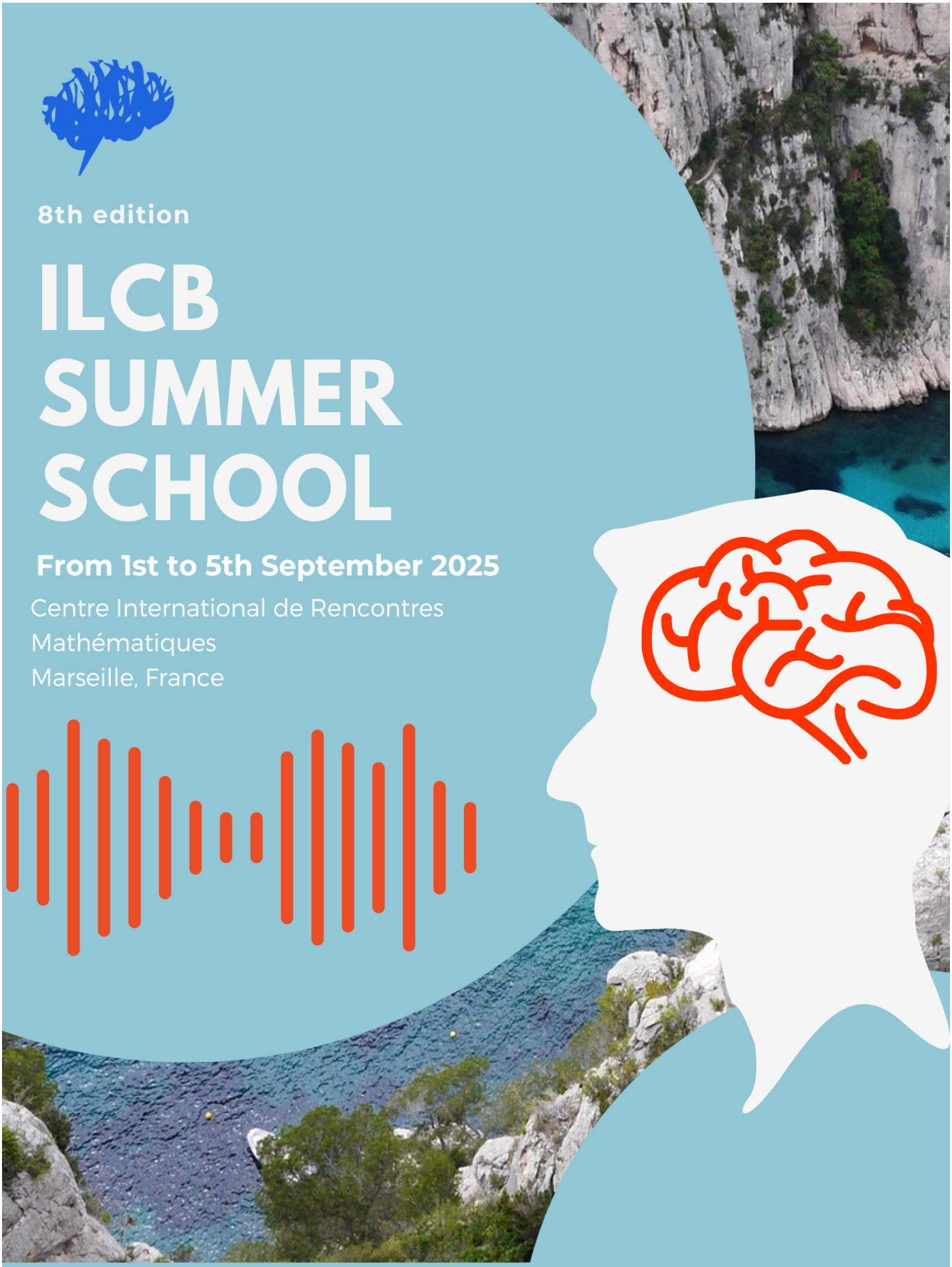
8th edition

ILCB SUMMER SCHOOL

From 1st to 5th September 2025

Centre International de Rencontres Mathématiques
Marseille, France



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INTRODUCTION

The Institute of Language, Communication and the Brain (ILCB) brings together experts in linguistics, psychology, neuroscience, mathematics, and computer science to promote an interdisciplinary approach to the study of language and communication. Each year, we organize a summer school that proposes week-long in-depth multidisciplinary courses as well as single-session presentations focusing on cutting-edge research on the topics related to the goals of the Institute. The courses and lectures are given by the experts from the Institute and renowned international speakers.

