

Understanding Gaze (UGaze)

Schwerpunktprogramm 2481

gefördert von der DFG

initiiert von

Gernot Horstmann

Anke Huckauf

Enkelejda Kasneci

Understanding Gaze

Overview:

- Introduction and core idea (Anke Huckauf)
- DFG regulations & DFG Q&A (Julia Engel, DFG)
- Topics in detail (Gernot Horstmann, Anke Huckauf, Enkelejda Kasneci)
- SPP special: planned collaboration (Anke Huckauf)
- Q&A: All

Window to the soul



Attention & consciousness: Intentions and Emotions



Centrally and peripherally embedded

Etablierte Paradigmen mit hoher zeitlicher und räumlicher Meßgenauigkeit



The Unwanted Visitor
Ilya Repin (1844-1930)



“Remember the position of people
and objects in the room”



“Estimate the ages of the
people”

Tatler, B. W., Wade, N. J., Kwan, H., Findlay, J. M., & Velichkovsky, B. M. (2010). Yarbus, eye movements, and vision. *i-Perception*, 1, 7-27.

Gaze-based Interaction

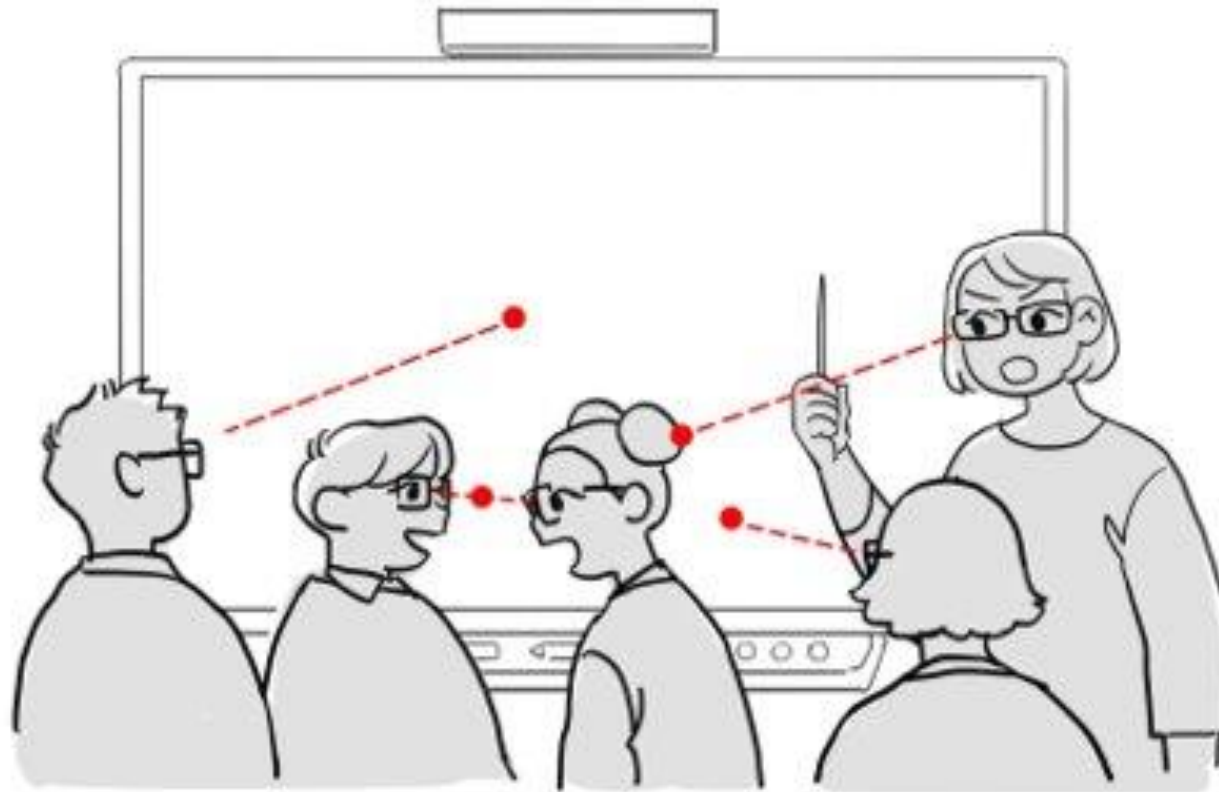
Measuring eye movements



Technological developments



Understanding Gaze Behaviour



Signalling functions of gaze

Gaze expression



Gaze sharing



Gaze Interaction in Multi-user Scenarios



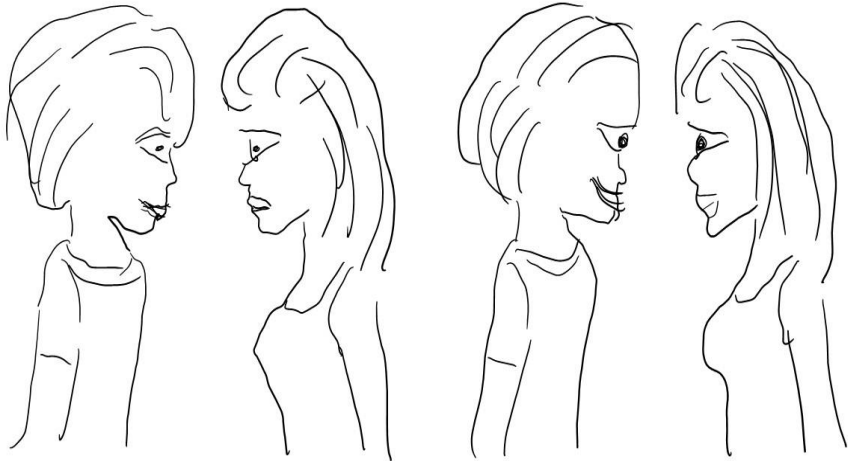
Signalling functions of gaze

Gaze expression

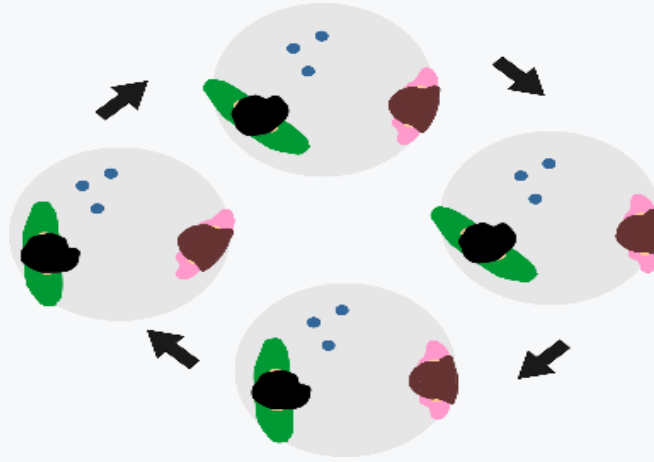


Signalling functions of gaze

Gaze sharing



Signalling functions of gaze



Gaze Interaction in Multi-user Scenarios



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A blurred, 3D-rendered logo of the Deutsche Forschungsgemeinschaft (DFG) in white, set against a blue background with light rays.

Priority Programme “Understanding Gaze“

Round Table 10 July 2024

Dr. Julia Engel (julia.engel@dfg.de)

Proposal Submission and Timeline

- ▶ Prepare proposal (please keep in mind that there is a new template and please write your proposal in English; contact programme committee or andrea.koch@dfg.de or julia.engel@dfg.de if you have any questions)
- ▶ Register in DFG's electronic proposal processing system ("elan") by **19 November 2024** at the latest (contact elan-helpdesk@dfg.de if you have any questions)
- ▶ Submit proposals by **3 December 2024** at the latest
- ▶ Proposals will be evaluated by an international, independent review panel (not by the programme committee) in **spring 2025**

Review Criteria

- ▶ **Quality** of the project (especially with regard to originality and the anticipated contribution to knowledge)
- ▶ **Objectives and work programme** (strengths and weaknesses of the planned investigations, suitability of the methods and appropriateness of the schedule)
- ▶ **Qualifications** of the applicant/applicants (taking the individual career stage into consideration)
- ▶ **Work and research environment**
- ▶ **Contribution of the project to the aims of the SPP**

What can be funded?

