



# SCSC

## 8th ANNUAL MEETING OF THE SOCIETY FOR THE COGNITIVE SCIENCE OF CULTURE



22 - 24 April 2026

Aix-en-Provence, France



amU Aix  
Marseille  
Université



amU Aix  
Marseille  
Université

INSP Institut national  
supérieur du professorat  
et de l'éducation  
Aix-Marseille



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# Welcome to Aix-en-Provence



Dear Colleagues,

We are delighted to welcome you to Aix-en-Provence for the 8th Annual Meeting of the Society for the Cognitive Science of Culture. Building on the success of the previous editions, this year's meeting promises a rich scientific and cultural program, set against the backdrop of one of France's most inspiring cities.

Aix-en-Provence—a city steeped in history, art, and intellectual tradition—offers a unique atmosphere for our gathering. Known as the birthplace of Paul Cézanne, Aix enchants visitors with its picturesque streets, sunlit squares, and lively cafés, all framed by the iconic landscapes of Mont Sainte-Victoire. We hope this vibrant setting will foster stimulating exchanges, creative collaborations and connections among participants.

This year's meeting would not have been possible without the dedicated support of many individuals and institutions. We are especially grateful to Thomas Lachmann and Alexis Hervais-Adelman for their warm and unwavering support throughout the preparation of the meeting. We extend our gratitude to the Society's scientific committee for their help in reviewing abstracts. Finally, we warmly thank Aix Marseille University for graciously hosting the event and the Institute of Language, Communication, and the Brain as well as Ampiric for their support in logistics and the preparation of promotional materials.

We wish you a productive and inspiring time in Aix-en-Provence. We look forward to reconnecting with colleagues and welcoming new members to our Society!

Best wishes

Chotiga Pattamadilok & Johannes Ziegler

## GENERAL INFORMATION

### Local organizing committee

Conference Chairs : Chotiga Pattamadilok & Johannes Ziegler  
Organizing Committee Members : Marieke Longcamp, Gaëlle Alhaddad, Lisa Bertolucci & Sophie Restoy  
Administrative Staff : Nadéra Bureau & Laurence Ibert-Huet

### Venue

Le Cube, Schuman Capus  
Aix Marseille University  
29 Av. Robert Schuman  
13100 Aix-en-Provence

### Internet

Individual WIFI access is provided at the registration

### Coffee break and Lunch

During coffee and lunch breaks catering is served in the entrance hall of the Cube

### Social events

The conference dinner is organized on Thursday 23 April 2026 @ La Table du Pignonet, Aix-en-Provence

Le Cube © Elia Ropiot



# Program of the 8th annual meeting of the Society for the Cognitive Science of Culture

## Program

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## Wednesday, 22nd April 2026

13h00-13h50 Registration & Coffee

13h50-14h00 **Opening remarks**

Thomas Lachmann (President Society for the Cognitive Science of Culture)  
Chotiga Pattamadilok (Local Organizer)

14h00-15h00 **Keynote lecture: Prof. Usha Goswami, University of Cambridge, UK**

*Brain Beats: Cognitive Science and Cognitive Neuroscience of Rhythmic Language*

(Chair: Johannes Ziegler)

15h00-15h30 Coffee break

15h30–17h10 **Oral session A: Speech Processing and Dyslexia Across Languages**

(Chair: Johannes Ziegler)

**A.1:** Marielle Hababou-Bernson: *How linguistic background shapes neural tracking of the speech envelope*

**A.2:** Martin Le Guennec: *Variations and similarities of synchronization dynamics in Indian and French participants: The role of enculturation on isochronous rhythms*

**A.3:** Tania Fernandes: *Single-letter processing in developmental dyslexia: Still deviant after all these years!*

**A.4:** Johannes Ziegler: *Dyslexia across languages explained by universal cognitive deficits interacting with the orthography to be learned*

17h10-18h40 **Poster session (A1-A14)** & Coffee break

18h40 Reception & Drinks @ Le Cube, AMU

## Thursday, 23rd April 2026

08h30 – 09h00 Coffee

09h00 – 10h00 **Keynote lecture : Prof. Patrick Lemaire, Aix-Marseille University, France**

*Mathematics across cultures: What can we learn about the role of culture on cognition?*

