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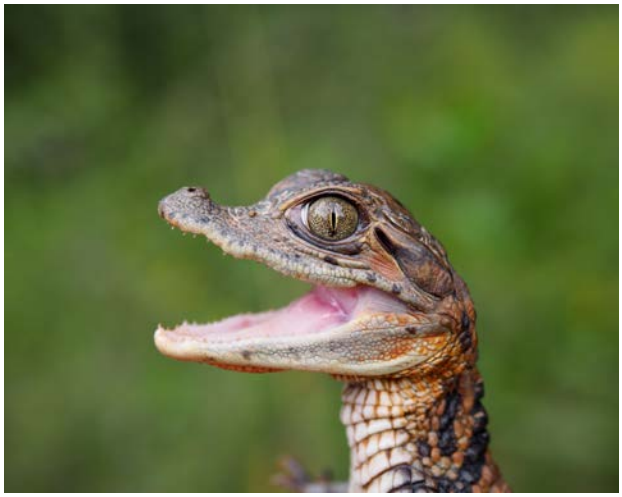

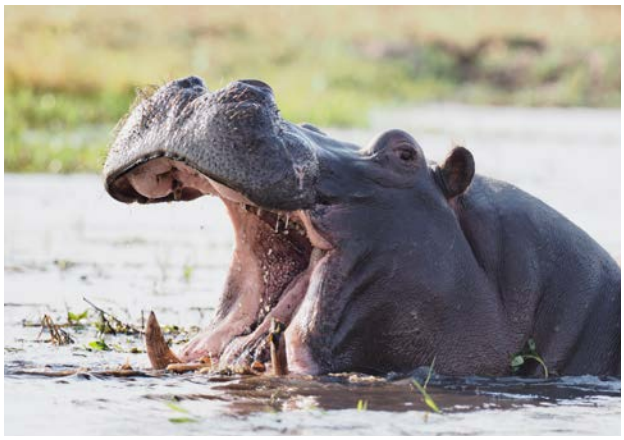

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ENES Symposium

2022 Programme

Equipe de Neuro-Ethologie Sensorielle
Centre de Recherche en Neurosciences de Lyon

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Université Jean Monnet Faculté des Sciences et Techniques, Bâtiment J (STAPS) Amphi J108, 23 rue Paul Michelon, 42023 Saint-Etienne

Thursday June 9, 2022, 9 - 18 h
Organiser contact: katarzyna.pisanski@cnrs.fr

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Schedule

9.00		Welcome
9.15	Nicolas Mathevon	Voice-mediated social interactions in the hippo
9.30	Tecumseh Fitch	Vocal allometry and acoustic adaptations (invited speaker)
10.00	Florence Levrero	Social systems and vocal interaction patterns in four great ape species
10.15	Mathilde Massenet	Harsh nonlinear vocal phenomena in puppy whines affect human perceptions of distress
1o.30	Léo Perrier	Variation in vocal repertoire use in African striped mice
10.45	David Reby	Vocal size exaggeration may have contributed to the origins of vocalic complexity
11.00		Coffee Break
11.30	Kasia Pisanski	Individual differences in human voice pitch are highly stable
11.45	Siloé Corvin	Adults learn to identify pain in human babies' cries
12.00	Julie Thévenet	Auditory perception and decision-making in crocodiles
12.15	Marie-Sabelle Hjeij	How low can odor sensitivity go? Smell detection thresholds in newborn rabbits
12.30		Lunch
2.15	Fred Sèbe	From individual acoustic information to large-scale population monitoring
2.30	Jeremy Rouch	From neural networks to long term vocal activity monitoring
2.45	Wenjing Wang	Chronic anthropogenic noise affects growth and behaviour of cichlid fish larvae
3.00	Lény Lego	Acoustic signatures in cavefish populations across caves: automatically detecting and analysing sounds
3.15	Loïc Prosnier	Positive effects of artificial noise on *Daphnia magna* fitness
3.30	Theophile Turco	Does boat noise affect one of the most problematic freshwater invaders: quagga mussels?
3.45	Floriane Fournier	Vocal production in wild mandrills
4.00		Coffee Break
4.30	Marilyn Beauchaud	Chronic anthropogenic noise affects learning in cichlid larvae
4.45	Vincent Medoc	Developing acoustic traps to mitigate Round goby invasion
5.00	Arthur Guibard	Propagation constraints on acoustic communication networks in mountain Galliformes
5.15	Naïs Caron Delbosc	Multimodal perception of aquatic vibrations and airborne sounds in crocodiles
5.30	Anna Terrade	What makes a mammal call alarming?

