Erwan DAVID | Curriculum Vitae

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Websites: Personal – ORCID – HAL – Google Scholar

Work experience

- **Associate professor** **2024**
  Le Mans University, France *Present*
  Computer Science Laboratory (LIUM), Technology Enhanced Learning Team,
  TU Laval, Multimedia and Internet department.
- **Postdoctoral Researcher** **2019**
  Goethe University Frankfurt, Germany *2023*
  Department of Cognitive Psychology, Scene Grammar Lab (SGL). P.I.: Prof. Melissa Le-Hoa Võ.
- **Invited researcher** **September 2022**
  Birkbeck, University of London
  CINE Lab, Pr. Tim Smith.
- **Invited researcher** **October 2020**
  Rennes university, France
  CNRS IRISA, PERCEPT team. Dr. Olivier Le Meur.

Education

- **Ph.D., Computer science** **2016**
  University of Nantes (polytechnical school), France *2019*
  Image Perception Interaction (IPI) team, LS2N
  Supervised by: P. Le Callet, M. Perreira Da Silva, P. Lebranchu.
- **Research Master, Cognitive sciences** **2015**
  National Polytechnical Institute of Grenoble (PHELMA), France *2016*
- **Research Master, Social and Cognitive psychology** **2013**
  University of Clermont-Ferrand, France *2014*

Projects

- **CAVE and VR protocol** **2022**
  Gaze and body tracking in virtual environments *2023*
  I spent a month at Birkbeck University (London), invited by Pr. Tim Smith, to implement a protocol meant to test the new CAVE system of the Center for Brain and Cognitive Development. I implemented a protocol using eye tracking (*pupil labs* HMD device), motion capture, gaze-contingent rendering, etc., in a distributed Unity3D set-up. I ported the protocol to run in an Vive Pro Eye VR headset a month later, the results of which were presented at VSS 2023.
- ***Salient360!*** **toolbox** **2020**
  Eye tracking toolbox for 360° Content. *present*

We developed a toolbox for processing of eye (*eye-in-head*), head (headset tracking) and gaze (*eye-in-space*). The toolbox implements functionalities over graphical, command-line and scripting interlaces to process raw data to saliency and scanpath features. Additionally, the toolbox implements functions to generate saliency (binary and images/videos) and scanpath (scanpath image and CSV reporting visuo-motor features per fixation and saccades) files. This toolbox supports dynamic stimuli, for example gaze data recorded during viewing of a movie can be used to produce a saliency video, we provide variation of our generation/comparison tools to process these dynamic data.

- ***EmotDes*** **2021**
  Emotion-Design project. *2022*
  The *EmotDes* project is the continuation of the *CogDes* project, still as a collaboration between the Scene Grammar Lab and the University of Art and Design (Hfg Offenbach). The goal of this project is to study how people behave and feel in metro stations, where one must wait for a train to arrive. The main question is how can we make individuals more comfortable in this situation. In virtual reality we display metro stations and vary visual (light), auditory (noise), and haptic (bench texture) sensations. We are using eye tracking and physiological sensors to assess a participant's state.

- ***CogDes*** **2020**
  Cognitive-Design project. *2021*
  The *CogDes* project is a collaboration between the Scene Grammar Lab and the University of Art and Design (Hfg Offenbach). The teams study scene grammar in everyday places, in particular in train/metro station. In virtual reality models of stations were built (some replicating real ones) for participants to navigate under different experimental conditions, highlighting elements of the scenes relevant (orientation system) or irrelevant (e.g., benches) to the task.

- ***Salient360!*** **benchmark** **2018**
  Visual Attention Modeling for 360° Content. *present*
  A benchmark of saliency and scanpath prediction models for the exploration of static and dynamic omnidirectional contents (virtual reality). We provide datasets ands an online benchmarking platform.

- **ICME18 Grand Challenge** **2018**
  Visual Attention Modeling for 360° Content.
  We organized a Grand Challenge for ICME 2018. We gathered gaze data with a free-viewing task in virtual reality. Teams had to predict saliency maps and scanpaths for the exploration of images and videos. This project was the occasion to many practical and theoretical debates about eye tracking, gaze data comparison and visual perception.