This year, the 8th ILCB Summer School will take place from Monday 1st September to Friday 5th September 2025, nearby Marseille's exceptional Parc National des Calanques, on the Luminy Campus, at the Centre International de Rencontres Mathématiques (CIRM), Marseille, France. In this edition, participants will be able to choose from a variety of theoretical and methodological five-day courses covering different aspects of language processing (e.g., linguistic theories, language and cognition, language pathologies, language development), computational modelling, neural basis of language processing, and statistics. The courses will be complemented by eight presentations of cutting-edge research from our Institute and two keynote sessions by international speakers.

We welcome participants from relevant backgrounds and at different career stages (PhD, Postdoc, Academics, and, exceptionally, excellent Master's students). Several social events will be organized to allow participants to interact in a friendly atmosphere.

SCHEDULE

	Monday 1st	Tuesday 2nd	Wednesday 3rd	Thursday 4th	Friday 5th
8:45	Welcome				
9:00 – 10:15	**1a** Modern Methods for Brain Imaging – V. Lopez, J. Drevet, P. Guilleminot, J. Pesnot (Aud. A1)				
	1b AI for the Ecological Study of Language Development – A. Fourtassi (Salle S2)				
	1c From Sound to Cognition – B. Morillon, P. Belin (Aud. A2)				
10:15 –10:45	Coffee Break				
10:45 – 12:00	**2a** Associative Memory and Priming in Neural Networks – E. Köksal Ersöz (Salle S2)				
	2b Linguistic Theories & Human Cognition – F. Di Garbo, C. Petrone (Aud. A1)				
	2c Language Development – C. Kabdebon, T. Schatz, I. Dautriche (Aud. A2)				
12:00 – 14:00	Lunch				
14:00 – 15:15	**3a** Language, Brain and Artificial Neural Networks – C. Pallier (Aud. A1)				
	3b Language & Pathology – F.-X. Alario, J. Ziegler, S. Pinto, A. Trébuchon (Salle S2)				
	3c Regression, Mixed Models, Paths – R. Anders (Aud. A2)				
15:15–15:45	Coffee Break				
15:45 – 17:00	New paradigms to investigate social cognition T. Chaminade (Aud. A2)	Principled data science J-M Freyermuth (Aud. A2)	Interactions in the adolescent brain M-H. Grosbras (Aud. A2)	The gestural origins of language A. Meguerditchian (Aud. A2)	
	Neural underpinnings of language abilities in individuals who have lost the autism diagnosis I-M. Eigsti (Aud. A1)	Language in the Dyad K. Strijkers (Aud. A1)	Phenomenology, development, and neural mechanisms of inner speech L. Nalborczyk (Aud. A1)	Bridging Speech and Large Lan-guage Models Y. Estève (Aud. A1)	
17:00–17:30	Coffee Break				
17:30 – 18:30	Social event	Keynote J. Magnuson (Aud. A1)	CREx (Aud. A2)	Keynote P. Albouy (Aud. A1)	
19:00 – 20:30	Dinner				

TITLES AND ABSTRACTS

Keynote 1

Understandable Language Models: Balancing realism and complexity in models of human speech recognition

The speech signal poses incredible challenges. A mostly uninterrupted stream of buzzes, pops, clicks, and hisses must be mapped rapidly onto words, and word sequences must be parsed sensibly to decode the message the speaker intends to communicate. For decades, leading cognitive (neural network and Bayesian) models of human speech recognition (HSR) have sidestepped the challenges of working with raw speech as input. Instead, they use simplified inputs like deterministic phonetic patterns or human diphone confusions. These models have greatly advanced theoretical understanding while deferring the challenges posed by real speech. These simplifying assumptions made sense 40 (or even 10) years ago, but the advent of automatic speech recognition (ASR) systems based on deep learning (with shared lineage with cognitive connectionist models) raises the possibility that we could set them aside. As I will explain, we cannot just turn to industrial-strength ASR systems as models of HSR, because they are too complex to offer much understanding of candidate mechanisms supporting speech processing. My colleagues and I are developing what we call Understandable Language Models: neural network models that grapple with realistic aspects of language input (the acoustic speech signal in particular) but are small/simple enough that there is some hope of understanding the emergent computations they develop over learning. I will discuss our efforts and/or plans to address 5 'adequacies' for computational models: explanatory (theoretical insights), computational (performance), behavioral (ability to simulate key human behaviors), developmental (ability to simulate key aspects of human development), and neural (ability to relate to neural correlates).

