*Audition group, Laboratoire des Systèmes Perceptifs, ENS UMR 8248*
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# Yves Boubenec

## Affiliations and Academic experience

2017– Head of the Neuro platform of the Laboratory of Perceptive Systems (LSP; ENS).

2016– Associate Professor (maître de conférences) (LSP, Audition Team – CNRS UMR 8248, DEC, ENS, Paris).

2013-2016 Post-doctoral research position. Mentor: Shihab Shamma (University of Maryland, College Park, USA & ENS, DEC, Paris).

2008–12 PhD. Mentor: Dan Shulz (UNIC, CNRS UPR 2191, Gif-sur-Yvette, France).

2007–08 Riken summer program (2008) and five-month internship (2007) in Hosoya's laboratory (Local Neuronal Circuits Lab, Riken BSI, Wako-shi, Japan).

2006 Two-month internship in John O'Keefe's laboratory, UCL, London, UK.

## Teaching and science popularization

2019– *Introduction to Cognitive Neuroscience* (Co-coordinator; lectures: 2H), CogMaster, ENS

2017– *Neurophysiology of auditory perception* (lectures: 6H), CogMaster, ENS

2015– Coordinator: *Cognitive neurophysiology: attention, perception, decision* (lectures + programming hands-on: 35H), CogMaster, ENS

2014– *Tutorats Interdisciplinaires en Neurosciences* (project supervision: 12H), Master IMaLiS, ENS

2018 *A hand-picked selection of dimensionality reduction techniques* (Lecture: 1H30), GdR NeuralNets

2016-2020 *Neurosciences for Neuroengineers* (lecture: 2H), ESPCI

2016-2018 *Signal Processing for Neuroengineers* (practical class: 6H), ESPCI

*Neurosciences student seminar* (Lecture: 2H), IBENS, ENS

2017 Coordinator: *Master Classes Quantitative Analysis in NEurosciences* DEC, ENS

*Introduction to auditory neurosciences* (Lecture: 3H), Neurosciences track, Biology Departement, ENS

2016 *Auditory perception in action* (Lecture: 3H), Neurosciences track, APT

2014 *Neurophysiology of auditory perception* (Lecture: 3H), CogMaster, ENS

2012 *Brain week* in Palais de la Découverte: experiments and lectures

2011 Coordinator: visit of a neurobiology institute (INAF, Gif-sur-Yvette) by high-school students

2009– Neurobiology teaching and discussion about neuroscience and research in high-school classes

## Education and diplomas

2016 Associate professor qualification in Neurosciences, in Physiology, and in Mechanics and Civil Engineering.

2008–12 PhD in Neurosciences (UPMC Paris 6 & ENS). *Sampling of tactile information in rats: whisker biomechanics and exploration strategy*.

2006–08 M.sc. in Neurobiology (Pasteur Institute, UPMC Paris 6 & ENS)

2005 admitted to ENS Paris (rank admission: 5)

## Publications

2020 Thoret E, [...], **Boubenec Y**, [...], Lorenzi, C. Characterizing amplitude and frequency modulation cues in natural soundscapes : A pilot study on four habitats of a biosphere reserve. *JASA* 147:5, 2020

2019 Kuchibhotla KV, [...], **Boubenec Y**, [...], Froemke, RC. Dissociating task acquisition from expression during learning reveals latent knowledge. *Nature Communications* 10:1038, 2019

Ego-Stengel V, [...], **Boubenec Y**, Shulz, DE. Mechanical coupling through the skin affects whisker movements and tactile information encoding. *J Neurophysiol* 10:1152, 2019

2018 Bimbard C*, Demené C*, Girard C, Radtke-Shuller S, Shamma S,Tanter M* & **Boubenec Y***. Multi-scale mapping along the auditory hierarchy using high-resolution functional UltraSound in the awake ferret. *eLife* 2018;7:e35028.

Bagur S, Averseng M, Elgueda D, Fritz J, Yin P, Shamma S, Ostojic S* & **Boubenec Y***. Task engagement induces shift from sensory to behavioral representations in primary auditory cortex *Nature Communications* 9:2529, 2018

Górska U, Rupp A, **Boubenec Y**, Celikel T & Englitz B. Evidence Integration in Natural Acoustic Textures during Active and Passive Listening *eNeuro* 2018 Apr 13;5(2)

2017 **Boubenec Y***, Lawlor J*, Górska U, Shamma S & Englitz B. Detecting changes in dynamic and complex acoustic scenes. *eLife* 2017;10.7554/eLife.24910.

Claverie L, **Boubenec Y**, Debrégeas G, Prevost A & Wandersman E. Whisker contact detection of rodents based on slow and fast mechanical inputs. *Front. Behav. Neurosci.*, 10:251.