(Chair: Marieke Longcamp)

10h00–11h15 **Oral session B: How Culture Shapes Cognition: Number, Tools, and Music**

(Chair: Marieke Longcamp)

**B.1:** Varun De Castro: *Numeric cognition and the four-unit limit in the verbal arts of the world*

**B.2:** Chloé Bryche: *How do stone tools become culture? Invention and transmission in micro-societies.*

**B.3:** Clara James: *Music training as a powerful tool against cognitive aging in healthy and mildly impaired adults*

11h15-11h45 Coffee break

11h45–13h00 **Oral session C: Cultural Symbols and the Brain: Reading and Visual Systems**

(Chair: Florence Bouhali)

**C.1:** Mirela Duranovic: *Spelling errors and handwriting fluency in children with dyslexia across Latin and Cyrillic scripts in a transparent orthography*

**C.2:** Melanie Labusch: *From cultural marks to neural codes: Investigating the neural basis of logotype recognition*

**C.3:** Florence Bouhali: *Principles and mechanisms of neuronal recycling across cultural symbolic systems: what word and music reading reveal about the organization of ventral visual cortex*

13h00–14h30 Lunch break

## Thursday, 23rd April 2026

14h30–15h30 **Keynote lecture: Dr. Daniele Schön, Aix-Marseille University, France**

*Music as window into language processing and rehabilitation*

(Chair: Chotiga Pattamadilok)

15h30–16h45 **Oral session D: Reading Acquisition and Speech–Print Interactions**

(Chair: Chotiga Pattamadilok)

**D.1:** Tiphaine Caudrelier: *How Writing shapes how we hear a second language*

**D.2:** Chotiga Pattamadilok: *Reading acquisition and neural (re)organization: How does the Visual Word Form Area respond to speech?*

**D.3:** Agnieszka Dębska: *Learning to read increases print–speech convergence in lvOT: A longitudinal voxel-based study in children*

16h45–17h15 Coffee break

17h15–18h30 **Oral session E: Cultural Symbols and the Brain: Writing and**

**Orthography**

(Chair: Alexis Hervais-Adelman)

**E.1:** Teresa Civera Barrachina: *Is the visual system more adapted to letters than symbols? Assessing this through inter-character spacing*

**E.2:** Sonia Kandel: *Languages use technology in different ways: A cross-linguistic French-Italian study of how orthographic depth modulates word writing dynamics in smartphone writing*

**E.3:** Olga Solaja: *Beyond diacritics: Feature asymmetry in early orthographic processing in Serbian Cyrillic*

18h30–19h30 **Poster session (B1-B12)**

19h45 Reception & Gala Dinner @ Le Pignonnet, Aix-en-Provence

## Friday, 24th April 2026

9h00–10h00 **Keynote lecture: Prof. Helmut Leder, University of Vienna, Austria**

*Beauty as sensory pleasure?*

(Chair: Thomas Lachmann)

10h00–10h15 Coffee break

10h15–11h55 **Oral session F: Cognition in Social and Cultural Contexts**

(Chair: Thomas Lachmann)

**F.1:** Pascal Barone: *Hierarchical and culturally modulated social categorization of faces*

**F.2:** Jennifer Bruder: *Ideological worldviews and climate engagement beyond partisan politics: Evidence from Qatar*

**F.3:** Veeky Baths: *Validation and comparison of virtual reality and 3D mobile-games for cognitive assessment*

**F.4:** Falk Huettig: *The medium of mind*

11h55–12h00 **Closing remarks**

Johannes Ziegler (Local Organizer)