James Magnuson
UCONN, BCBL

Keynote 2

Spectro-temporal modulations and functional asymmetries for speech and music

I will present our recent studies that aimed to address important debates in modern auditory cognitive neurosciences such as:
(i) The question of whether speech and music processing are best characterized in terms of encapsulated cognitive domains or in terms of differential dependence on low level acoustical cues.
(ii) the closely related question of the origins of hemispheric specialization for these two domains and,
(iii) the generalization of such principles across different societies worldwide.
We investigated these questions by taking advantage of the spectro-temporal modulation framework, a rigorous approach that has received much support from single-neuron recordings and human imaging. According to this framework, auditory cortical neurons are best characterized functionally in terms of their responses to spectral and temporal power fluctuations. By applying this approach to behavioral, neurophysiological (Stereo-electroencephalography, SEEG) and neuroimaging (functional Magnetic Resonance Imaging, fMRI) data we have shown i) how spectro-temporal modulations of speech and music are encoded by the auditory system (SEEG), and ii) identified converging dissociations that support the acoustical cue account of hemispheric specialization for speech and music (fMRI). I will show that functional asymmetries can be explained by differential sensitivity to spectral vs temporal modulations contained in natural sounds and that these specific ranges of spectral and temporal modulations differentiate speech from song in a consistent fashion worldwide. Overall, these studies suggest that humans have developed two parallel means of communication via the auditory modality, speech, and music, and that they exploit different ends of the spectro-temporal continuum. Hemispheric specialization is thus seen as the nervous system's elegant solution to optimizing the processing of these two forms of communication.

Philippe Albouy
CERVO, CHU QUEBEC, BRAMS, ULAVAL, CHAIRE IMÉRA-ILCB

Cutting-edge sessions

New paradigms to investigate social cognition: Second person neuroscience and human-robot interactions

Social Cognitive Neuroscience is a recent discipline that investigates the biological bases of social behaviours. It was revolutionized by the proposal of a new experimental approach, «second-person neuroscience», by Leonhard Schilbach and colleagues. This new experimental approach will be described, and specific examples from research in the neural bases of natural conversations using human-robot interactions will be presented.

Thierry Chaminade
INT, AMU, & CNRS

Neural underpinnings of language abilities in individuals who have lost the autism diagnosis

The Autism Long-term Outcomes Study (ALTOS) examined adolescents and young adults who were diagnosed with autism early in development according to gold standard expert clinical evaluation, who currently have no symptoms. In prior work, we described the unique brain networks that were involved in language processing in such a population, in comparison with individuals with a current autism diagnosis and those without a history of autism. This talk will describe preliminary results of our current behavioral and fMRI studies of language outcomes and their association with other cognitive and communication abilities.

Inge-Marie Eigsti
IBACS, CNC, UCONN

Cutting-edge sessions

Principled data science

This talk provides an overview of key principles for conducting ethical, transparent, reproducible, and methodologically rigorous data science. In-depth discussions will explore more specifically algorithmic bias and stability, curses and blessings in the Age of Big Data, and the limitations of p-values in statistical inference. Illustrations on practical data analyses will be tailored to the domains of expertise covered by the ILCB.

Jean-Marc Freyermuth
I2M, AMU & CNRS

Language in the Dyad: Linking linguistic and neural alignment during communication

Most language use occurs in interactive contexts involving two or more people, yet research in psycholinguistics and neurolinguistics has traditionally focused on individuals. However, recent evidence suggests that language and cognitive processing in dyads are not simply additive but fundamentally synergistic, necessitating a multi-person perspective to fully understand language as a communicative and social tool. In this talk, I will discuss the state of the art and future directions regarding the cognitive mechanisms and neurophysiological dynamics of language processing during interaction. I will focus on alignment—the phenomenon of mirroring an interlocutor's language use—observed at both behavioral and neural levels, as a key test case for linking cognitive processes in dyads with the neurophysiology of interacting brains.

Kristof Strijkers
LPL, AMU & CNRS

Cutting-edge sessions

Interactions in the adolescent brain

Marie-Hélène Grosbras
CRPN, AMU & CNRS

Adolescence marks a critical period in life characterized by profound transformations in cognitive and social dynamics, in the context of ongoing, specific, brain maturation.
This presentation will highlight recent research advances in understanding the intricate interplay within the adolescent brain's functional architecture, particularly emphasizing systems crucial for social interactions. We will then discuss theoretical , clinical and societal implications.

Phenomenology, development, and neural mechanisms of inner speech

Ladislas Nalborczyk
LPL, AMU & CNRS

The mental production of speech, or "inner speech", is a foundational ability that plays a central role in various activities such as reading, writing, planning, and remembering. Inner speech is typically accompanied by a rich multisensory experience, most notably involving the perception of an «inner voice". But what does it feel or sound like to produce inner speech? Why do humans rely on inner speech at all? How does it develop during childhood? And how is it implemented in the brain? These are fundamental yet unresolved questions for inner speech research (i.e., phenomenology, functions, development, neural implementation). In this presentation, I will provide an overview of recent advances in tackling these questions, drawing on insights from psycholinguistics, cognitive neuroscience, and neuroprosthetics. I will conclude by outlining promising directions for developing a neurocomputational theory of inner speech—one able to account for its phenomenology, functions, development, and neural implementation.

