Yseult Héjja-Brichard

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ACADEMIC POSITION

Konrad Lorenz Institute of Ethology, University of Veterinary Medicine — **Vienna, Austria**
Postdoctoral researcher — *September 2024 - Present*

Department of Behavioral & Cognitive Biology, University of Vienna — **Vienna, Austria**
Senior Research Fellow — *September 2024 - Present*

> Research on courtship behaviour of several bird species using data science and machine learning tools. Postdoctoral advisor: Leonida Fusani (KLIVV & BeCogBio).

Centre d'Ecologie Fonctionnelle et Evolutive — **Montpellier, France**
Postdoctoral researcher — *December 2023 - August 2024*

UMBC Biological Sciences — **Baltimore, MD, USA**
Postdoctoral researcher — *November 2021 - November 2023*
Visiting postdoctoral researcher — *March 2024 - May 2024*

Centre d'Ecologie Fonctionnelle et Evolutive — **Montpellier, France**
Postdoctoral researcher — *November 2020 - October 2021*

> How information theory can inform the evolution of sexual signalling patterns in darters (*Etheostoma* spp.). Collaboration between France and the US. *Behavioral experiments, image analysis, deep learning.* Postdoctoral advisors: Tamra C. Mendelson (UMBC) and Julien P. Renoult (CEFE, CNRS).

EDUCATION

PhD studies in Neuroscience, Cognition, and Behavior — **2020**
Université Paul Sabatier and CerCo (CNRS), Toulouse, France

Supervisor: Benoit R. Cottereau, within the Eco-3D team.
Title of the thesis: Spatial and temporal integration of binocular disparities in primates.
Functional neuroimaging, visual behaviour, comparative visual cognition (macaques and humans)

Msc in Neuroscience, Cognition, and Behavior (2nd year) — **2015**
Université Paul Sabatier, Toulouse, France

Msc in Cognitive and Social Psychology (1st year) — **2014**
Université de Grenoble-Alpes, Grenoble, France

Bsc in Psychology — **2013**
Université de Grenoble-Alpes, France & Universität Leipzig, Germany

RESEARCH SKILLS

Computer skills

- ***Programming:*** Matlab, R, Python (NumPy, PyTorch), C# (basic knowledge), MPI (parallel computing)
- ***Web development:*** HTML, CSS, JavaScript
- ***Version control:*** Git, Github, Gitlab
- ***Neuroimaging:*** SPM12, caret5 (software for monkey data), PRoNTo (Pattern recognition toolbox)

- ***Stimulus presentation:*** EventIDE, jsPsych, PsychToolbox
- ***Writing:*** LaTeX, RMarkdown, Office
- ***Graphics editor:*** Adobe Illustrator, Photoshop, GIMP, Inkscape
- ***Data and article sharing:*** Github, Open Science Framework, bioRxiv, EcoEvoRXiv
- ***Animal behavior:*** BORIS, DeepEthogram, ImageJ, AnimalTA
- ***Other tools:*** MEGA software (phylogenetic data), LimeSurvey (survey tool), Blender (video animation)

Data analysis

- Image analysis (pattern recognition, signal processing)
- Functional neuroimaging data (univariate, retinotopic, and multivariate pattern analyses)
- Psychophysical and behavioural data modelling
- Eye-tracking analyses

SCIENTIFIC PRODUCTION

Publications

Under review

- **Héjja-Brichard, Y.**, Raymond, M., Cuthill, I., Mendelson, T.C., Renoult, J.P. *(in revision)*. Perceptual biases, camouflage patterns, and the origin of sexual signals. [Preprint]