Journal publications

- Beitner, J., Helbing, J., **David**, E., Võ, & M. L.-H. (2024). Using a flashlight-contingent window paradigm to investigate visual search and object memory in virtual reality and on computer screens. Scientific reports, 14, 8596.
- **David**, E., Gutiérrez, J., Võ, M. L. H., Coutrot, A., Perreira Da Silva, M., & Le Callet, P. (2024). The Salient360! toolbox: Handling gaze data in 3D made easy. Computers & Graphics, 103890.
- Draschkow, D., Anderson, N., **David**, E., Gauge, N., Kingstone, A., Kumle, L., Laurent, X., Anna, C. N., Shiels, S., & Võ, M. L.-H. (In press). Using XR (Extended Reality) for Behavioral, Clinical, and Learning Sciences Requires Updates in Infrastructure and Funding. Policy Insights from the Behavioral and Brain Sciences.
- Beitner, J., Helbing, J., Draschkow, D., **David, E.**, & Võ, M. L.-H. (2023). Flipping the world upside down: Using eye tracking in virtual reality to study visual search in inverted scenes. Journal of eye movement research, 15(3), 5.
- **David, E.**, Lebranchu, P., Perriera Da Silva, M., & Le Callet, P. (2022). What are the visuo-motor tendencies of omnidirectional scene free-viewing in virtual reality?. Journal of Vision, 22(4), 12.
- **David, E.**, Beitner, J., & Võ, M. L.-H. (2021). The importance of peripheral vision when searching 3D real-world scenes: A gaze-contingent study in virtual reality. Journal of Vision, 21(7), 3-3.
- **David, E.**, Beitner, J., & Võ, M. L.-H. (2020). Effects of transient loss of vision on head and eye

movements during visual search in a virtual environment. Brain sciences, 10(11), 841.
- Spur, M., Tourre, V., **David, E.**, Moreau, G., & Le Callet, P. (2020). Exploring Multiple and Coordinated Views for Multilayered Geospatial Data in Virtual Reality. Information, 11(9), 425.
- **David, E.**, Lebranchu, P., Perriera Da Silva, M. & Le Callet, P. (2019). Predicting artificial visual field losses: a gaze-based inference study. Journal of Vision, 19(14), 22. [hal-02289190]
- Mermillod, M., Bourrier, Y., **David, E.**, Kauffmann, L., Chauvin, A., Guyader, N., Dutheil, F., & Peyrin, C. (2019). The importance of recurrent top-down synaptic connections for the anticipation of dynamic emotions. Neural Networks, 109, 19-30. [hal-01911098]
- Gutiérrez, J., **David, E.**, Rai, Y., & Le Callet, P. (2018). Toolbox and dataset for the development of saliency and scanpath models for omnidirectional/360° still images. Signal Processing: Image Communication, 69, 35-42. [hal-01970919]

Book chapter

- Schwarze, J., Vöckler, K., Hinde, S., **David, E.**, Võ, M. L.-H. & Eckart, P. (2023). Virtual reality in mobility design: Experimental research on the application of VR simulations. In K. Vöckler, P. Eckart, M. Knöll & M. Lanzendorf (Eds.), Mobility design: shaping future mobility Volume 2: Research. Berlin, Boston: JOVIS Verlag GmbH.

Proceeding publications (peer-reviewed)