12h00–12h45 **Board meeting**

13h00 Business lunch

## Poster : Session A

- A1** Shreya Kishor Broad and narrow patterns of adaptation to linguistic and cultural diversity: Development of an adaptability index
- A2** Katarzyna Jednoróg Tracking rapid neural adaptation in dyslexia across early literacy
- A3** Asaid Khateb The impact of semantic and phonological training on visual wordrecognition in Arabic: An event-related potential study
- A4** Chirag Chittar In search of (a) piece of mind: The quest to decipher whether theory of mind is consistent and a universal cognitive trait, or a plastic trait
- A5** Emilia Kerr Meaning-specific neural alignment to words between interlocutors.
- A6** Klara Spooren Development of reading-and spelling skills in prematurely born primary school children
- A7** Yitong Zuo Neurophysiological mechanisms of optimized graphomotor performance in biscriptuals
- A8** Ozkan Zeynep Gunes Toward a comprehensive account of literacy: Evidence from braille
- A9** Francisca S.Rodriguez Music Listening Intervention for People with Dementia
- A10** Sophie Restoy From symbols to letters: Emergence of the transposition effect with decoding skills
- A11** Anaïs Mercier The serendipity myth: An emergent product of social transmission?
- A12** Reem Dallahsheh Khatib Spontaneous inner speech in multilinguals: Smartphone-based evidence of short and long-term effects on code-switching
- A13** Aleksandar Bulajić Does the integration of play and learning in higher education affect creativity? Relations between creativity, creative reasoning, cognitive flexibility and learning styles among university students – a pilot study
- A14** Lisa Luther Valence perception of poetic justice differs between children growing up in Germany and France

## Poster : Session B

- B1** Daniel Nieto Kinematic analysis of typing: Pipeline for tracking finger motion and analyzing typing styles.
- B2** Elise Lefèvre Is thalamic sub-cortical connectivity a primary predictor of dyslexia? Examining the mediating role of auditory skills and the impact of SES
- B3** Hannah Gauditz Effects of colored syllables in different stages of reading acquisition: Evidence from eye movements and behavioral data
- B4** Maaïke Smit Speech processing in Dutch speaking pre-readers in Flanders at familial risk for dyslexia
- B5** Thierry Chaminade From mentalizing to society: Toward a neural account of the institutional stance
- B6** Taznin Hussain Noun bias as a fundamental strategy in language acquisition: A longitudinal study focusing on minimally verbal Assamese-speaking children diagnosed with autism.
- B7** Laura Grazt Cultural differences in aesthetic experience: A multidimensional study of art perception in Germany and Portugal
- B8** Priyanka Roy An exploratory study of induced expectancy, beliefs, and sustained attention performance
- B9** Gaëlle Alhaddad Graphomotor preferences: Cultural or biomechanical determinants of directional biases?
- B10** Inka Romero-Ortells Labrada Do subtitles always "steal the show"? Language familiarity and social status modulate subtitle viewing
- B11** Nina Stauffert Can teaching overcome the opacity of the information transmitted in a micro-society paradigm?
- B12** Maksim Likhanov Spatial ability and Chinese language: is there a link?

# KEYNOTE LECTURES

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**USHA GOSWAMI**  
UNIVERSITY OF  
CAMBRIDGE, UK

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## Brain Beats: Cognitive Science and Cognitive Neuroscience of Rhythmic Language

Early linguistic experiences, particularly lullabies and BabyTalk, shape infant's linguistic development across cultures and set children up for acquiring literacy. By describing her cross-language research programme, Professor Goswami will explain how children's language development is rooted in rhythmic learning. Computational modelling of infant-directed speech (BabyTalk), nursery rhymes and child songs, story reading and metrical poetry across languages has revealed a shared acoustic structure based on amplitude modulation (loudness). Neural studies with infants and children (e.g. the Cambridge BabyRhythm project) further reveal how speech rhythms and brain rhythms are intimately linked, providing the key foundations for language learning and literacy.



**PATRICK LEMAIRE**  
AIX MARSEILLE  
UNIVERSITY  
FRANCE

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## Mathematics across cultures: What can we learn about the role of culture on cognition ?

Over 50 years of research has shown that culture shapes cognitive architectures and influences cognitive performance in a wide variety of domains, included mathematics. Influence of culture on cognition is modulated by a number of parameters (e.g., language, schooling, culture values) and is moderated by numerous participants' characteristics within a given culture (e.g., age, personality, IQ). The issue then is how to account for these modulations and moderations? Above and beyond examining cultural differences in cognitive performance and changes in magnitudes of these differences as a function of several parameters, the field is ready to move beyond describing these differences so as to provide mechanistic accounts of the sources of cultural differences in human cognition. In this talk, I will propose to use a conceptual and methodological framework to characterize and explain cultural differences. This framework focuses on strategic variations underlying cognitive performance.