Cutting-edge sessions

The gestural origins of language : Insight from the neuroethology of communication in nonhuman primate

Language is a complex intentional, syntactical and referential system involving a left-hemispheric specialization of the brain in which some cerebral regions such as Broca's and Wernicke's areas play a key-role. Because nonhuman primates are phylogenetically close to humans, research on our primate cousins might help providing clues for reconstructing the features of our ancestral communicative systems that have been inherited from our common ancestor and for evaluating the evolutionary prerequisites of language. Most of the studies have focused naturally on the vocal modality and some researchers have suggested that language resulted from the evolution of the vocal system in our ancestors. This theory is now challenged by a growing number of authors supporting the "gestural origins" view that gestural communication may be the first phylogenetic precursor of human language. Such an alternative gestural theory finds support not only in the evidence emphasizing the tight relation between gestures and language in humans but also in the recent investigation of the properties of the gestural communicative system in nonhuman primates.
In the last 20 years, we investigated this gestural system in the baboons Papio anubis, an Old World monkey species, as well as its lateralization and cortical correlates across development, using both ethological, psychology and longitudinal noninvasive in vivo brain imaging approach (MRI). In the present talk, after reviewing briefly the features of gestural communication in nonhuman primates and their potential relations to some language properties such as intentional and referential "domain general" properties of language, I will summarize our main findings showing similar underlying structural hemispheric specialization including Broca and the Planum Temporale. I will also present our recent MRI longitudinal work documenting their brain ontogeny from birth and how they pave the way for the further emergence of gesture lateralization across development. These collective findings suggest the critical implications of the gestural system inherited from our common ancestor in the phylogeny of language and its brain organization, which preceded the progressive control of the oro-facial system and the vocal tract in the course of the language evolution.

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Adrien Meguerditchian
CRPN, AMU & CNRS

Cutting-edge sessions

Bridging Speech and Large Language Models

Large Language Models (LLMs) have revolutionized the way we process and generate text, but how do they handle speech?
This lecture explores the intersection of speech processing and Large Language Models (LLMs), covering key concepts such as speech-to-text systems, self-supervised learning for speech, and the integration of spoken language into LLMs. We will discuss how these models transform audio signals into text, the challenges of spoken language understanding, and the implications for real-world applications. No prior expertise in computer science is required—this session is designed to provide an accessible introduction to the field.

Yannick Esteve
LIA, AVIGNON UNIV.

ILCB Center of Experimental Resources (CREx)

Workshop

The ILCB Center of Experimental Resources (CREx) plays a central role within the ILCB Institute by providing support to all of its members and across all of its topics of research. This team is composed of four engineers specializing in scientific computing and data analysis as well as a team coordinator. During this session, CREx members will present some of the applications they are developing at ILCB.

Thierry Legou
CREX, ILCB, AMU, CNRS

Valérie Chanoine
CREX, ILCB, AMU & CNRS

Deidre Bolger
CREX,ILCB, AMU & CNRS

Ambre Denis-Noel
CREX, ILCB, AMU & CNRS

Week-long courses

Modern Methods for Brain Imaging

This course offers a deep dive into the latest methods used to study brain function through imaging techniques such as EEG, MEG, and fMRI. We will cover five key topics, each addressing fundamental questions and practical tools for analyzing neural data.

(1) We'll begin with source localization, a critical challenge in neuroimaging: how can we estimate where brain signals originate? After a brief recap of the main imaging techniques and their trade-offs in temporal and spatial resolution, we will explore different approaches to solve the inverse problem. From simple dipole models to distributed source techniques, beamforming, and independent component analysis (ICA), we will discuss how these methods help identify the origins of neural activity in the brain.

(2) Next, we'll focus on connectivity, which investigates how different brain regions interact. We'll address the important conceptual distinction between correlation versus causation. We will present methods based on frequency decomposition such as coherence and phase-locking value (PLV), but also methods coming from information theory, such as mutual information, transfer entropy and Granger causality.

(3) The third part of the course will examine encoding models, which link external stimuli or events to brain responses. We'll cover classic approaches like event-related potentials (ERPs) and more advanced methods such as regression ERPs (rERPs), temporal receptive fields (TRFs), and mutual information measures. We'll also discuss emerging tools such as Echo State Networks (ESNs) and reduced rank regression (RRR).

Victor José Lopez Madrona
INS, AMU & INSERM

Jacques P. Lerousseau
INS, AMU & INSERM

Week-long courses

Modern Methods for Brain Imaging

(4) In the fourth section, we'll explore decoding models – predicting cognitive states or behaviors from brain activity patterns. This includes understanding the concept of population coding and the need of multivariate analyses. We will cover tools such as linear models and multivariate pattern analysis (MVPA). We will also provide practical tips for interpreting results, in particular the distinctions between filters and patterns in linear models.