2016 **Boubenec Y**, Lawlor J, Shamma S & Englitz B. Change detection in auditory textures. *Adv Exp Med Biol*. 894:229-39.

Demené C, Bimbard C, [...], **Boubenec Y** & Tanter M. Functional Ultrasound Imaging of the thalamo-cortical auditory tract in awake ferrets using ultrafast Doppler imaging. *IEEE International Ultrasonics Symposium*, IUS. Vol. 2016-November, 2016

2014 **Boubenec Y**, Claverie N, Shulz DE & Debrégeas G. An amplitude modulation/demodulation scheme for whisker-based texture perception. *J Neurosci* 34(33):10832–10843.

2012 **Boubenec Y**, Shulz DE & Debrégeas G. Whisker encoding of mechanical events during active tactile exploration. *Front. Behav. Neurosci.* 6:74.

## Chapter

2014 **Boubenec Y** & Debrégeas G. Sensing through friction: the biomechanics of texture perception in rodents and primates. Chapter in Allemand, JF and Desbiolles, P (Eds.), *Physics and Biology: from Molecules to life*, World Scientific.

## Oral communications (presenting author), invited seminars, and organized symposium

2019 Invited talk. Workshop on "Functional ultrasound imaging of the brain". Cargèse, France.

Symposium organizer: Statistics in Auditory Scenes. ICA, Aachen, Germany.

Talk: Cross-species comparison of natural sound encoding in auditory cortex. ICA, Aachen, Germany.

Invited talk: Probing the encoding of natural sounds in ferret auditory cortex using functional UltraSound imaging . Neurospin, Saclay.

Invited talk: Task engagement induces population-level behavioral representations in primary auditory cortex. Laboratoire Jean Perrin, UPMC, Paris.

Invited talk: Probing the encoding of natural sounds in ferret auditory cortex using functional UltraSound imaging. IBSAL, Salamanca, Spain.

2018 Selected talk: Task engagement induces population-level behavioral representations in primary auditory cortex. GdR NeuralNets, Paris.

Symposium organizer: Decision-making in complex statistical environments. ARO, San Diego, USA.

Workshop organizer: Cross-modal processing (from physiology to behaviour. ENS, Paris, France.

Invited talk: Behavioral and neural bases of auditory learning. ENP days. Troyes, France.

2017 Invited seminar: Neural basis of change detection in complex and acoustic environments. NeuroSpin, Saclay, France.

Invited talk: Task engagement induces shift from sensory to behavioral representations in primary auditory cortex. Brain, Learning and Computation Workshop, Bengalore, India.

2016 Invited talk: Task engagement induces shift from sensory to behavioral representations in primary auditory cortex. Frontiers in Interdisciplinary Neuroscience and Technology, Hanghzou, China.

2015 Invited talk: Change Detection in Auditory Textures. International Symposium on Hearing, Groningen, Netherlands.

Task-related memory trace in ferret primary auditory cortex. Blitz session at the Association for Research in Otolaryngology, Baltimore, USA.

Whisker biomechanics: last advances in physics. Donders Institute for Neuroscience, Nijmegen, Netherlands.

2012 Whisker biomechanics and exploration strategy in rats. Club somatosensoriel, Paris, France.

## Posters (senior author)

2020 Nordmark J, Shamma S, & **Boubenec Y**. Spatial modulation of distractor sounds by concurrent vocalizations. ARO, San Jose, USA.

Proville R, Rogers C, & **Boubenec Y**. Context-dependent encoding of sounds in primary auditory cortex during task switching. ARO, San Jose, USA.

Landemard A*, Bimbard C*, Shamma S, Norman-Haigneré S & **Boubenec Y**. Functional UltraSound Imaging of Ferret Auditory Cortex Reveals a Unique Neural Signature of Human Speech and Music Perception. ARO, San Jose, USA.

2019 Landemard A*, Bimbard C*, Shamma S, Norman-Haigneré S & **Boubenec Y**. Functional segregation of the ferret auditory cortex probed with natural and model-matched sounds. COSYNE, Lisbon, Portugal.

2018 Lawlor J, Bimbard C, Shamma S & **Boubenec Y**. Tracking changes in stimulus statistics from sensory cortices to frontal cortex. SfN, San Diego, USA.

2017 Lawlor J, Bimbard C, Shamma S & **Boubenec Y**. Cortical representations of statistical changes is generalised along the cortical pathway. ICAC, Banff, Canada.

Bimbard C, Lawlor J, Shamma S & **Boubenec Y**. Online decision-making in ferret frontal cortex: conversion of sensory evidence into a decision signal. ICAC, Banff, Canada.