- **David, E.**, Gutiérrez, J., Võ, M. L.-H., Coutrot, A., Perreira Da Silva, M., & Le Callet, P. (2023). The Salient360! Toolbox: Processing, Visualising and Comparing Gaze Data in 3D. 2023 Symposium on Eye Tracking Research and Applications (ETRA23). Tubingen, Germany.
- **David, E.**, Bourrier, Y., Vuillaume, R., & Mermillod, M. (2020). Recurrent top-down synaptic connections at different spatial frequencies help disambiguate between dynamic emotions. 42nd Annual Meeting of the Cognitive Science Society. Virtual meeting.
- Spur, M., Tourre, V., **David, E.**, Moreau, G., & Le Callet, P. (2020). MapStackVR: Exploring Multilayered Urban Data In Virtual Reality. 11th International conference on information visualization theory and application (VISIGRAPP).
- **David, E.**, Gutiérrez, J., Coutrot, A., Da Silva, M. P., & Le Callet, P. (2018, June). A dataset of head and eye movements for 360° videos. In Proceedings of the 9th ACM Multimedia Systems Conference (pp. 432-437). ACM. [hal-01994923]
- Gutiérrez, J., **David, E.**, Coutrot, A., Da Silva, M. P., & Le Callet, P. (2018, May). Introducing UN Salient360! Benchmark: A platform for evaluating visual attention models for 360° contents. In 2018 Tenth International Conference on Quality of Multimedia Experience (QoMEX) (pp. 1-3). IEEE. [hal-01970916]
- **David, E.**, Lebranchu, P., Perriera Da Silva, M. & Le Callet, P. (2018). How are ocular behaviours affected by central and peripheral vision loss? A study based on artificial scotomas and gaze-contingent paradigm. Electronic Imaging, 2018(14), 1-6. [hal-01970940]

Conference talks and posters (abstracts)

- **David**, E., & Võ, M. L.-H. (May 2024). SPHEER: a rich dataset of time-resolved gaze and head movements in virtual reality. Vision sciences society annual meeting 2024 (VSS 2024). St Pete Beach, Florida.
- Mader, J. N., **David, E.**, & Võ, M. L.-H. (Accepted). Out of sight: The Impact of Hidden Objects on

Visual Search in 3D Scenes. In 45rd European Conference on Visual Perception (ECVP23). Cyprus.
- **David, E.**, & Võ, M. L.-H. (May 2023). Dynamics of gaze and body while viewing omnidirectional stimuli. Vision sciences society annual meeting 2023 (VSS 2023). St Pete Beach, Florida.
- Beitner, J., Helbing, J., **David, E.**, & Võ, M. L.-H. (May 2023). Investigating the effects of a virtual reality vs. screen-based testing setup on incidental memory after visual search through scenes. Vision sciences society annual meeting 2023 (VSS 2023). St Pete Beach, Florida.
- **David, E.**, & Võ, M. L.-H. (March 2023). Mouse movements on-screen are an alternative to gaze in VR. 65th Tagung experimentell arbeitender Psycholog:innen (TeaP; Conference of Experimental Psychologists). Trier, Germany.
- **David, E.**, & Võ, M. L.-H. (August 2022). Visual search in 3D-modelled rooms: comparing results from the same protocol run in VR and on 2D screens. 44rd European Conference on Visual Perception (ECVP22). Nijmegen, Netherlands.
- **David, E.**, & Võ, M. L.-H. (May 2022). Searching for hidden objects in 3D environments. Vision science annual meeting 2022 (VSS 2022). St Pete Beach, Florida.
- **David, E.**, & Võ, M. L.-H. (2022). The importance of relational spatial information for scene classification. 64th Tagung experimentell arbeitender Psycholog:innen (TeaP; Conference of Experimental Psychologists).
- **David, E.**, Lebranchu, P., Võ, M. L.-H. (2021). Looking while loaded: Differences in oculo-motor tendencies during three common visual tasks might be based on varying degrees of cognitive load. In 43rd European conference on visual perception (ECVP21). Virtual meeting (poster).
- **David, E.**, Beitner, J., & Võ, M. L.-H. (2020). The role of central and peripheral vision for search in VR environments. In vision science annual meeting 2020 (VSS 2020). Virtual meeting.
- Coutrot, A., **David, E.**, Da Silva, M. P., J., Gutiérrez, & Callet, P. L. (2018). Omnidirectional gaze data: feedbacks from the creating process of a new 360° videos, head & gaze dataset. In Grenoble Workshop on Models and Analysis of Eye Movements, Grenoble, France.
- **David, E.**, Lebranchu, P., Perriera Da Silva, M. & Le Callet, P. (2017). A new experimental setup to study central and peripheral visions with gaze contingent protocol and artificial scotomas. In 2nd International Conference and Expo on Optometry and Vision Science, Paris, France.
- **David, E.**, & Mermillod, M. (2016). Spatial frequency comparison in emotional facial expression prediction with neural networks (In French). In Grenoble GDR BioComp seminar.