After briefly describing the core fascinating cultural differences in different cognitive domains in general and in math in particular, I will present the main features of the strategic variations framework. Then, I will illustrate the usefulness of this strategic variation framework with data collected to address two specific issues. First, the data further our understanding of effects of age-based stereotype threat on cognitive performance. A second series of findings illustrate how cultural differences in effects of distraction on children's math performances are mediated by strategic variations. The data are collected in the domain of arithmetic, but the findings and conclusions generalize to numerous cognitive domains.



**DANIELE SCHÖN**  
AIX MARSEILLE  
UNIVERSITY  
FRANCE

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## Music as window into lan- guage processing and rehabi- litation

This presentation examines the relationship between music and language as interrelated cognitive and neural systems. Drawing on linguistic, neuropsychological, and neurophysiological evidence, it explores how shared mechanisms—such as rhythm, temporal prediction, and hierarchical processing—support both domains. Studies reveal overlapping cortical networks and oscillatory synchronization underlying the perception and production of musical and linguistic structures. Beyond theoretical insights, the talk highlights how music can enhance language processing and rehabilitation, improving phonological awareness, grammaticality judgments, and speech entrainment.

Clinical findings from stroke, aphasia, and developmental language disorders demonstrate that rhythmic and melodic interventions promote neural plasticity and functional recovery. Overall, music serves as both a model and a therapeutic tool, offering a unique window into the brain's capacity for communication, adaptation, and learning.



**HELMUT LEDER**  
UNIVERSITY OF  
VIENNA, AUSTRIA

# ORAL SESSIONS

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## Beauty as sensory pleasure ?

The history of psychological aesthetics develops from a debate in the 18th and 19th centuries about the interpretation and sovereignty of art and beauty. With Baumgarten and Fechner, psychology, this newly emerging science, sided with physiology and thus formed the core of a new social science orientation, a science of human beings. For Baumgarten, aesthetics was sensual pleasure and in modern empirical aesthetics is the psychological hallmark of beauty. To date, the evidence for this statement has been rather indirect; recently, we attempted to empirically test the central assumption that sensory stimulation makes us perceive beauty by conducting an MRI study to determine how sensual, aesthetic experiences differ from merely imagined sensual experiences. The question arises as to whether aesthetic experiences can similarly emerge through imagery or whether these complex experiences necessitate direct input into the sensory system.

While slightly less potent, imagery is equally sufficient in evoking aesthetic experiences, and for highly vivid imaginations, evoked experiences even become behaviorally indistinguishable across conditions. Yet, representational similarity analysis reveals distinct neural patterns across conditions as the brain mainly encodes stimulus modality, even in areas canonically associated with aesthetic processing. Thus, although evoked experiences might be behaviorally identical across modalities during highly vivid trials, neural patterns differ substantially due to differences in modality, as evoked experiences are only marginally encoded.

# A.1

## How linguistic background shapes neural tracking of the speech envelope

**Marielle Hababou-Bernson<sup>1,2</sup>, Victor Jose Lopez-Madrona<sup>3</sup>, Isabelle Dautriche<sup>1</sup>, Clément François<sup>2</sup>**

<sup>1</sup>Centre de Recherche en Psychologie et Neurosciences, Marseille, France. <sup>2</sup>Laboratoire Parole et Langage, Aix-en-Provence, France. <sup>3</sup>Institut de Neurosciences des Systèmes, Marseille, France.



Neural tracking of the speech envelope, i.e. the temporal alignment between cortical activity and the amplitude fluctuations of the speech signal, is a key mechanism in speech comprehension (Ahissar, E., et al. 2001; Kubanek, J., et al. 2013). Two main accounts have been proposed: a domain-general account, attributing envelope tracking to general auditory mechanisms (Steinschneider, M., et al. 2013), and an interactive account, positing interactions between low-level acoustic processing and higher-level linguistic representations (Peelle, J.E., et al. 2013).

Evidence favoring the interactive account, in paradigms comparing native vs. non-native languages, have reported stronger envelope tracking for non-native speech (Song, J., & Iverson, P. 2018; Zou, J., et al. 2019; Reetzke, R., et al. 2021). Because a purely auditory mechanism should be insensitive to language proficiency, this modulation argues for a linguistically informed mechanism.