Peer-reviewed journal articles

- Zaneva, M., Coll-Martín, T., **Héjja-Brichard, Y.**, Kalandadze, T., Kis, A., ... Zisk, A. H. (2024). Introduction to Neurodiversity: An Annotated Reading List. *eLife*. https://doi.org/10.7554/eLife.102467 [Preprint]
- **Héjja-Brichard, Y.**, Million, K., Renoult, J.P., Mendelson, T.C. (2024). Using Neural Style Transfer to study the evolution of animal signal design: A case study in an ornamented fish. *Ecological informatics*. https://doi.org/10.1016/j.ecoinf.2024.102881 [Preprint]
- **Héjja-Brichard, Y.**, Renoult, J.P., Mendelson, T.C. (2024). Comparative analysis reveals assortative mating preferences in darters independent of sympatry and sex. *Ecology and Evolution*. https://doi.org/10.1002/ece3.11498. [Preprint]
- ManyPrimates et al. (including **Héjja-Brichard, Y.**) (2022). The evolution of primate short-term memory. *Animal Behavior and Cognition*. https://doi.org/10.26451/abc.09.04.06.2022 [Preprint]
- Guiomar, N., Krol, L.R., Combrisson, E., Dubarry, A.-S., Elliott, M.A., François, C., **Héjja-Brichard, Y.**, ... Chaumon, M. (2022). Good Scientific Practice in MEEG research: Progress and Perspectives. *Neuroimage*. https://doi.org/10.1016/j.neuroimage.2022.119056. [Preprint]
- Audurier, P., **Héjja-Brichard, Y.**, De Castro, V., Kohler, P.J., Norcia, A.M., Durand, J.-B., Cottereau, B.R. (2021). Symmetry processing in the macaque visual cortex. *Cerebral Cortex*. https://doi.org/10.1093/cercor/bhab358. [Preprint]
- De Castro, V., Smith, A.T., Beer, A.L., Leguen, C., Vayssière, N., **Héjja-Brichard, Y.**, Audurier, P., Cottereau, B.R. & Durand, J.B. (2021). Connectivity of the cingulate sulcus visual area (CSv) in macaque monkeys. *Cerebral Cortex*. https://doi.org/10.1093/cercor/bhaa301
- **Héjja-Brichard, Y.**, Rima, S., Rapha, E., Durand, J.-B. & Cottereau, B.R. (2020). Stereomotion processing in the non-human primate brain. *Cerebral Cortex, 30*(8), 4528-4543. https://doi.org/10.1093/cercor/bhaa055. [Preprint & OSF project]
- Rima, S., Cottereau, B.R., **Héjja-Brichard, Y.**, Trotter, Y. & Durand, J.B. (2020). A new visuotopic cluster in macaque posterior parietal cortex revealed by wide-field retinotopy. *Brain Structure and Function*. https://doi.org/10.1007/s00429-020-02134-2
- Chauhan, T., **Héjja-Brichard, Y.**, & Cottereau, B.R. (2020). Modelling binocular disparity processing

from statistics in natural scenes. *Vision Research*, 176. https://doi.org/10.1016/j.visres.2020.07.009

- Cottereau, B.R., Smith, A.T., Rima, S., Fize, D., **Héjja-Brichard, Y.**, Renaud, L., ... & Durand, J.-B. (2017). Processing of Egomotion-Consistent Optic Flow in the Rhesus Macaque Cortex. *Cerebral Cortex, 27*(1), 330–343. https://doi.org/10.1093/cercor/bhw412

Presentations

Invited talks

- **Héjja-Brichard, Y.** (2024) In Defense of Depth: Slow Science for Sustainable Progress in Ecology and Evolution. Society for Open, Reliable, and Transparent Ecology and Evolutionary Biology. [Video]
- **Héjja-Brichard, Y.** (2024) Neural style transfer and perceptual distance to test pattern preferences in fish. AI for ecology and evolution seminar, University of Montpellier, France.
- **Héjja-Brichard, Y.** (2023) Computational approaches to understanding the evolution of sexual signal design. Department of Biology, University of Pennsylvania, USA.
- **Héjja-Brichard, Y.** (2022) AI methods to study sexual selection. Imaginecology2: machine learning for image and sound processing and analysis in ecology, Villeurbanne, France.
- **Héjja-Brichard, Y.** (2020). Rethinking our Narratives: The Challenge of Slow Science. LiveMEEG.
- **Héjja-Brichard, Y.** & Mercier M.R. (2018). Data visualisation in cognitive neuroscience: Functional neuroimaging and electrophysiology. Toulouse Data Vizualisation group, Toulouse, France.

