ANTONINO CALAPAI

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## WORK

**Postdoctoral researcher at Cognitive Neuroscience Laboratory, German Primate Center, Göttingen, Germany** — **Jan 2020 / Present**
Supervisor: Prof. Dr. Stefan Treue
Projects:

- Autonomous cognitive assessment and enrichment of captive non-human primates
- Gamification of human visual psychophysics for motion perception and decision making
- Development of machine learning techniques for animal identification and gaze estimation

**Postdoctoral researcher at Institute for Auditory Neuroscience, University Medical Center Goettingen, Göttingen, Germany** — **Nov 2016 / Dec 2019**
Supervisors: Prof. Dr. Tobias Moser, Dr. Marcus Jeschke
Projects**:**

- Development of a cage-based device for autonomous audiology of common marmosets
- Designing of CAD implants for wireless optogenetic cochlea devices for marmosets

## EDUCATION

**PhD student in Systems Neuroscience, Göttingen Graduate Center for Neurosciences, Biophysics, and Molecular Biosciences, Georg August University Göttingen, Germany** — **Sep 2011 / Nov 2016**
Supervisor: Prof. Dr. Stefan Treue
Final grade: *Magna cum laude*
Projects:

- The characterization of macaque brain area MST through multidimensional mapping
- Developing autonomous training, testing, and enrichment devices for captive monkeys
- The role of microsaccadic eye movements in the deployment of visual attention in humans

**MS in *Neurosciences and Neuropsychological rehabilitation*, University of Bologna, Psychology Faculty,** — **Oct 2008 / Feb 2011**
Final grade: 110/110 *cum laude*
Thesis' title: Electrophysiological mapping of the macaque's lateral prefrontal cortex: methodological aspects and preliminary results
Thesis' supervisors: Prof. Dr. Alessio Avenanti, Prof. Dr. Pier Francesco Ferrari, Dr. Stefano Rozzi

**BS in *Neuropsychological Science and Techniques*, University of Turin, Psychology Faculty,** — **Oct 2004 / Oct 2008**
Final grade: 90/110
Thesis' title: Data collection by questionnaire. An in-depth examination of the CAWI technique
Thesis' supervisor: Dr. Barbara Loera

## PUBLICATIONS

Hansmeyer L., Yurt P., Agha N., Trunk A., Berger M., Calapai A., Treue S., and Gail A., (2022). *Home-enclosure based behavioral and wireless neural recording setup for unrestrained rhesus macaques*. eNeuro, 0285-22.2022; doi: 10.1523/ENEURO.0285-22.2022

Yurt, P., Calapai, A., Mundry, R. and Treue, S., (2022). *Assessing cognitive flexibility in humans and rhesus macaques with visual motion and neutral distractors*. Frontiers in Psychology, 13. doi: 10.3389/fpsyg.2022.1047292

Cabrera-Moreno J, Jeanson L, Jeschke M and Calapai A., (2022). *Group-based, autonomous, individualized training and testing of long-tailed macaques (Macaca fascicularis) in their home enclosure to a visuo-acoustic discrimination task.* Frontiers in Psychology. 13:1047242. doi: 10.3389/fpsyg.2022.1047242

Calapai A., Cabrera-Moreno J., Moser T., Jeschke M., (2022). *Flexible auditory training, psychophysics, and enrichment of common marmosets with an automated, touchscreen-based system*. Nature Communication, 13, 1648. doi: 10.1038/s41467-022-29185-9

Xue C., Calapai A., Krumbiegel J., Treue S., (2020). *Sustained spatial attention accounts for the direction bias of human microsaccades*. Scientific Report 10, 20604. doi: 10.1038/s41598-020-77455-7

Berger M., Calapai A., Stephan V., Niessing, M., Burchardt L., Gail A., Treue S., (2017). *Standardized automated training of rhesus monkeys for neuroscience research in their housing environment*. Journal of Neurophysiology, 119(3), 796–807. doi: 10.1152/jn.00614.2017

Calapai A., Berger M., Niessing M., Heisig K., Brockhausen R., Treue S., Gail, A., (2016). *A cage-based training, cognitive testing and enrichment system optimized for rhesus macaques in neuroscience research*. Behavior Research Methods, 1–11. doi: 10.3758/s13428-016-0707-3

## PUBLICATIONS IN PREPARATION

A touchscreen-based, multiple-choice, game-like approach to cognitive enrichment of captive rhesus macaques. With Pfefferle D., Nazari A., Cassidy L., Yurt P., Brockhausen R., and Treue S.

Evidences of independent processing of motion direction and depth in cortical area MST of rhesus macaque. With Xue C., and Treue S.

Assessing perceptual confidence with and without social context, in a continuous perceptual report serious game. With Schneider F., Gail A., Kagan I., Treue S.

Gamification of visual psychophysics of motion perception with Unreal Engine. With Unruh L., Unger L., Semmelhack E., Degener M., Unakafova V., Treue S.

## ONGOING PROJECTS

Cognitive flexibility in attention deficit hyperactivity disorder (ADHD). With Yurt P., Poutska L. and Treue S.