Presentations

Nicolas Mathevon

ENES — Director

Voice-mediated social interactions in the hippo

Hippos are well-known for their amphibious habits: at night they feed alone on land, but during the day they gather in pods in the water to avoid overheating, and to rest and mate. Our playback experiments in the field show that hippos can identify conspecifics using individual vocal signatures, and show that hippo pods are territorial entities that behave less aggressively towards neighbours than strangers.

Tecumseh Fitch

Invited speaker — University of Vienna — Professor

Vocal allometry and acoustic adaptations

Body size plays a key role in many aspects of biology, ranging from physiology through ecology and including important aspects of social behaviour. In vertebrate vocalisations, the physics of vocal production lead to several candidate acoustic indicators of body size, including fundamental frequency, formant frequencies, and duration (others have also been proposed). In this talk I will discuss these various candidate cues, and also review the many anatomical and physiological adaptations that have evolved to exaggerate or manipulate them.

Florence Levrero

ENES — Associate Professor

Social systems and vocal interaction patterns in four great ape species

The evolution of animal vocal communication and human language are major topics in Bioacoustics. One hypothesis posits that the core of communication is represented not only by what can be expressed by an isolated caller, but also by how vocal interactions are structured, language being above all a social act. We study vocal turn-taking in four great ape species: chimpanzees, bonobos, gorillas and orang-utans, and show how their varied social structures may influence vocal interaction patterns among group members.

Mathilde Massenet

ENES — PhD student (D. Reby, N. Mathevon)

Harsh nonlinear vocal phenomena in puppy whines affect human perceptions of distress

While Nonlinear Phenomena (NLP) are widely reported in animal vocalisations, their communicative functions remain poorly understood. First, we describe the acoustic contexts in which NLP occur in the natural whines of distressed puppies. Second, using sound re-synthesis, we show how the presence and extent of NLP in puppy whines affects judgments of their distress levels by human listeners.

Léo Perrier

ENES — PhD student (F. Levrero, N. Mathevon)

Variation in vocal repertoire use in African striped mice

Vocal ultrasonic communication in rodents is mostly studied in laboratory rats and mice. To investigate vocal communication in a wild social rodent, the African striped mouse, we first describe its vocal repertoire. Second, we experimentally test the use of various call types during two-individual encounters (same and different sexes). Finally, we compare this repertoire with our preliminary data on spontaneous calls recorded in the field.

David Reby

ENES — Professor

Vocal size exaggeration may have contributed to the origins of vocalic complexity

In many species, vocal tract elongation functions to exaggerate apparent body size by uniformly lowering vocal tract resonances (formants). We propose that smaller speech-like articulatory movements that alter only individual formants can serve a similar yet less energetically costly size-exaggerating function, and we test this in a series of playback experiments using synthesized human vowels and animal calls.

Katarzyna (Kasia) Pisanski

ENES — CNRS Researcher

Individual differences in human voice pitch are highly stable

Voice pitch is the most perceptually salient, sexually dimorphic and intensively studied nonverbal vocal parameter of the human voice. It varies a great deal from person to person and is known to predict a range of biologically and socially relevant traits of the vocaliser. In a series of studies, we show that these individual differences in human voice pitch are stable across neutral speech, emotional speech, and even nonverbal vocalisations, with theoretical and practical implications for the voice sciences.

Siloé Corvin

ENES, NeuroPain — PhD student

(N. Mathevon, R. Peyron, C. Fauchon)

Adults learn to identify pain in human babies' cries

Human baby cries can encode distress and pain, but how does experience shape a listeners' ability to decode this information? By using playback experiments, we show that current parents of young babies can identify a baby's pain cries even if they have never heard this baby before, whereas inexperienced individuals are typically unable to do so. This shows how parenting shapes our ability to decode the information conveyed by babies' communication signals.