Conference talks

- Million, K., **Héjja-Brichard, Y.**, Nasir M., Tucker, S., Mendelson, T.C. (2023).Territorial competition and mate choice in the rainbow darter *(Etheostoma caeruleum)*. Southeastern Fishes Council 2023 meeting, Chattanooga, TE, USA.
- **Héjja-Brichard, Y.**, Million, K., Renoult, J.P., Mendelson, T.C. (2023). Using generative artificial intelligence to test hypotheses about animal signal evolution in an ornamented fish. Evolution 2023 meeting, Albuquerque, NM, USA.
- ManyFishes (incl. **Héjja-Brichard, Y.**)(2023) Using the detour task to assess inhibitory control across the fish taxon. 30th Annual International Conference on Comparative Cognition, Melbourne Beach, FL, USA.
- Renoult, J.P. & **Héjja-Brichard, Y.** (2022) Using deep neural networks to study the evolution of visual signals. International Conference on Ecological Sciences, SFE2-GfÖ-EEF joint meeting, Metz, France.
- **Héjja-Brichard, Y.** (2021). Workshop on Research Culture based on the Café Culture Kit developed by the Wellcome Foundation. Conférence Science Ouverte Lente Durable, Nantes, France.
- Audurier, P., **Héjja-Brichard, Y.**, Kohler, P.J., Norcia, A.M., Durand, J.-B., Cottereau, B.R. (2019). Processing of rotational symmetry in the non-human primate brain. Annual meeting of the French research group 'GDR Vision', Marseille, France.

Conference posters

- **Héjja-Brichard, Y.**, Million, K.M., Moodie, I.M., Renoult, J.P., Mendelson, T.C. (2024, June). Sensory drive in the era of artificial intelligence: new tools for new experiments. Animal Behavior Society, London, ON, Canada.
- **Héjja-Brichard, Y.**, Raymond, M., Cuthill, I.C., Mendelson, T.C., Renoult, J.P. (2023, Nov.). Visual pattern preferences: Testing the processing bias hypothesis with background-matching stimuli to shed light on signal design evolution. Society for Neuroscience, Washington, DC.
- **Héjja-Brichard, Y.**, Renoult, J.P., Mendelson, T.C. (2022, July). Strength of preference for conspecifics in Darters (genus Etheostoma): A meta-analysis. Animal Behavior Society, San José, Costa Rica.
- Audurier, P., **Héjja-Brichard, Y.**, Kohler, P.J., Norcia, A.M., Durand, J.-B., Cottereau, B.R. (2019,

Oct.). Processing of symmetry in the non-human primate brain. Society for Neuroscience, Chicago, USA.

- De Castro, V., LeGuen, C., **Héjja-Brichard, Y.**, Audurier, P., Cottereau, B.R., Durand, J.-B. (2019, Oct.). Functional and structural connectivity of the cingulate sulcus visual (CSv) area in macaque monkeys. Society for Neuroscience, Chicago, USA.
- **Héjja-Brichard, Y.**, Bruzzone, S.E.P., Rapha, E., Durand, J.-B., Cottereau, B.R. (2019, Sept.). Influence of natural statistics on depth perception. Predictive Brain Conference, Marseille, France.
- **Héjja-Brichard, Y.**, Rima, S., Rapha, E., Durand, J.-B., Cottereau, B.R. (2018, Nov.). Stereomotion processing in the non-human primate brain. Society for Neuroscience, San Diego, USA.
- Rima, S., Cottereau, B.R., **Héjja-Brichard, Y.**, Trotter, Y., Durand, J.-B. (2017, Nov.). Wide-field retinotopy reveals a new visuotopic cluster in IPS. Society for Neuroscience, Washington DC, USA.
- **Héjja-Brichard, Y.**, Rima, S., Durand, J.-B., Cottereau, B.R. (2017, Aug.). Stereomotion processing in the non-human primate brain. European Conference on Visual Perception, Berlin, Germany.
- **Héjja-Brichard, Y.**, Rima, S., Trotter, Y., Banks, M.S., Durand, J.-B., Cottereau, B.R. (2015, Oct.). Adaptation to the 3D properties of the environment in non-human primates. GDR Vision annual forum, Grenoble, France.