Assessing perceptual and cognitive grouping strategies in humans and monkeys with a foraging-like spatial working memory task. With With Yurt P. and Treue S.

Developing machine learning techniques for tracking, identification of macaques in breeding colonies, and gaze estimation of macaques on touchscreen devices. With Kozyrev V. and Treue S.

## TECHNICAL SKILLS

Machine Learning (Python 3.7 with *Tensorflow;* CoreML under MacOS); to train various convolutional neural networks to identify Macaque monkeys operating autonomous touchscreen devices **2021**

Autodesk Fusion 360; for mechanical designs of: touchscreen-based autonomous devices, and of electrophysiological implants; for non-human primates **2017**

C++, to interact with microcontrollers (Arduino and/or Teensy) embedded in autonomous devices for captive non-human primates **2016**

Unreal Engine, from version 4.16; to run gamified visual psychophysics experiments on motion processing, in conjunction with open-source software MWorks for stimuli display **2016**

Python, from version 3.0; for data collection, extraction, curation, analysis, data visualization, and designing graphical-user interfaces; for psychophysics and cognitive testing in visual and acoustic domains **2016**

R, from version 3.1.0; for designing and evaluating Generalized Linear Models to interpret neuronal response to moving stimuli **2015**

Matlab, from version R2011a; to collect, extract, curate, analyze, and visualize neuronal data from macaques' medial superior temporal brain area (MST) and dorsolateral prefrontal cortex (DLPFC) with moving stimuli (random dot patterns) **2012**

MWorks, from version 5.0; to conduct visual psychophysics (with Humans and Monkeys) and electrophysiological recordings (with Monkeys) **2011**

## TEACHING ACTIVITIES

Lecture and tutoring:

MSc/PhD Neurosciences Program: Higher Vision and Attention; teacher: Prof. Dr. Stefan Treue; 6 lecture hours/course **2018-2022**

Doctoral students mentored:

Yurt P., Cognitive assessment of captive rhesus macaques through foraging-like experimental paradigms (supervisor: Prof. Treue S.) **2019-ongoing**

Cabrera-Moreno J., Cage-based auditory psychoacoustics with common marmosets (supervisor: Dr. Marcus Jeschke) **2018-2022**

Master's students supervised:

Tasilyurt S., Behavioral correlates of perceptual confidence and motion perception in a novel, continuous motion tracking paradigm, Faculty of Psychology, Baskent University, Ankara, Turkey **2021**

Dannhäuser K., Can microsaccades be used to represent spatial covert attention or *oculomotor* planning? Faculty of Psychology, Göttingen University, Göttingen, Germany **2013**

Internships and Bachelor's students supervised:

Zingler D., Behavioral correlates of perceptual confidence in a novel, continuous motion-tracking paradigm **2020**

Semmelhack E., Three-dimensional, gamified psychophysics for the study of motion discrimination with human subjects, Faculty of Psychology, Göttingen University, Göttingen, Germany **2018**

Unruh L., A gamified task for psychophysics: application in motion discrimination, Faculty of Psychology, Göttingen University, Göttingen, Germany **2017**

Unger L., Investigating the validity of gamified visual psychophysics for motion discrimination, Faculty of Psychology, Göttingen University, Göttingen, Germany **2017**

Krumbiegel J., Spatial and feature-based attention and their interaction in reaction times and microsaccades, Faculty of Psychology, Göttingen University, Göttingen, Germany **2015**

## ACQUIRED FUNDINGS

For a research assistant within the pilot project: "Home-cage based automatic auditory training of long-tailed macaques (Macaca fascicularis)"; by Leibniz-ScienceCampus „Primate Cognition"– Audacity Funds, Göttingen (2020) **12,000 Euros**

For the pilot project: "Rhesus macaque automatized chair training" and to hire a research assistant for the project "A gamified task for psychophysics: application in motion discrimination"; by Leibniz-ScienceCampus „Primate Cognition" – Seed Funds, Göttingen (2017) **10,000 Euros**

To attend the Visual Neuroscience European Summer School, Marburg, Germany; by the Göttingen Graduate School for Neurosciences, Biophysics, and Molecular Biosciences (2014) **560 Euro**

## PERSONAL LIFE

Married (since 2014), father of three (2015, 2018, 2022), musician
Speaking Italian (Native), English (Fluent), German (Intermediate)

## REFERENCES

Prof. Dr. Stefan Treue, STreue@dpz.eu,
German Primate Center, Cognitive Neuroscience Laboratory, Göttingen, Germany.

Prof. Dr. Alexander Gail, AGail@dpz.eu,
German Primate Center, Sensorimotor Group, Cognitive Neuroscience Laboratory, Göttingen, Germany.

Dr. Marcus Jeschke, MJeschke@dpz.eu,
University Medical Center Goettingen, Institute for Auditory Neuroscience and InnerEarLab, Göttingen, Germany; and German Primate Center, Cognitive Hearing in Primates (CHiP) Group, Auditory Neuroscience and Optogenetics Laboratory, Göttingen, Germany.