Julie Thévenet

ENES, CAP — PhD student

(N. Mathevon, N. Grimault)

Auditory perception and decision-making in crocodiles

How do crocodiles perceive their auditory environment and how do they sort information to make decisions? We combine go/no-go laboratory experiments with field playback experiments to test perception and auditory discrimination of different signal ranges.

Marie-Sabelle Hjeij

ENES — PhD student (G. Coureaud)

How low can odor sensitivity go? Odor detection thresholds in newborn rabbits

Olfaction enables most mammals to detect and discriminate odours and pheromones, and such chemosensitivity is also critical for mother-infant relationships and infant survival and growth. We exposed newborn rabbits to a pheromone naturally emitted by rabbit mothers in their milk, the mammary pheromone, and paired this pheromone with other odorants, showing that such associateive conditioning influences detection thresholds for these odorants whose biological relevance was increased.

Fred Sèbe

ENES — Associate Professor

From individual acoustic information to large-scale population monitoring

Climate change and human activity have serious consequences on the productivity and abundance of high mountain fauna. Some bird species, such as the rock ptarmigan, are already in decline. Counting individuals, while difficult, is an essential step in any species conservation and management plan. We investigate the existence of individual signatures in rock ptarmigan songs, and evaluate the reliability and efficiency of using this information as a method of population census on a large spatio-temporal scale.

Jeremy Rouch

ENES — Postdoctoral fellow (F. Sèbe)

From neural networks to long term vocal activity monitoring

The huge amount of sound data produced by long-term autonomous sound recorders during wildlife monitoring requires advanced audio processing and artificial intelligence techniques. Yet, convolutional neural networks (CNN) are generally performed on very short sounds (~1s), rather than on data spanning years. We examine whether CNNs can be effectively used to monitor wildlife populations, namely *Lagopus Muta* and *Lagopus Lagopus* arctic birds.

Wenjing Wang

ENES — PhD student (M. Beauchaud, N. Mathevon)

Chronic anthropogenic noise affects growth and behaviour of cichlid fish larvae

The chronic effects of anthropogenic noise in early life, including during larval development, remain largely unknown. We measure larvae growth and collective feeding behaviours in cichlid fish (*Metriaclima zebra*) during 3 months of boat noise exposure. We then examine stress and aggressive behaviours of larvae using classical behavioural tests such as the light-dark box test and mirror test. Our results indicate that long-term boat noise exposure affects fish growth differently at different life stages.

Lény Lego

ENES — Masters student (J. Attia)

Acoustic signatures in cavefish populations across caves: automatically detecting and analysing sounds

The blind cavefish *Astyanax mexicanus* is a fascinating model for evolutionary biology, particularly to understand adaptations to extreme environments. Communication is observed between river dwelling and cave-adapted morphs. We show that fish populations inhabiting different caves of North-East Mexico have different acoustic signatures. Alongside traditional analyses (“with hands and ears”) we develop a machine learning method to automatically detect and analyse their vocal sounds.

Loïc Prosnier

ENES — Lecturer

Positive effects of artificial noise on *Daphnia magna* fitness

To study the unclear effect of noise on ecologically important zooplankton, we exposed *Daphnia magna* to continuous broadband noise. We surprisingly observed a higher survival and fecundity among exposed than unexposed individuals. This may be linked to a lower speed observed under noisy conditions: energy not used for mobility is available to increase fitness.

Theophile Turco

ENES — PhD student (V. Médoc, M. Beauchaud)

Does boat noise affect one of the most problematic freshwater invaders: quagga mussels?

In Lake Bourget, we study whether *Dreissena* mussels are impacted by and/or able to adapt to boat noise. Our investigations include behavioural, physiological and ecological comparisons between mussels subjected to noise or silence, after having been accustomed to boat noises or not. This talk will focus on methods and preliminary results.

Floriane Fournier

ENES — Masters student (F. Levrero)

Vocal production in wild mandrills

Vocal development in nonhuman primates has been assumed to be largely predetermined and completed within the first postnatal months of life. We study the vocal repertoire of a wild habituated population of mandrills (*Mandrillus sphinx*), taking a close look at the acoustic structure of crowing calls and their development from infancy to adulthood.