Invited talks and seminars

- **David** (2024, June). Eye tracking in extended reality. Meeting of the GdR MANGER (marketing research group, Le Mans, Angers), Laval, France.
- **David** (2023, November). Using visual attention to measure simulation realness. SICAL research team, LIRIS, Lyon, France.
- **David** (2023, October). Gaze tracking in virtual reality, workshop. Giessen, Germany.
- **David**, E. & Spur, M. (2022, October). Two days virtual reality and gaze tracking workshop. SFB Workshop, Giessen, Germany.
- Võ, M. L.-H & **David**, E. (2022, September). Using VR in Perception Studies. European Summer School on Eye Movements (ESSEM), University of Bonn, Germany.
- **David, E.** (2021, December). Virtual reality eye-tracking to study natural conditions? GIPSA-lab, Grenoble, France.
- **David, E.** (2021, July). Head, eye and gaze movements: Viewing tendencies. Brain, Attention and Reality lab, University of British columbia.
- **David, E.** (2021, January). Methodology of machine learning and research plan for modelling visual search. In Frankfurt University course: *Artificial Intelligence: an interdisciplinary field. Perspectives from*

Psychology and Computer Science. Frankfurt-am-Main, Germany.

- **David, E.** (2021, January). Visual attention and omnidirectional content viewing. InterDigital, virtual.
- **David, E.** (2020, October). Eye tracking methodology for the study of visual attention. RAINBOW research team, Inria/IRISA, Nantes, France.
- **David, E.** (2020, October). Exploration de scènes omnidirectionnelles en réalité virtuelle: mesures, modélisation et boîte à outils des données visuo-motrices. PERCEPT research team, IRISA, Nantes, France.
- **David, E.** (2020, June). Introduction to programming and modelling in R. Department of Surveying and Geoinformatics, University of West Attica, Athens, Greece.
- **David, E.** (2020, February). A new saccadic model for omnidirectional still content using oculomotor biases. Goethe University Cognitive psychology department symposium, Riezlern, Austria.
- **David, E.** (2019, November). Artificial visual field losses in the virtual world: a replication study with omnidirectional static stimuli. Eye-Tracking Day symposium, Max Planck Institute for Empirical Aesthetics, Frankfurt, Germany.
- **David, E.** (2019, May). Artificial scotomas on-screen and in virtual reality: experiments and applications. Biovision project-team, Inria, Sophia Antipolis, France.
- **David, E.** (2019, March). Artificial scotomas and what we can learn from them. Scene Grammar Lab (SGL), Goethe University, Frankfurt, Germany.
- **David, E.** (2019, January). Predicting artificial visual field losses: a gaze-based inference study. Seminar of Image Perception Interaction (IPI) research team, LS2N, Nantes, France.
- **David, E.** (2018, December). Eye-tracking methodology in the IPI team. Seminar of Perception, Action, Cognition pour la Conception et l'Ergonomie (PACCE) research team, LS2N, Nantes, France.

Teaching experience

- **Assistant lecturer** – 240 hours **2020**
  Goethe University Frankfurt *2023*
  Looking outside of the laboratory: active vision and natural behaviour (master level)
  Introduction to eye-tracking (master level)
  An introduction to machine learning for psychologists (master level)

- **Assistant lecturer** – Approximately 150 hours **2016**
  Nantes polytechnical school *2019*
  lecturer: experimental methodology and statistics (master level)
  Assistant: machine learning (master level), web technologies (bachelor level), computer system architecture (bachelor level)
  Nantes Science and Technique of Physical and Sports Activities school
  lecturer: statistics (bachelor level)
  Nantes University technology institute
  Assistant: C programming (bachelor level)

- **Instructor** – 29 hours **2013**
  University of Clermont-Ferrand, psychology department
  Assistant: office suite (bachelor level)

- **Instructor** – 140 hours **2007**
  University of Brest, psychology department *2010*
  Assistant: statistics (bachelor and master levels), *office suite* (bachelor level), *intro. to computers* (bachelor level)

