Ricardo Javier Alejandro Benavides

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scholar

Research Interests:

Cognitive Neuroscience. Working at the intersection of neurobiology, psychology, and engineering to understand the links between neurobiology and cognition, particularly those involved in and related to memory, learning, and cognitive control.

EDUCATION

since 2020 **PhD in Experimental Psychology**
Ghent University. Ghent, Belgium.
Topic: Computational Cognitive Neuroscience – Cognitive Control.
Advisor: Clay Holroyd.

2018 – 2020 **M.Sc. in Biomedical Engineering**
Universität zu Lübeck & Technische Hochschule Lübeck. Lübeck, Germany.
Topic: Cognitive Neuroscience – Contextual Semantic Memory.
Advisor: Nico Bunzeck.

2012 – 2017 **Electronics and Telecommunications Engineering** (equivalent to BSc + MSc)
Technical University of Loja (UTPL). Loja, Ecuador.
Topic: Wireless Sensor Networks.
Advisor: Manuel Quiñones.

EMPLOYMENT HISTORY

since 2020 **Learning and Cognitive Control Lab. Ghent University, Ghent, Belgium**
Doctoral researcher
- Computational Cognitive Neuroscience: cognitive control, decision making, and learning.
- Acquisition and analysis of functional magnetic resonance (fMRI) data.
- Acquisition and analysis of electroencephalography (EEG and iEEG) data.
- Univariate and Multivariate statistical analysis: representational similarity analysis, multivariate pattern analysis.
- Computational modelling.

2019 – 2020 **Bunzeck Lab. Institut für Psychologie I, Universität zu Lübeck, Lübeck, Germany**
Research Assistant
- Cognitive Neuroscience: lifelong learning and memory processes.
- Processing, and analysis of Electroencephalography (EEG) data.

2016 – 2018 **INTEC (Ingeniería y Tecnología) Company. Loja, Ecuador**
Communications Technician
- Implementation of radiofrequency, optical fiber, and satellite communication links.
- Configuration, maintenance, and repair of electric and electronic equipment, including medical devices.
- Design and implementation of electronic solutions for security, wireless sensor networks, renewable energy, and home automation.

2017 – 2018 **Los Andes Technological Institute. Loja, Ecuador**
Lecturer

GRANTS AND AWARDS

2024 Travel Grant (*Bridging Diverse Perspectives on the Mechanistic Basis of Foraging Conference*), funded by Howard Hughes Medical Institute's Janelia Research Campus

2023 Travel Grant (*IV Latin American Workshop on Computational Neuroscience*), funded by IBRO – International Brain Research Organization

2015 Winner in *UTPL Challenges: "Two outputs Radiofrequency Power Divider"*. Loja, Ecuador

PUBLICATIONS

Preprints

Oerlemans J., **Alejandro, R. J.**, Hemelsoet, D., Genbrugge, E., Bouche, K., Defreyne, L., De Herdt, V., Holroyd, C. B. (2024). Lesions of anterior cingulate cortex disrupt an electrophysiological signature of reward processing in humans. *bioRxiv*. https://doi.org/10.1101/2024.12.04.626789

Peer-reviewed Journal Articles

Alejandro, **R. J.**, Foinikianaki, E., Ikink, I., & Holroyd, C. B. (in preparation). The role of ACC in shifting between foraging strategies.

Alejandro, **R. J.**, Ikink, I., Foinikianaki, E., & Holroyd, C. B. (in preparation). Predictive representations of planning, learning, and memory.

Foinikianaki, E., Ikink, I., **Alejandro, R. J.**, Colin, T., & Holroyd, C. B. (under review). ACC representations of reward-driven motivation over hierarchically-organized behavior.

Ikink, I., Foinikianaki, E., **Alejandro, R. J.**, Colin, T., & Holroyd, C. B. (under review). Stability of Representations in Anterior Cingulate Cortex During Simultaneous Execution of Multi-step Sequences.

Castillo, D., **Alejandro, R. J.**, García, S., Rodríguez-Álvarez, M. J., & Lakshminarayanan, V. (2025). Region of Interest Features and Classification of MRI Brain Lesions. In S. Berrezueta-Guzman, R. Torres, J. L. Zambrano-Martinez, & J. Herrera-Tapia (Eds.), *Information and Communication Technologies* (Vol. 2273, pp. 57–70). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-75431-9_4

Oerlemans, J., **Alejandro, R. J.**, Van Roost, D., Boon, P., De Herdt, V., Meurs, A., & Holroyd, C. B. (2024). Unravelling the origin of the reward positivity: a human intracranial event-related brain potential study. *Brain*, Vol. 148, 199–211. https://doi.org/10.1093/brain/awae259

Alejandro, R. J., & Holroyd, C. B. (2024). Hierarchical control over foraging behavior by anterior cingulate cortex. *Neuroscience & Biobehavioral Reviews*, Vol. 160, 105623. https://doi.org/10.1016/j.neubiorev.2024.105623