Marilyn Beauchaud

ENES — Associate Professor

Chronic anthropogenic noise affects learning in cichlid larvae

Anthropogenic noise is a global concern and a major stressor for animals, yet little is known about how long-term noise exposure affects early life development. By studying 6 clutches of cichlid fish (*Metriaclima zebra*), we show that fish exposed to boat noise conditions learn more slowly than control fish do, indicating that long-term exposure to boat noise may induce a detrimental effect on their learning abilities.

Vincent Medoc

ENES — Associate Professor

Developing acoustic traps to mitigate Round goby invasion

The Round goby *Neogobius melanostomus* originates from the Ponto-Caspian area and has spread to western Europe to now invade the French hydrosystems. Male Round goby fish produce acoustic cues during mating and agonistic interactions. Our project consists of using these cues as lures to catch gobies and reduce their spread.

Arthur Guibard

ENES, LMFA École Centrale de Lyon — PhD student

(F. Sèbe, S. Ollivier, D. Dragna)

Propagation constraints on acoustic communication networks in mountain Galliformes

Although propagation of an acoustic signal is known to depend heavily on weather and ground effects, the impact of propagation constraints on bird communication networks remains poorly understood. We have developed an acoustic propagation model that allows us to test how birds deal with environmental constraints.

Naïs Caron Delbosc

ENES, CRNL — PhD student

(N. Mathevon, N. Grimault)

Multimodal perception of aquatic vibrations and airborne sounds in crocodiles

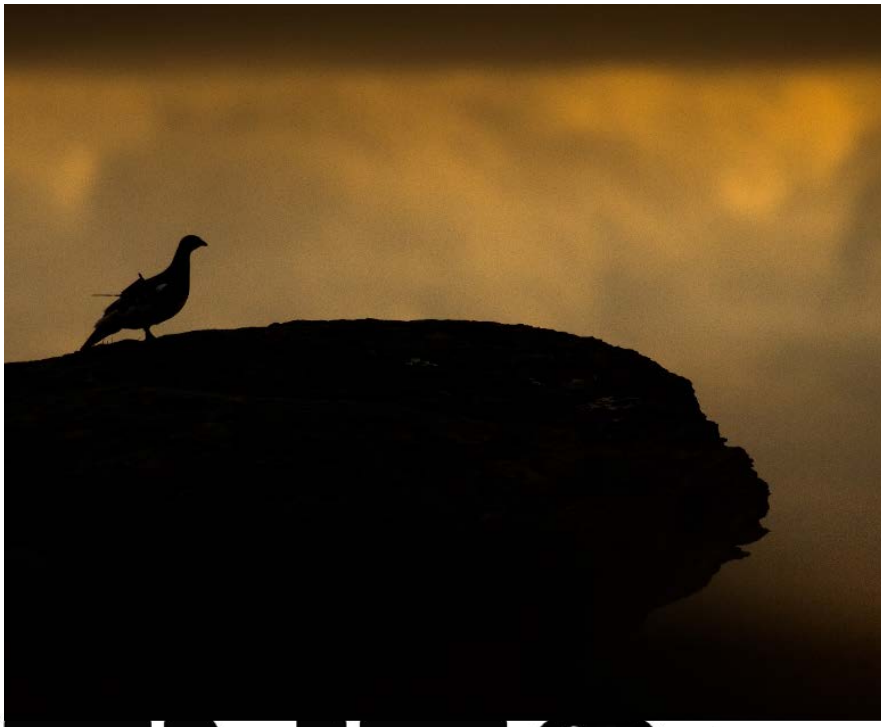
Crocodiles are acoustically communicative animals that are known to have highly developed hearing, both in water and on land, but they can also detect aquatic vibrations with their mechano-sensory receptors. We do not yet know to what extent they are able to integrate sound and vibrations propagating on the water surface. We test whether crocodiles can use auditory and vibratory stimuli simultaneously, and whether one of these modalities is more dominant.

Anna Terrade

ENES, MNHN, SNCF — PhD student (D. Reby)

What makes a mammal call alarming?

Distress calls are often characterised by the presence of nonlinear phenomena (NLP) and a longer duration among calls within the mammalian vocal repertoire. Distress vocalisations are also known to increase responsiveness and receiver arousal in some species, and this may be due to NLP. We examine how the presence of nonlinear vocal phenomena in synthesised distress calls of mammals affects perceptions of alarm in human listeners.



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