(5) Finally, we'll turn to model-based approaches, which use computational models to understand neural processes. We'll discuss how regression techniques combined with computational models can reveal hidden variables and representations. We will also discuss techniques for analyzing neural geometry, including representational similarity analysis (RSA) and multidimensional scaling (MDS).

This course will provide participants with both conceptual insights and hands-on approaches for tackling key challenges in neuroimaging research.

Julie Drevet
INS, AMU & INSERM

Pierre Guilleminot
INS, AMU & INSERM

Week-long courses

Linguistics theories & human cognition

This course aims to situate linguistic theory and the representation of linguistic structure within the cognitive sciences. We discuss physiological, cognitive, and socio-cultural constraints on language systems by examining some fundamental properties of human language, such as iconicity, hierarchical structure, and recursiveness. We illustrate these properties by focusing on a selection of examples from morphosyntax, prosody and segmental phonology. The course will consist of four lectures, followed by an interactive session during which students will work in small groups on practical tasks related to the topics introduced during the lectures.

Francesca Di Garbo
LPL, AMU

Caterina Petrone
LPL, AMU & CNRS

Week-long courses

AI for the Ecological Study of Language Development: A Hands-On Introduction

Computer modeling has long been essential in understanding children's early language acquisition. Traditional simulations, however, have often relied on simplified inputs and served primarily as proofs of concept. Modern advancements in Artificial Intelligence are transforming this field. With its ability to uncover patterns in complex, real-world data, AI can scale computational models to children's natural developmental contexts, enabling deeper empirical insights.

This course addresses key challenges in child language research, including:

- How children acquire substantial linguistic knowledge from minimal sensory input.
- How cognitive abilities support efficient learning.
- How early communicative interactions affect learning outcomes.

Through state-of-the-art case studies, the course demonstrates how AI can strategically address these challenges.

While AI offers transformative potential, we learn how its contributions rely on established methodologies in language acquisition research. These include observational methods to characterize real-world linguistic experiences and controlled experiments to evaluate the model's emergent linguistic knowledge. The course emphasizes how AI can complement these approaches.

Prerequisites: No prior experience in machine learning is required, but familiarity with basic Python programming is necessary.

Abdellah Fourtassi
LIS, AMU & CNRS

Week-long courses

Transverse approach from Sound to Cognition

This course will provide an overview of how sounds are processed by the human brain. The auditory system is the main sense to communicate between one another. Sounds are temporal in essence, and can be as diverse as voice, music, or environmental sounds. All of those carry selective cues that can be analyzed by the human brain, to share linguistic, semantic or emotional information. This course will lead you from the sound dimensions themselves to how cognitively relevant information is extracted and mapped in the cortex.

Computational audition: from psychoacoustics to deep-neural networks

Neural dynamics of auditory and speech perception – Benjamin Morillon

Categorical processing of voice-specific information in the associative auditory cortex – Pascal Belin

Prerequisites:
Basic notions of neurophysiology: local field potential, functional neuroanatomy
Basic notions of signal processing: dimensions of a temporal signal (amplitude, time), an oscillatory signal (phase, frequency...). Spectral decompositions: Fourier or time-frequency.

Benjamin Morillon
INS, AMU & INSERM

Pascal Belin
INT, AMU & CNRS

Week-long courses

Associative memory and priming in neural networks

Associative memory is the ability to link pieces of information (memory items) together, enabling goal-directed behavior, language processing, musical performance, thinking, decision-making, and prediction. Research on associative memory has its roots in Pavlov's conditioning experiments in the 19th century, evolved with Donald Hebb's principles of learning in 1945, and gained computational significance through John Hopfield's models in the 1980s.
This course begins with an introduction to the biological and computational principles of associative memory. It then delves into the cell ensemble theory and the modeling of memory dynamics, focusing on sequences of encoded memory items in continuous neural networks. Key topics include how neural gain, inhibition, and noise shape the sequential activation of memory items, prediction, and adaptation to changing environments. Practical exercises will reinforce these concepts, offering hands-on experience with memory dynamics in both discrete and continuous neural networks.

Elif Köksal Ersöz
CNRL, INRIA DE LYON

Week-long courses

Language development

This course will introduce a range of topics at the forefront of current research on language development, including (i)contributions of brain imaging and the broader neuroscientific perspective; (ii) advances in artificial intelligence and associated opportunities and pitfalls; (iii) developmental and evolutionary origins of the "language of thought".