- ▶ Funding duration for each project: **36 months**
- ▶ **Funding for staff:** pre-doc or post-doc (depending on the skills needed to successfully complete the project) and support staff
- ▶ Project activities that are centrally coordinated (e.g., retreats) will be funded centrally by the coordination project; project-specific activities (e.g., travel to specific conferences) should be applied for individually
- ▶ **Acceptance rate** depends on how many projects will be submitted

Useful Links

- ▶ [Call Text: „DFG - Deutsche Forschungsgemeinschaft - Priority Programme “Understanding Gaze \(UGaze\)” \(SPP 2481\)“](#)
- ▶ [General Programme Information, Eligibility, Funds, etc. \(see Part B\): “Guidelines Priority Programme \(dfg.de\)”](#)
- ▶ [Proposal Preparation Instructions – „Leitfaden für die Antragstellung Projektanträge \(dfg.de\)“](#)
- ▶ [Guidelines for Preparing Publication Lists – “Guidelines for Preparing Publication Lists \(dfg.de\)”](#)
- ▶ [Information on the Vote of the Ethics Committee \(unfortunately in German only\) – „DFG - Deutsche Forschungsgemeinschaft - FAQ: Informationen aus den Geistes- und Sozialwissenschaften“](#)



Thank you for your attention

Further Informationen

- ▶ DFG: <https://www.dfg.de>
- ▶ Funding Atlas: <https://www.dfg.de/foerderatlas>
- ▶ Funded Projects: <https://www.dfg.de/gepris>
- ▶ Overview of the German Research Institutions: <https://gerit.org>
- ▶ Historical DFG-projects: <https://gepris-historisch.dfg.de>

Gaze expression



Fakultät für Psychologie und Sportwissenschaft



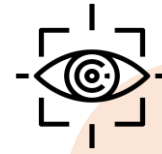
Prof. Dr. Gernot Horstmann
Universität Bielefeld

Gaze expression



Decoding mind states

- **Observing people during task performance** - what is perceived where and when, and how is processed what is perceived.
- **Observing people's states of consciousness** - emotion, arousal, wishes, intentions, communicative gestures
- **Observing people when their perception is idle** - remembering, thinking, deciding



Some questions

- Does gaze reflect what people do? What they perceive? What they do with what they perceive, their task? And if so, do observers know?
- What do the eyes do when they are idle? When attention is drawn to inner processes like imagining, thinking, remembering?
- Do the eyes reflect states of consciousness – emotion, intention, wishes, alertness, sentiments? To which components do observers pay attention?

Gaze sharing



Anke Huckauf

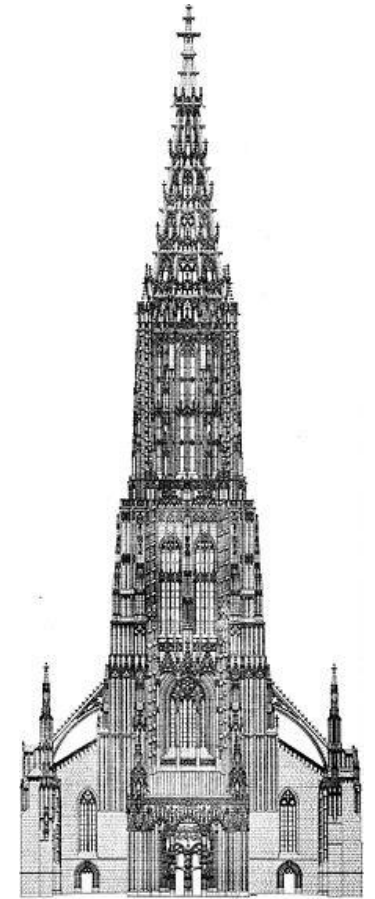
Prof. Dr. phil.habil.

Universität Ulm

Chair of General Psychology, UUlM

Dean of Faculty of Engineering, Computer Science, & Psychology

Coordinator of Doctoral Network Eyes4ICU (Horizon Europe)



Gaze sharing



Categories of Gaze and their Relation

Frequency of experiencing mutual eye contact; conditions, dynamics, and effects? What are the similarities and differences between **direct mutual gaze**, **referential gaze**, **averted gaze**? How do parameters such as blinks or pupil size changes affect the quantity and quality of gaze exchange?



Joint attention

How is **joint attention** and **joint fixation** established? How are gaze states (e.g., direct gaze, mutual gaze, joint gaze) responded by the observer? How does joint attention develop, how does it end, what are determinants for sustaining joint attention, how do **blinks** or **pupillary movements** contribute to joint attention?