Bimbard C, [...] & **Boubenec Y**. Functional organisation of the thalamo-cortical auditory system in awake ferrets using fast ultrasound imaging. ICAC, Banff, Canada.

2017 Lawlor J, Englitz B, Shamma S & **Boubenec Y**. Behavior-dependent gating and extraction of task-relevant auditory signals in ferret frontal cortex. SfN, San Diego, USA.

Bimbard C, [...] & **Boubenec Y**. Functional organisation of the thalamo-cortical auditory system in awake ferrets using fast ultrasound imaging. SfN, San Diego, USA.

2016 Averseng M, Shamma S & **Boubenec Y**. Task-relevant modulation of phase-locked responses in primary auditory cortex. ARO, San Diego, USA.

Lawlor J, Englitz B, Shamma S & **Boubenec Y**. Change Detection in Auditory Textures. ARO, San Diego, USA.

## Posters (presenting author)

2020 Landemard*, Bimbard C*, Shamma S, Norman-Haigneré & **Boubenec Y**. Functional segregation of the ferret auditory cortex probed with natural and model-matched sounds. COSYNE, Lisbon, Portugal.

2018 Bimbard C, Landemard A, Demené C, Norman-Haigneré S, Shamma S, Tanter M & **Boubenec Y**. Multi-scale mapping along the auditory hierarchy using high-resolution functional UltraSound in the awake ferret. SfN, San Diego, USA. (also selected for Hot Topic by the SfN commitee)

2015 **Boubenec Y**, Lawlor J, Shamma S & Englitz B. Change Detection in Auditory Textures. Association for Research in Otolaryngology, Baltimore, USA.

Bagur S, Fritz J, Elgueda D, Shamma S, Ostojic S & **Boubenec Y**. Task-related memory trace in ferret primary auditory cortex. Association for Research in Otolaryngology, Baltimore, USA.

Bagur S, Fritz J, Elgueda D, Shamma S, Ostojic S & **Boubenec Y**. Task-related memory trace in ferret primary auditory cortex. Société des Neurosciences, Montpellier, France.

2011 **Boubenec Y**, Shulz DE & Debrégeas G. Pre-neuronal texture-whisker transduction in anaesthetized Rats: A predictive model of whisker deflections. $40^{th}$ meeting of the Society for Neuroscience, Washington DC, USA.

2010 **Boubenec Y**, Débregeas G & Shulz DE, Texture-whisker transduction in anaesthetized Rats: influence of sampling conditions. Active touch sensing meeting, Royal Society, Chicheley, UK.

2008 Estebanez L, **Boubenec Y** & Shulz DE, Recording and replaying whisker deflections induced by textures in anaesthetized rats. ENI-Net symposia in Neuroscience, Alicante, Spain.

## Scientific collaborations

Stephen David. OHSU. Oregon, USA.

Bernhard Englitz. Department for Neurophysiology, Donders Institute. Netherlands.

Jonathan Fritz. Institute for System Research, University of Maryland. USA.

Jean-François Léger and Laurent Bourdieu. IBENS, ENS, Paris. France.

Kishore Kuchibhotla. Institute of Biomolecular Medicine, NYU, New York. USA.

Srdjan Ostojic. GNT, ENS, Paris. France.

Charlie Demené and Michael Tanter. Institut Langevin, ESPCI, Paris. France.

Roberto Toro. Institut Pasteur, Paris. France.

## Grants and fellowships

2019 "Front cog" collaborative grant, coPI with E. Dupoux (100 k€).

Grant Région Île de France SESAME, fUS-PSL (200 k€).

Grant "ENS Incitative Actions" (25 k€).

2018 ANR JCJC "Multiscale dynamics of learning in auditory cortex" (300 k€)

2018 Grant "ENS Incitative Actions" (30 k€).

2017 Grant "Fondation FYSSEN" (35 k€).

Grant "ENS Incitative Actions" (30 k€).

2016 Grant "Cognitive Studies Department" (10 k€).

2015 Grant "Agir pour l'Audition". Shihab Shamma and Jean-François Léger (PIs). Co-investigators: Yves Boubenec and Laurent Bourdieu (300 keuro, 80 k€ for the team).

2014 CSN II fellowship for the 2014 Telluride Workshop (USA).

2013–2016 Post-doc financed by ERC ADAM (Adaptive Auditory Mind).

2009–12 ENS PhD fellowship ("allocation spécifique pour normaliens").

2008 RIKEN BSI Summer School fellowship (Japan).

## Academic responsabilities

2020– Member of the pedagogical committee of the ED3 doctoral school.

2019– Examiner for the jury of Maxime Maheu's PhD thesis (supervisor: S. Dehaene & F. Meyniel): Perception of regularity in sequences: behavioral, neural and computational signatures (Neurospin, France.)