However, existing evidence remains limited. Most studies have focused on a small set of languages and often rely on non-ecological, speech-in-noise listening tasks. Systematic comparisons across languages in more natural settings are therefore essential to disentangle auditory and linguistic contributions to neural tracking - an approach we adopt here. In this study, we investigated how linguistic background shapes neural tracking of speech

in two languages, with markedly different acoustic properties: Moroccan Arabic (stress timed) and French, (syllable timed). EEG was recorded from Moroccan Arabic monolinguals (N = 25) and French monolinguals (N = 25) listening to 7-minute stories in both languages, all narrated by the same proficient bilingual speaker. Temporal Response Function (TRF) modeling was used to relate neural activity to the speech envelope.

A significant interaction between the linguistic background and stimulus language was observed ( $\beta = 0.043$ , SE = 0.012,  $t(47) = 3.58$ ,  $p = .001$ ), indicating stronger envelope tracking for the native language in both groups of listeners.

These results support the interactive processing hypothesis and suggest that envelope tracking is largely determined by linguistic background, reflecting language comprehension's influence on neural mechanisms.

While prior studies reported stronger envelope tracking for non-native speech, our results suggest that in quiet, less attentionally demanding listening conditions, tracking may be stronger for native speech, possibly due to intelligibility and top-down linguistic predictions.

# A.2

## Variations and similarities of synchronization dynamics in Indian and French participants: The role of enculturation on isochronous rhythms

**Martin Le Guennec<sup>1</sup>, Andon Tchechmedjiev<sup>2</sup>, J. A. Scott Kelso<sup>3,4,5</sup>, Julien Lagarde<sup>6</sup>**

<sup>1</sup>EuroMov Digital Health in Motion, Université de Montpellier, IMT Mines Alès, Montpellier, France. <sup>2</sup>SyCoLA - Systèmes Complexes et Intelligence Artificielle, IMT Mines Alès, Alès, France. <sup>3</sup>Center for Complex Systems, Florida Atlantic University, Boca Raton, United States. <sup>4</sup>Intelligent Systems Research Centre, Ulster University, Derry - Londonderry, Ireland. <sup>5</sup>Institute for the Augmented Human, University of Bath, Bath, United Kingdom. <sup>6</sup>Movement, Balance, Performance and Health Laboratory, Université de Pau et des Pays de l'Adour, Tarbes, France.



Long-term exposure to a social environment leads to the perceptual learning of its regularities. For example, we perceive and produce more proficiently familiar than unfamiliar musical rhythms independently of their complexity (Jacoby et al., 2024). This phenomenon, called rhythmic enculturation, has been largely documented on irregular rhythms but scarcely with regular rhythms. While isochrony (regular rhythm) is pervasive throughout musical cultures (Savage et al., 2015), non-isochronous rhythms are less common and often found in understudied non-Western populations (Henrich et al., 2010). For example, Indian classical music employs non-isochronous beat grouping and the rhythmic structure evolves throughout a musical performance (Clayton, 2000; Clayton et al., 2019).

We recruited Indian and French participants in a series of synchronization experiments. French were enculturated to Western music mainly composed of regular metrical structure while Indians were exposed to a wider variety of musical structures. We postulated that French participants were better tuned to interact with isochronous rhythms than Indian participants, the latter being also able to interact with irregular rhythms (Hannon, 2010). In a first exploratory study, participants synchronized their finger movement with a

metronome of increasing rate to document synchronization dynamics. French and Indian participants had equally stable synchronization and lost synchronization at the same rate. However, French participants moved ahead of the metronome—a supposedly universal phenomenon known as Negative Mean Asynchrony (NMA, Repp, 2005)—but, surprisingly, Indian participants didn't demonstrate that tendency. The NMA was associated with the overestimation of the metronome frequency when synchronization was lost for French, but not for Indians. We hypothesized that the NMA observed in French was due to an over-estimation of the metronome frequency (Pikovsky et al., 2001; Wohlschläger & Koch, 2000), while Indian participants did not exhibit this bias because of their exposure to changing rhythmic structures. A second study investigated this frequency adaptation mechanisms. We examined the participants' ability to synchronize with rates faster or slower than their spontaneous rates and documented the synchronization dynamics with increasing and decreasing metronome rate. Our work extends previous knowledge by showing the role of rhythmic enculturation on the most basic synchronization mechanisms.