Tutoring

- **Tutoring three BSc. students** — **October 2022**
  Psychology degree, Goethe University Frankfurt — *February 2023*
  Main supervisor: Melissa Võ
- **Tutoring four BSc. students** — **October 2021**
  Psychology degree, Goethe University Frankfurt — *February 2022*
  Main supervisor: Melissa Võ
- **Tutoring three BSc. students** — **May 2021**
  Psychology degree, Goethe University Frankfurt — *October 22022*
  Main supervisor: Melissa Võ
- **Tutoring two BSc. students** — **May 2019**
  Psychology degree, Goethe University Frankfurt — *July 2020*
  Main supervisor: Erwan David
- **Tutoring three MSc. students** — **Dec. 2019**
  Psychology and computer science degrees, Goethe University Frankfurt — *April 2020*
  Main supervisor: Erwan David
- **Tutoring one Bsc. student** — **Dec. 2019**
  Psychology degree, Goethe University Frankfurt — *Feb. 2020*
  Main supervisor: Erwan David
- **Tutoring two MSc. students** — **Jan. 2019**
  Engineer degree: electronic engineering, Nantes polytechnical school — *Apr. 2019*
  Main supervisor: Patrick Le Callet (Full Prof.)
- **Tutoring two MSc. students** — **Nov. 2018**
  Engineer degree: computer science, Nantes polytechnical school — *Feb. 2019*
  Main supervisor: Matthieu Perreira Da Silva (Assoc. Prof.)
- **Tutoring two MSc. students** — **Feb. 2018**
  Master: computer science, University of Nantes — *May 2018*
  Main supervisor: Matthieu Perreira Da Silva (Assoc. Prof.)
- **Tutoring two BSc. students** — **Nov. 2017**
  Preparatory School for Engineer Studies, Nantes polytechnical school — *Dec. 2017*
  Main supervisor: Jean-Pierre Guédon (Full Prof.)
- **Tutoring two BSc. students** — **Feb. 2017**
  Preparatory School for Engineer Studies, Nantes polytechnical school — *Mar. 2017*
  Main supervisor: Matthieu Perreira Da Silva (Assoc. Prof.)
- **Tutoring one MSc. student** — **Feb. 2017**
  Master: data science, Nantes polytechnical school — *Apr. 2017*
  Main supervisor: Matthieu Perreira Da Silva (Assoc. Prof.)

Reviewing

- **Cognitive science**
  Journal of Vision; Journal of Eye Movement Research; Frontiers In (Virtual reality), eNeuro
- **Computer science**
  IEEE International Conference on Image Processing; IEEE International Conference on Multimedia and Expo; IEEE Transactions On Image Processing; IEEE Transactions on Visualization and Computer Graphics; EURASIP Journal on Image and Video Processing; Signal Processing: Image Communication; ACM International Conference on Interactive Media Experiences; ACM International Conference on Interactive

Media Experiences; MDPI sensors

- **Multi-disciplinary**
  Nature scientific Reports; PLOS ONE
- **Other**
  Mathematical Problems in Engineering

Science communication and mediation

- **Passeport Recherche** **Nov. 2017**
  Supervised students from a technical high school for a research project *May 2018*
  as an introduction to research work and methodology.
- **Nantes Digital Week** **Sept. 2017**
  As part of *LOGIN* (a Ph.D. student association), we presented to the general public
  machine learning algorithms via workshops, activities and "mini-conferences".
- **Maker Faire Nantes** **Jul. 2017**
  As part of *LOGIN*, we presented to the general public an algorithm of neural style transfer.

Research Internships

- **Detection of facial expressions: the importance of low frequencies** **Feb. 2016**
  Internship at the Psychology and NeuroCognition Lab. (LPNC) *jul. 2016*
  Grenoble, France
- **Technological acceptability of present industrial work environments** **Feb. 2014**
  Internship at the Social and Cognitive Psychology Lab. (LaPSCo), scholarship from *jun. 2014*
  the French Institute for Advanced Mechanics (now SIGMA)
  Clermont-Ferrand, France
- **Modified Attention Network Test for emotional stimuli processing** **Feb. 2013**
  Master project at the Social and Cognitive Psychology Lab. (LaPSCo) *may 2013*
  Clermont-Ferrand, France
- **Procedural learning in virtual environments** **nov. 2010**
  Master project at the European Center for Virtual Reality *Feb. 2011*
  Brest, France