Claire Kabdebon
CRPN, AMU & CNRS

Session 1&2: Language learning in the developing brain – Claire Kabdebon

To date, the infant brain remains the only known system capable of mastering the complexity of human language within just a few years. Most remarkably this feat is achieved while the underlying brain circuitry is still maturing. This course will ask what makes the infant brain such an efficient learning device. We will explore the neurobiology of early brain development, and the challenges of infant brain imaging. We will investigate the early organisation of brain networks involved in language processing, examining continuities and discontinuities between infant and adult cognition. Finally, we will address the emergence of linguistic representations in the infant brain from a neuroscience perspective. Overall, this course will provide an overview of the neurodevelopmental origins of language learning.

Thomas Schatz
LIS, AMU & CNRS

Session 3: Machine learning and the development of speech perception – Thomas Schatz

Using speech perception as a case study, this course will attempt to characterize new opportunities for research on language development offered by advances in artificial intelligence, and discuss open questions, limitations, challenges and pitfalls associated with these opportunities.

Week-long courses

Language development

Isabelle Dautriche
CRPN, AMU & CNRS

Session 4&5: Development and evolution of the language of thought – Isabelle Dautriche

Fodor famously framed the idea that human minds operate in a language-like format, a "language of thought" (LoT), where mental representations compose in the manner of formal language symbols, allowing us to build arbitrarily complex mental structures out of a small set of initial primitive operations. Through all areas of cognitive science, there has been rich evidence supporting the idea that a LoT could explain many facets of human cognition. Do infants and animals also have a LoT? The overarching goal of this class/talk is to delve into the latest research studying the developmental and evolutionary origins of the LoT and its relationship with language development.

Week-long courses

Language, Brain and Artificial Neural Networks

For 150 years, our knowledge of the cerebral basis of the faculty of language was essentially based on observation of the consequences of cerebral lesions in aphasic patients. Then, since the early 1990s, the development of brain imaging (PET, fMRI) has enabled us to explore, in vivo, in healthy subjects, the areas involved in language comprehension and production. The experimental paradigms employed, inspired by linguistics and psycholinguistics, placed participants in situations that were nonetheless rather artificial (reading individual words, ill-formed sentences, etc.). Assessing the comprehension of spoken or written language in more natural situations (e.g. listening to a story) was largely out of reach. The advent of deep learning-based language models, with their remarkable performance on natural language processing tasks, has made it possible to start tackling these issues. In this series of lectures, I will present the evolution over the last 30 years of the paradigms and our associated knowledge, and detail the methods used to analyze brain activations during text listening with language models.

Christophe Pallier
INSERM-CEA, CNRS

Week-long courses

Language and pathology

Connecting healthy and pathological language processing – François-Xavier Alario

How different are healthy and pathological language processing? Can the study of patients inform our understanding of the general population? Can theories describing “canonical” unimpaired language processing reliably inform clinical decisions? At what level of description should the pathological aspect of processing be described? How should remediations be conceived and implemented for these impairments? This segment of the “Language & Pathology” course will present some broad concepts and invite an interactive discussion of the links between healthy and pathological language processing. It will provide a reading-grid to guide you through the following segments.

François-Xavier Alario
CRPN, AMU & CNRS

Studying speech motor control from its impairment: a general introduction to dysarthrias – Serge Pinto

Motor Speech Disorders refer to a set of signs affecting the control and production of speech consequent to neurological impairment. They are characterized by an approach which dichotomizes motor speech disorders in two modalities: apraxia of speech and dysarthria, which can be distinguished on at least two fundamental points: (1) dysarthria is the consequence of motor dysfunctions also involving the limbs (rigidity, akinesia, ataxia, dystonia, etc.) and of which a specific pathophysiology is determined; dysarthric disorders are constant, predictable, whereas this is not the case for patients suffering from apraxia of speech; (2) verbal dysfluency, marked in apraxic patients, is not characteristic of dysarthric speech. After presenting the classification and pathophysiology of dysarthrias associated with specific movement disorders, I will briefly introduce the relevance of targeting research on dysarthria, and mainly hypokinetic dysarthria in Parkinson’s disease, as a model for a better understanding of the involvement of cortico-basal ganglia-cortical pathways in speech motor control.

Serge Pinto
LPL, AMU & CNRS

Week-long courses

Language and pathology

Language pathology and epilepsy-Agnès Trébuchon

In case of drug-résistant epilepsy the surgery procedure consisting in the resection of the "seizure generator" is considered as the treatment of choice. However, this procedure may induce Language deficits, particularly after left temporal surgery. In this context, counseling at the individual level patients about the risks and benefits of surgery can be challenging. The functional exploration of the language network is by consequent crucial.