## A.3

### Single-letter processing in developmental dyslexia : Still deviant after all these years !

**Tânia Fernandes<sup>1</sup>, São Luís Castro<sup>2</sup>, Alexandra Reis<sup>3</sup>, Susana Araújo<sup>1</sup>**

<sup>1</sup>Faculty of Psychology, Universidade de Lisboa, Lisbon, Portugal. <sup>2</sup>Faculty of Psychology and Education Sciences, Universidade do Porto, Porto, Portugal. <sup>3</sup>Faculty of Human and Social Sciences, Universidade do Algarve, Faro, Portugal.



Developmental dyslexia is a specific reading disorder associated with reduced print specialization (e.g., Helenius, 1999; Maurer et al., 2007; Maurer et al., 2011), particularly in the N170, an early electrophysiological marker of expertise (e.g., Maurer et al., 2005; Wong, 2005). However, it remains unclear whether this reduced specialization also affects single-letter processing and persists after years of extensive reading practice. Dyslexic children show greater overall sensitivity to surrounding information relative to typical readers (Perea et al., 2012; Ziegler et al., 2010; Zorzi et al., 2012), including when processing single items surrounded by geometric shapes, whereas typical readers show sensitivity restricted to pseudoletters (i.e., nonletters with the same features as letters; Fernandes et al., 2014; Lachmann & van Leeuwen, 2008). In this EEG-ERP study, we investigated the temporal course of single-letter processing and the impact of surrounding information in dyslexic and typical college students. Participants performed a one-back detection task with letters or pseudoletters presented in isolation or surrounded by a congruent or incongruent shape (e.g., “A” surrounded by a triangle or rectangle, respectively). At the behavioral level, no group differences were found. At the brain level, P1 amplitudes (72-119 ms) were modulated by surrounding information for both stimulus categories across

groups, likely reflecting increased visual complexity relative to isolated items (Winsler et al., 2022). Neural specialization for print (letters vs. pseudoletters) was found at N170 (150-180 ms) and P3 (300-500 ms) in typical readers (Stevens et al., 2013; Wong, 2005), but not in dyslexics. Surroundings affected letters and pseudoletters at different time-windows across groups. For pseudoletters, modulation occurred at N170; for letters, it appeared later at N250, but a congruency effect was present at N170. Critically, group differences in surround effects emerged at P3 only: typical readers only exhibited shape sensitivity for pseudoletters. These results show that reduced neural specialization for print, including in single-letter processing, persists in dyslexic adults despite prolonged reading experience. Furthermore, the effects of surroundings occurred at different time-windows, with earlier interference for pseudoletters than letters. Congruency effects at P3 suggest involvement of post-perceptual, attention-dependent processes on which typical and dyslexic readers differed.

## A.4

### Dyslexia across languages explained by universal cognitive deficits interacting with the orthography to be learned

**Johannes C. Ziegler<sup>1</sup>, Conrad Perry<sup>2</sup>, Andrea Facoetti<sup>3</sup>, Usha Goswami<sup>4</sup>, Marco Zorzi<sup>3</sup>**

<sup>1</sup>Aix-Marseille Université, CNRS, Marseille, France. <sup>2</sup>The University of Adelaide, Adelaide, Australia. <sup>3</sup>University of Padova, Padova, Italy; <sup>4</sup>University of Cambridge, Cambridge, United Kingdom.



Developmental dyslexia (DD) exists in all languages. However, the behavioral symptoms and severity differ across languages, mainly due to the varying orthographic transparency of different writing systems. Despite these cross-linguistic differences in symptoms and severity, the underlying cognitive deficits (UCDs) of DD are similar across languages, namely impairments in utilizing the phonological lexicon (e.g. in speeded tasks), in phonological awareness and in letter string processing. Here we use personalized computational modelling of these UCDs and incorporate self-teaching through reading experience to demonstrate that the shared UCDs cause cross-language reading differences in DD. We collected reading-aloud data from children with DD and control children in three languages, English, French and Italian, and measured individual performance (i.e., the UCDs) in each language using matched items and tasks. These UCDs mapped onto three core parameters (letter activation, phoneme activation, global activation) in a previously-developed personalized computatio-

nal model of reading acquisition derived from English data. We then modelled individual differences in shared UCDs using this updated self-teaching model for all languages. The model generated cross-language differences in reading accuracy, but not reading speed, mirroring decades of behavioral studies. This suggests that orthographic learning and self-teaching interact with the UCDs in the same way across languages, with differences in reading outcomes generated by orthographic transparency. Accordingly, we provide a mechanistic explanation of how individual differences in language-universal UCDs can give rise to different behavioral manifestations of DD and different levels of severity across languages.