Intention

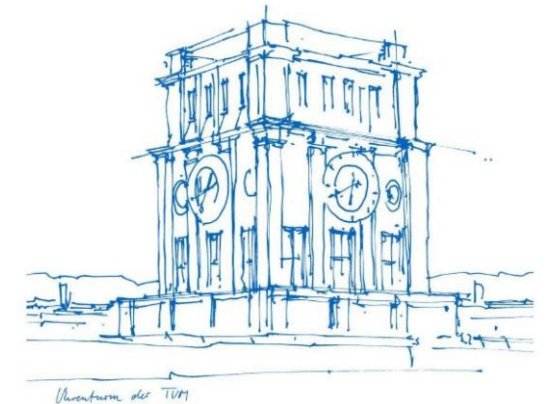
When we detect **intention**, e.g. lying, faking, joking, etc. by gaze behavior, how do we respond, what is the feedback? Is there a **dominating person** in an interaction, and (if so) how is dominance reflected in gaze behavior?

Gaze Interaction in Multi-user Scenarios



Human-Centered Technologies for Learning
TUM Liesel Beckmann Distinguished Professorship

Director TUM Center for Educational Technologies
Program Head MSc. "AI in Society"



Prof. Dr. Enkelejda Kasneci
Technical University of Munich

Gaze Interaction in Multi-user Scenarios



Techniques

What techniques can be developed to **integrate the perception-action loop** underlying **individual gaze behavior** with the **dynamics of the interactive gaze circuit**, considering factors such as fixation selection, foveal positioning, field of view, blink rates and durations, the role of pupil adjustments, etc. in information intake?



Study natural gaze behavior

How can advancements in **hardware miniaturization and machine learning algorithms** be leveraged to **study natural gaze behavior** in diverse contexts, particularly in scenarios involving multiple participants or objects, and how can the complex interplay of gazes with objects and other gazes be **analyzed and understood**?



Gaze in real-world scenarios

The proposal aims to extrapolate gaze-based interaction research beyond controlled laboratory settings to **"in-the-wild" scenarios**. This involves dealing with a higher degree of **variability and complexity**, as it will require robust models that can handle less predictable and controlled stimuli and tasks.



Privacy

The **gaze** can also **reveal sensitive and personal information** about an individual. As we capture, analyze, and interpret gaze data, ensuring the protection of individual privacy is essential. We encourage **research on privacy in eye tracking** in the context of this SPP.

Special to SPP UGaze

Organization



- **Steering team:** Anke Huckauf, Gernot Horstmann, Enkelejda Kasneci
- **Advisory panel:** invited international experts
- **Supervisory board:** all PIs and employees

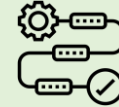
Strategies for collaboration:



- Yearly winter schools
- Conferences
- Hybrid seminar series
- Online tutorials
- Panels for collaboration and exchange
- Supervision in teams with common guidelines

Special to SPP UGaze

Promoting researchers:



- Mentoring
- Balancing gender in lectures
- Flexible working hours
- 3 year contracts
- Supporting care and nursing work
- Lab visits
- Awareness trainings
- Courses in academic writing
- Trainings in presentation and discussion skills
- Early discussions about authorship
- Workshops about types of publications

Special to SPP UGaze

Handling research data:



- Ethical votes
- Strict regulations of data security
- Open data: Confidentially sharing data
- Open access
- Integrating replications

International networking:



- Special issues
- Conference workshops
- Hybrid seminar series
- Internet presence, Social media
- Public events

Special to SPP UGaze

Our Criteria:



- Eye-tracking research
- Perceptive and signaling function
- Integrative (e.g., various parameters, multiple participants/users,)
- Clear focus on one of three core topics
- Ideas how to bridge gaps to another one

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Our Request:



- Your expression of interest in **one (1) page until September 30** via email to initiators
- Meeting in the beginning of the new semester (e.g. October 16, 4pm) to stimulate and facilitate cooperation
- **Deadline for project proposals: December 3**

SPP UGaze: Your Questions?

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Research areas and relevance ranking of research foci (1 = most relevant).

	Gaze Expression	Gaze Sharing	Multi-user Interaction
modelling/theory	1	3	3
empirical	2	1	2
technological	3	2	1