Examiner for the jury of Jordi-Ysard Llobet's PhD thesis (supervisor: P. Verschure): Learning mechanisms of uncertainty and neuromodulation (Universitat Pompeu Fabra), Barcelona, Spain.

Member of the selection jury for the graduate school FrontCog, Neuro and modeling track.

2018– Examiner for the jury of Ophélie Foubet's PhD thesis (supervisor: R. Toro): Characterization of the Ferret Neocortical Development using Structural Magnetic Resonance Imaging, Université Paris Diderot (Paris 7), Paris, France.

Associate Faculty Member for F1000.

2017 Examiner for the jury of Élodie Tiran's PhD thesis (supervisor: M. Tanter): Imagerie cérébrale et étude de la connectivité fonctionelle par échographie Doppler ultrarapide chez le petit animal éveillé et en mouvement, Université Paris Diderot (Paris 7), Paris, France.

2016– Member of the CogMaster pedagogic team (ENS PSL Paris V EHESS).

In charge of the internships for the ENS Department of Cognitives Studies.

2011-12 Doctoral mission: Coordinator for an art & science festival in the Université Paris-Sud (Paris 11).

2010-11 Doctoral mission: Co-coordinator of an European grant proposal in UPMC (Paris 6).

2009-10 Doctoral mission: Reorganization of graduate student training for the Université Paris-Sud (Paris 11).

2005-06 Member of the scientific council of the ENS, elected by scientific students

## Editorial activity

2018– Reviewer for the COSYNE meeting

Review editor in *Frontiers in Neuroscience and Psychology*; Reviewer for *Nature Communications*, *eLife*, *PNAS*, *The Journal of Neuroscience*, *Cerebral Cortex*, *eNeuro*, *The European Journal of Neuroscience*, *The Journal of Neurophysiology*, *Frontiers in Psychology*, *Frontiers in Neuroscience*, *Behavioural Processes*, *The Journal of Biomechanics*

Reviewer for the EU ERA-NET program, the UK Medical Research Council, the Romanian National Research Council

## Supervision

Post-doc

2016– Rupesh Kumar, co-supervised with Srdjan Ostojic.

Graduate students

2019– Jeffrey Boucher (ENS fellowship CDSN), co-supervised with Shihab Shamma. Doctoral school: FIRE/FdV.

2018– Agnès Landemard (Polytechnique fellowship), co-supervised with Shihab Shamma. Doctoral school: ED3C.

2018– Clara Bardin (ED3C fellowship), co-supervised with Jean-François Léger. Doctoral school: ED3C.

2018– Thomas Schaffhauser (ED3C fellowship), co-supervised with Pascal Mamassian. Doctoral school: ED3C.

2017– Jonatan Nordmark (LISTEN ITN fewllowship), co-supervised with Shihab Shamma. Doctoral school: ED3C.

2015–2019 Célian Bimbard (ENS fellowship), co-supervised with Shihab Shamma. Doctoral school: ED3C.

2014–2018 Jennifer Lawlor, co-supervised with Shihab Shamma. Doctoral school: ED3C.

Undergraduate students

2020 Magdalena Sabat. FrontCog student, ENS.

2019 Jeffrey Boucher, co-supervised with Jean-François Léger. M2 Master IMaLiS, ENS.

Aurélien Gaudaire. M2 Cogmaster, ENS.

Jules Lebert, co-supervised with Rupesh Kumar. M2 Dual master, BIP, UPMC.

2018 Clara Bardin, co-supervised with Jean-François Léger. Master BioMedical Engineering, Neuroscience track, Paris Descartes/ESPCI.

Agnès Landemard, co-supervised with Emmanuel Dupoux. Master BioMedical Engineering, Neuroscience track, Paris Descartes/ESPCI.

Mehdi Rousset, M2. Master IMaLiS, ENS.

Jeffrey Boucher, M1. Master IMaLiS, ENS.

2017 Manuel Beiran, M2. ENP.

Jong Lee, M2R. CogMaster, ENS.

Agnès Zagala, M1. Master BIP, UPMC.

Sourya Sengupta, L3 (Charpak scholarship recipient). Jadavpur University, India.

2016 Mathieu Fehr, L3. DI, ENS.

Constantin Girard, M1. APT.

2014-2017 Sophie Bagur, M2. Master IMaLiS, ENS.

2015-2016 Martin Averseng, M2. Master ATIAM, UPMC & IRCAM.

2013-2014 Thomas Pagesy, M2. Master ATIAM, UPMC & IRCAM.

2013-2014 Jennifer Lawlor, M2. CogMaster, ENS.

2012 Camilla Pulido, Rotation student, ENP.

2011 Timothée Devaux, M1. ENS student.

2009 Sham Tlili, L3. ENS student.