Lab seminars

- Sensory drive in the era of artificial intelligence: new tools for new experiments (2024). Fusani Lab Day, Seebarn am Wagram, Austria.
- Computational approaches to understanding the evolution of sexual signal design (2023). Department of Biological Sciences, UMBC, Baltimore, MD, USA.
- Visual Pattern Preferences (2023). Mendelson Lab Meeting, Department of Biological Sciences, UMBC, Baltimore, MD, USA.
- Deep Learning et al. Architecture and Applications in Biology (2022). Mendelson Lab Meeting, Department of Biological Sciences, UMBC, Baltimore, MD, USA.
- Investigating natural statistics and sexual signalling patterns with deep learning (2021). Department of Evolutionary and Behavioral Ecology meeting, CEFE, Montpellier, France.
- Open Science practices in Eco/Evo (2021). E3CO team seminar, CEFE, Montpellier, France.
- Stereovision processing in primates: A neuroimaging and psychophysics investigation (2021). E3CO team seminar, CEFE, Montpellier, France.
- Democracy in the animal kingdom: Collaborative decision-making (2019). CerCo Winter School, Pragnères, France.
- Stereovision in the animal kingdom: Which species, at what cost, and for which advantages? (2018) CerCo Lab Day, Muret, France.
- Sexism in research and at the university: Why should it matter? What can we do about it? (2018) CerCo Winter School, Piau-Engaly, France.

TEACHING & MENTORING EXPERIENCE

Temporary teaching assistant (2019-2020) for BSc Psychology students (1st year) - 48 hrs
Department of Psychology, Université Toulouse Jean Jaurès, Toulouse, France.
Tutorial classes: *Introduction to Psychophysiology*
Responsibilities: Re-designed and delivered weekly tutorial classes to groups of 40 students on the topics of Ontogenesis, Hormones in the human body, and Introduction to Genetics.

Graduate teaching assistant (2015-2018) for BSc Biology students (2nd and 3rd years) - 193 hrs

Department of neuroscience and behavioural science, Université Paul Sabatier, Toulouse, France.
Practical works and tutorial classes: *Nervous and cerebral functions, Behavioral ecology, Neurophysiology, Neuroscience*
Responsibilities: Designed and delivered the content of two seminars to groups of 40 students; trained two new graduate teaching assistants; assessed students' reports and final exams; implemented new assessment methods. Trained groups of 20 students on experimental designs, research methodology, and statistical analyses during weekly three-hour lab sessions.

Student supervision

- Arthur Celle, Assistant Engineer, Centre d'Ecologie Fonctionnelle et Evolutive, Montpellier, France, 2025
- Nishtha Pareek, Master's student in Biology and Electronics Engineering, Birla Institute of Technology and Science, Pilani, India, 2024
- Sarah Clement, Master's student in Ecology and Evolution, University of Rennes, France, 2024
- Maxine Akunnakwe^{+}, Undergraduate student in Biological Sciences, UMBC, US, 2024
- Gabriella Dennis^{+}, Undergraduate student in Biological Sciences, UMBC, US, 2023, 2024
- Jessie Gordon, Undergraduate student in Biological Sciences, UMBC, US, 2023
- Kossi Katchekpele, Undergraduate student in Biological Sciences, UMBC, US, 2022
- Lauren Norwood, Undergraduate student in Biological Sciences, UMBC, US, 2022
- Silvia Bruzzone, Master's student in Neuroscience, University of Trieste, Italy, 2019
- Guillaume Thuéry, Master's student in Neuroscience, University of Bordeaux, France, 2018

$^{+}$*Undergraduate research award recipient*

Peer-mentoring

- Weaving the Future of Animal Behavior (WFAB) program, hosted by the Animal Behavior Society (coordinator: Emilia Martins, ASU). July 2022 – August 2023. Online and in-person workshops to support early career investigators in our transition to academic positions.
- Disabled in STEM (coordinator: Alyssa Paparella). October 2023 - July 2024. Mentorship and resource sharing.

GRANTS & FELLOWSHIPS

- 2023: Travel grant to attend the COSYNE 2023 conference in Montréal, QC, Canada
- 2022: Travel grant to attend the Brains Minds & Machines summer course in Woods Hole, MA, USA
- 2022: Travel award to attend the annual conference of the Animal Behavior Society in Costa Rica
- 2021: Funding to organise a conference on open and sustainable science, LPPL and PROGEDO Loire
- 2020: Three-month extension to finalise my doctoral thesis, Internal funding, CerCo - CNRS
- 2015: Three-year doctoral fellowship to pursue a PhD, University of Toulouse, France
- 2012: Erasmus grants from the European Union and from the French Rhône-Alpes region