Alejandro, R. J., Packard, P. A., Steiger, T. K., Fuentemilla, L., & Bunzeck, N. (2021). Semantic Congruence Drives Long-Term Memory and Similarly Affects Neural Retrieval Dynamics in Young and Older Adults. *Frontiers in Aging Neuroscience*, 13:683908. DOI: https://doi.org/10.3389/fnagi.2021.683908

CONFERENCE ABSTRACTS

Alejandro, R. J., Ikink, I., Foinikianaki, E., Colin, T., & Holroyd, C. B. (2024). The role of the ACC in shifting between foraging strategies. In *Bridging Diverse Perspectives on the Mechanistic Basis of Foraging*. Ashburn, Virginia, USA. **[Talk]**

Alejandro, R. J., Ikink, I., Foinikianaki, E., Colin, T., & Holroyd, C. B. (2023). The role of the ACC in shifting between foraging strategies. In *International conference on Motivational and Cognitive Control*. Lyon, France. **[Poster]**

Ikink, I., Foinikianaki, E., **Alejandro, R. J.**, Colin, T., & Holroyd, C. B. (2023). Testing the stability of ACC task representations: doing sequential tasks in a separate versus interleaved fashion. In *International conference on Motivational and Cognitive Control*. Lyon, France. **[Poster]**

Oerlemans, J., **Alejandro R. J.**, Hemelsoet, D., Meurs, A., Boon, P., De Herdt, V., & Holroyd, C. B. (2023). Identifying the source of the Reward Positivity: intracranial ERP-analysis in human epilepsy patients. In *Annual Meeting of the Society for Psychophysiological Research (SPR).* New Orleans, Louisiana, USA. **[Symposium]**

Alejandro, R. J., Ikink, I., Foinikianaki, E., Colin, T., & Holroyd, C. B. (2022). The role of the ACC in shifting between foraging strategies. In *3rd Workshop on Mental Effort*. Providence, Rhode Island, USA. **[Flash Talk and Poster]**

Oerlemans, J., **Alejandro R. J.**, Hemelsoet, D., Meurs, A., Boon, P., De Herdt, V., & Holroyd, C. B. (2022). Identifying the source of the Reward Positivity: two patient studies involving cortical lesions and intracranial recordings. In *Annual Meeting of the Society for Psychophysiological Research (SPR).* Vancouver, British Columbia, Canada. **[Poster]**

Alejandro, R. J., Ikink, I., Foinikianaki, E., Colin, T., & Holroyd, C. B. (2022). The role of the ACC in shifting between foraging strategies. In *Annual Meeting of the Belgian Association of Psychological Sciences***.** Leuven, Belgium. **[Poster]**

Foinikianaki, E., Ikink, I., **Alejandro, R. J.**, Colin, T., & Holroyd, C. B. (2021). The effect of reward on task representations in ACC. In *NVP Dutch Society for Brain and Cognition Winter Conference*. Egmond aan Zee, Netherlands. **[Poster]**

Alejandro, R. J., Packard, P. A., & Bunzeck, N. (2020). The semantic congruence effect is not impaired in older subjects but associated with changes in neural processing. In *BioMedTec Student Conference***.** Lübeck, Germany. **[Talk, Peer reviewed paper, and Poster]**

Alejandro, R. J., & Quiñones M. (2017). Design and Implementation of a Wireless Sensor Network for Compost Intelligent Production. In *UTPL Investiga***.** Loja, Ecuador. **[Invited talk]**

TEACHING AND MENTORING

Teaching

since 10.2023 **Teaching Assistant** – Ghent University, Ghent, Belgium
- Instruments in Experimental Psychology (third year Bachelor of Psychology)

03.2017 – 03.2018 **Lecturer** – Los Andes Technical Institute, Loja, Ecuador
- Mathematics, Linear Algebra, Programming, Computer Networks, Digital Systems.

Mentoring

since 06.2020 **Reviewer and grader** – Ghent University, Ghent, Belgium
- Paradigms in Experimental Psychology (third year Bachelor of Psychology)
- Research Project Experimental Psychology (first year Master of Psychology)
- Internship Research Project (second year Master of Psychology)

SCIENTIFIC AND PROFESSIONAL SOCIETY MEMBERSHIPS

2022 Psychonomic Society

2016 IEEE Communications Society

SKILLS

Languages

Spanish: Native
English: TOEFL iBT: 102
German: B1 (Common European Framework of Reference for Languages)
Dutch: A1 (Common European Framework of Reference for Languages)

Methods

- Magnetic Resonance Imaging: Structural (**MRI**) and Functional (**fMRI**).
- Electroencephalography: Superficial (**EEG**) and intracranial (**iEEG**).
- Computational Modelling: **Reinforcement learning**.
- Online behavioral studies (Pavlovia, Prolific)

Programming

- Matlab, Python, Bash/Shell

Signal Processing

- BrainVision
- LabVIEW, Proteus

Development

- GitHub, Docker

Data Analysis

- PyMC, SPM12, FSL, fMRIPrep, MRIQC, Brain Imaging Data Structure
- EEGLAB, FieldTrip, Brainstorm
- RStudio, JASP, Jamovi, SPSS

Paradigm Design

- Psychopy, E-Prime

Writing

- MS Office, Latex

Hardware

- Arduino, Raspberry Pi, Libelium