modelling with Neusrel Integrating eye-tracking metrics into higher models



# Townhall meeting

The screenshot displays a Zoom townhall meeting interface. The main window shows a grid of six participants: Andreas Bulling, Anke Huckauf, Bonita Shari, Krzysz Kozlowski, Shic Fred, and Enkelella Kazem. Below the grid is a large logo for 'Mihai Bace' featuring a stylized eye with a plus sign. To the right, a chat window is open showing a message from 'Mihai Bace' about a 'Townhall meeting' and a 'podium'.

Participants visible in the grid:

- Andreas Bulling
- Anke Huckauf
- Bonita Shari
- Krzysz Kozlowski
- Shic Fred
- Enkelella Kazem

Chat window content:

Mihai Bace, an Eye Researcher  
If you hover over their names in the participant list, you can "invite them to speak"

Podium: 1. (Name) 2. (Name) 3. (Name)  
Open the link to the podium here...

Background banner text: TRA 2021, TALKING TOWNHALL, Symposium on Eye Research & Application, Event, 24-25

Bottom bar controls: Audio ein, Video beenden, Teilnehmer (36), F&A, Chat, Bildschirm freigeben, Hand haben, Aufnehmen, Verlassen

# Tutorial 3: The Neurology of Eye Movements by Jorge Otero-Millan





  
Soha Rostaminia

  
Jorge Otero-Millan

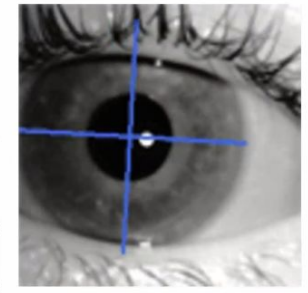
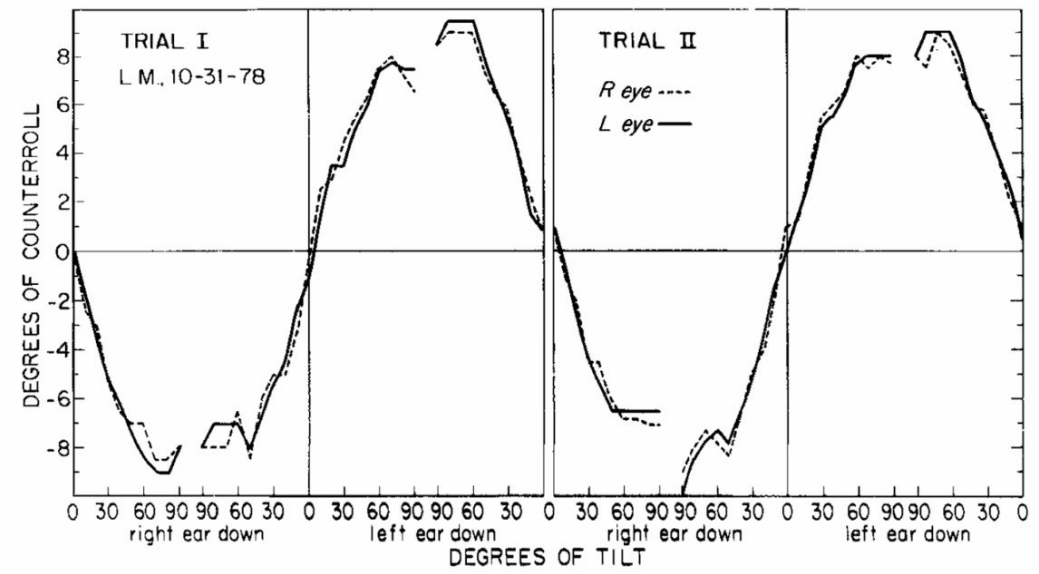
  
Streaming6 ETRA...

Cécile Eymond

Bernhard Pete...

Dan Witzner H...

# Ocular counter roll







Huckauf

Thies Pfeiffer is muted

Ludwig Sidenmark has a weak connection

Soha Rostaminia is muted

Tanja Blascheck is muted

Krzysztof Krejtz is muted

Katarzyna Wisiecka is muted

Mihai Băce

Teresa Hirzle is muted

Hans Gellersen

Chandan Kumar is muted

Mohamed Khamis

Michael Raschke is muted

Mic off