PROFESSIONAL AFFILIATIONS

- Research Network Data Science at Uni Vienna (2024 - present)
- Association for Women in Science (2023 - present)
- Animal Behavior Society (2022 - present)
- Comparative Cognition Society (2022 - present)
- Society for Open, Reliable, and Transparent Ecology and Evolutionary Biology (2021 - present)
- Association for the Study of Animal Behaviour (2020 - present)
- Big Team Science: ManyPrimates; ManyFishes (founding team member); ManyManys

EXTRACURRICULAR ACTIVITIES

Lab & Community Involvement

- Article for ecrLife, an eLife-supported programme to give voice to early-career researchers (2024, March): Y. Héjja-Brichard, A. Arora & R. Bajaj "Overcoming hardships for internationals in academia"
- Statistical advisor for students of the Mendelson lab (2022, 2023)
- Co-organisation of a conference to promote open and sustainable scientific practices for the French-speaking community: SOLD21 (July 2021)
- Ambassador for the Center for Open Science: COS (2018-present)
- Co-creation of a Welcome Kit for new students and postdocs (2019)
- Organisation of the Lab Student Day (2019) and the Lab Winter School (2017, 2018)
- Student representative at the Lab Council (2017-2018)

Reviewing activity

- Scientific journals: *Behavioral Ecology, Ecology and Evolution, Trends in Ecology and Evolution, NeuroImage, Symmetry*
- Research grants: *The Animal Behavior Society Student Research Grants, National Science Foundation (Behavioral Systems Cluster)*
- Editorial activity: *Moderator for the EcoEvoRxiv preprint server*

Personal Implication in Science Popularisation

- Scientific speed dating with groups of high school students (December 2023) with the Declics association.
- Outreach project at UMBC (Spring and Fall 2023) to share our research on sexual selection in darters with undergraduate and high school students.
- Presentation on using Python to investigate communication signals in fish for undergraduate students in Biology at the University of Maryland, College Park (January 2023).
- Editor of the second issue of the magazine "Perspectives" for FRESCO, a French national organisation involved in popularising cognitive science.
- Coordination of a thematic issue on Altruism in animals for the magazine "Perspectives" (Spring 2022).
- Moderator of a discussion on slow science and research outside academia (March 2021), WEPASCO
- Public presentation on visual illusions (March 2019) for the Brain Awareness Week in Toulouse, FR.
- Public presentation on the study of 3D vision in animals (February 2017), Museum de Toulouse, FR.
- Article for the Museum of Natural History in Toulouse (2017, in French) about the evolution of 3D vision in animals: Y. Héjja-Brichard & B.R. Cottereau "Evolution et vision : le vivant a de la profondeur!"

Complementary Skills and Training

- **Languages** – French (native), English (full proficiency), German (good command in speaking, level B2), Spanish (basic communication skills, level B1), Italian (basic communication skills, level B1).
- **Teaching training** – Pedagogical toolbox (3-day on evidence-based teaching practices); Teaching in the digital era: Thinking about your teaching differently; Teaching practice in a foreign language; Understanding what it means to learn to teach more effectively (University of Toulouse)
- **Methodological improvement**
  - Tutorials in statistical analyses: frequentist and Bayesian frameworks
  - Workshops in ethics: Primate Welfare Meetings; "Research in Biology and societal considerations" by a graduate school; Ethics and scientific integrity
  - Workshop on Artificial Intelligence: 'Tracing the links between Cognition, Consciousness, and AI' by CIFAR; Tutorial on Reinforcement Learning at COSYNE 2023.
- **Summer Schools**
  - Neuromatch Academy: Deep Learning (August 2021). Group project: "Assessing the robustness

against word permutations of CNNs and LSTMs in semantic similarity learning."

- Center for Brains, Minds & Machines: Summer school on the problem of intelligence (Woods Hole, MA, August 2022). Personal project on multi-agent reinforcement learning.

- **Certification**

  - Experimental research design in non-human primates - June 2016 (CNRS Marseille, France)

  - Lab training: Introduction to Biosafety, Animal Biosafety, Hazard Communication, Wildlife Research, Training for Investigators, Staff and Students Handling Biohazards - November 2021, 2022, 2023 (CITI program, UMBC)