Agnès Trébuchon
AP-HM,INS, AMU & INSERM

Learning to read and dyslexia: from theory to interventaion- Johannes Ziegler

How do children learn to read? How do deficits in various components of the reading network affect learning outcomes? How does remediating one or several components change reading performance? In this talk, I will quickly summarize what we know about how children learn to read. I will then present developmentally plausible model of reading acquisition. The model will be used to understand normal and impaired reading development (dyslexia). In particular, I will show that it is possible to simulate individual learning trajectories and intervention outcomes on the basis of three component skills: orthography, phonology, and vocabulary. The work advocates a multi-factorial approach of understanding reading that has practical implications for dyslexia and intervention.

Johannes Ziegler
ILCB, CRPN, AMU & CNRS

On the diversity of language pathologies - François-Xavier Alario, Serge Pinto

Following the week-long course, this final segment will invite students to summarize what they have learned. The reading grid presented in the first segment will be used to discuss what has been presented and what might be missing. You will be expected to speak out, not only listen and write. Prerequisites: Some familiarity with neuropsychological, neuroscientific or linguistic concepts is a plus but not a strict requirement.

Week-long courses

Regression, Mixed Models, Paths

This hands-on course will provide both the theoretical background and skills to apply linear and logistic mixed models in R/RStudio. Mixed models are among the most popular analytical approaches in the human sciences, and the R programming language is widely used in academia. Topics include (but are not limited to) considerations of appropriate data preparation, model fitting and checking, interpretation, and optimization/model comparison. If time permits, the course will also cover mediation and moderation analyses.

Prerequisite: Some prior experience coding in R would be useful.

Royce Anders
UPVM

APPLICATION PROCEDURE
(NON-ILCB MEMBERS)

The Summer School has a registration fee of **€250**. Participants are responsible for their own travel expenses, accommodation, and meals.

STEP 1

Apply before Friday, 23rd May, 2025 (anywhere on earth)
Apply to our ILCB summer school 2025.

The link will direct you to the application form.

STEP 2

By the end of May, the summer school organizing committee will review your application. In June, you will be notified whether it has been accepted, waitlisted, or declined.

STEP 3

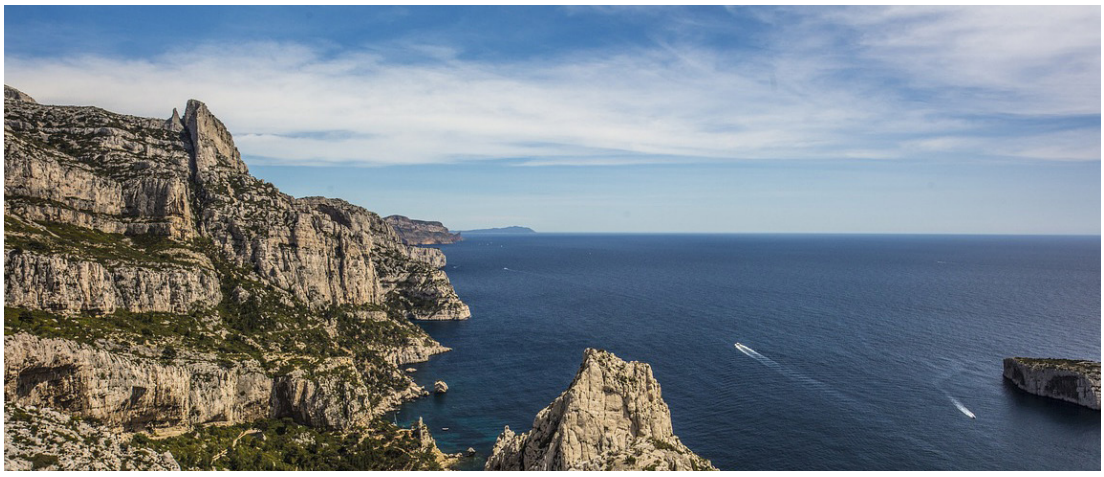
Once your application has been accepted, you will be able to confirm your participation and register for classes via the CIRM website. Further details will be provided in the acceptance email to facilitate your registration.

* You may also reserve meals and accommodation at the CIRM. However, this is not compulsory and only available to a limited number of participants. Once your application has been accepted, you will be notified if you qualify for accommodation at the CIRM and how to reserve a room.
CIRM's rates are available here.
There are many other options for accommodation in Marseille.

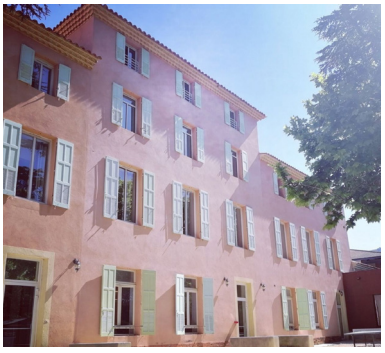
VENUE

The Centre International de Rencontres Mathématiques (CIRM)

Situated on an estate with a thousand-year history, on the doorstep of the calanques, CIRM is in a unique location in the south of France. It is a quiet place, linking the charms of traditional Provence with all the facilities that researchers need for a successful event.



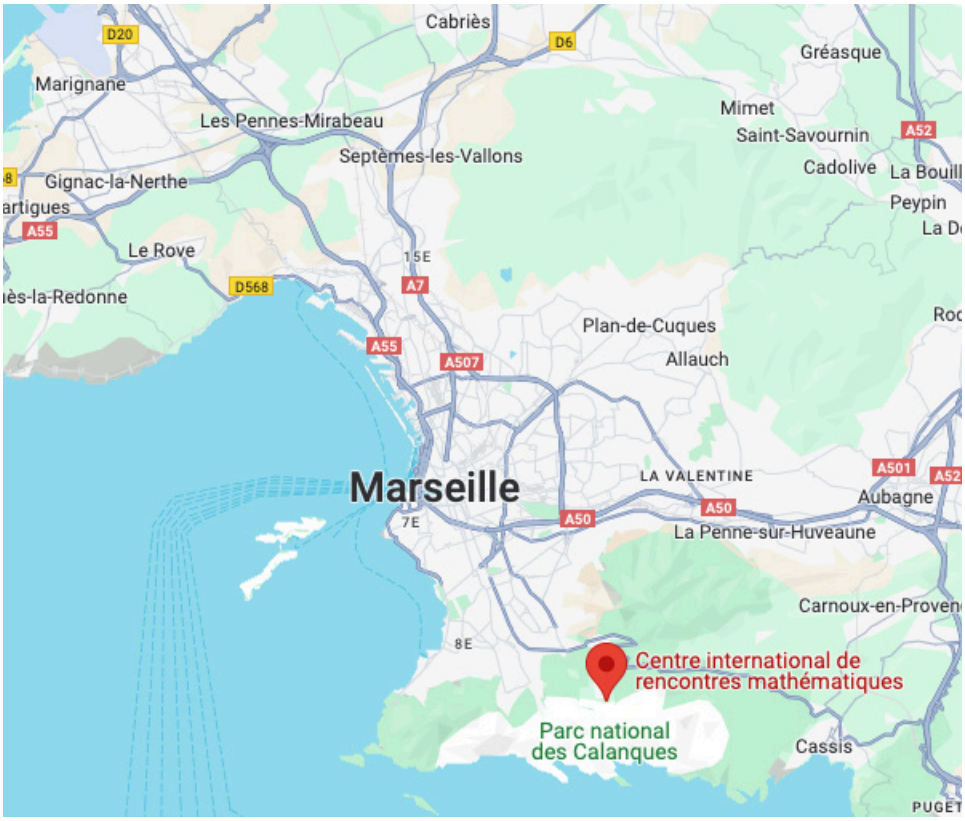
The main building called the 'Bastide' has kept the traditional look of Provençal houses with its pink walls. It contains a large number of bedrooms as well as offices. Other bedrooms and studios, recently updated, are situated in nearby buildings all a few minutes from each other. The restaurant is one of the main features of CIRM and offers a varied cuisine based on traditional French cooking and local products.



Calanques National Park

The cultural heritage of the Calanques National Park is rich and diverse: you'll find castles, bastides, artists' villas, a lighthouse, a cave, wrecks of ships and airplanes, religious, agricultural, industrial, military, health buildings, as well as a few surprises, such as a «téléscaphe» (underwater cable car) and mysterious inscriptions.

ARRIVING AT CIRM



Coming from the airport

1. Take a taxi: about 50 minutes for a cost of 80€ to 100€.
2. Take the Airport shuttle bus which will take you to Gare Saint-Charles – Marseille's main train station – from where you can access public transport. Then take the metro 2 to the « Rond-Point du Prado » station and continue with the B1 or 21J bus to the terminus, the Luminy Campus.

Coming from the train station

1. Take a taxi: average cost of 40€.
2. Take public transport. first the metro 2 to the « Rond-Point du Prado » station, then the B1 or 21J bus to the terminus, the Luminy Campus.

Coming from the train station after 21:45

At night (after 9pm) you can catch Bus 521 outside the Gare St Charles. It will take you directly to the « Luminy PN des Calanques » stop, 6 minutes walk from the CIRM (signs will show you the way). You will not need to take the metro.

ORGANIZING COMMITTEE

Chotiga Pattamadilok
LPL, AMU & CNRS

Jean-Marc Freyermuth
I2M, AMU & CNRS

Nadera Bureau
ILCB & AMU

Lilia Mena
ILCB & AMU

Arnaud Rey
CRPN, AMU & CNRS

Thomas Schatz
LIS, AMU & CNRS

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