## B.1 Numeric cognition and the four-unit limit in the verbal arts of the world

**Varun DC Arrazola**

*IKER-CNRS, Bayonne, France*



The production of verse (i.e. song, poetry) often imposes precise numerosity requirements: a sonnet contains fourteen lines, a blues verse twelve bars, a protest chant four beats. Across cultures, verbal art demands tracking of discrete numerical structures, likely constrained by fundamental cognitive limits such as sequential subitizing and working memory capacity.

This study investigates numerical control across 34 poetic and musical traditions spanning language families from all major continents. We first identify linguistic, melodic, and rhythmic boundary markers (e.g., rhyme, alliteration, parallelism, lengthening) that create groupings through identity and contrast (Fabb 1997). For each verse template, we derive a metric: the maximum number of identical adjacent constituents. This metric captures, for each template, the numeric upper limits at each hierarchical level (from syllables and feet to couplets and stanzas).

Our analysis reveals no reliable evidence of verse templates requiring more than four adjacent identical constituents at any level. For example, while Dyrbal or Tibetan lines may contain five or seven syllables, these are grouped into twos or threes. Similarly, a sonnet's fourteen-line structure never requires counting beyond three, with hierarchical chunking handling the rest. If adjacent consti-

tuents are not identical (e.g. syllables sung to a melody), the need for explicit counting disappears altogether.

These findings align with research in numeric cognition documenting a recurring limit around four. Subitizing, both simultaneous and sequential, is restricted to sets of approximately four items (Revkin et al. 2008), while working memory exhibits a similar «magical number four» constraint (Cowan 2001). Crucially, hierarchical chunking strategies can extend these baseline capacities (Ericsson et al., 1980), mirroring the structural organization observed in verse templates. Moreover, cross-cultural studies suggest these numerical limits may reflect universal cognitive constraints rather than culturally specific counting systems (Epps et al. 2012).

We propose that experiments in numeric cognition can explain the observed typological patterns, particularly regarding how chunking and grouping extend working memory within fixed capacity limits. Conversely, the cross-cultural constraints on verse forms may offer unique ecological validation for theories of numeric cognition, highlighting the interplay between cognitive architecture and cultural transmission in shaping artistic conventions.

## B.2 How do stone tools become culture? Invention and transmission in micro-societies

**Chloé Bryche<sup>1</sup>, François Osiurak<sup>1, 2</sup>**

*<sup>1</sup>Laboratoire d'Étude des Mécanismes Cognitifs, Université de Lyon, Lyon, France. <sup>2</sup>Institut Universitaire de France, Paris, France.*



Understanding how technical innovations become culturally inherited traditions is a central issue in cognitive science and evolutionary archaeology. Stone tools, as the earliest durable products of human technical activity, provide a privileged window onto the cognitive and social mechanisms supporting the emergence, stabilization, and transmission of technical knowledge (Bryche et al., 2024). Although cumulative technological culture is frequently invoked to explain the long-term evolution of lithic traditions, the conditions under which technical know-how can be reliably transmitted across individuals and generations remain debated (Henrich, 2016; Snyder et al., 2022; Osiurak et al., 2023). In this study, participants were assigned a functional goal, cutting ropes of increasing thickness, and were free to explore, select, modify, or use different stone materials (e.g., pebbles, slate, pozzolana) to achieve this objective. This open-ended task allowed multiple technical solutions to emerge, including both unmodified and intentionally modified tools. The technical solutions produced and used to cut the ropes were then transmitted across participants according to different social learning conditions, implemented within an experimental micro-society paradigm inspired by early Paleolithic contexts and previous work (Caldwell & Millen, 2008; Morgan et al., 2015). One hundred and twenty parti-

cipants were randomly assigned to one of four transmission conditions: single-model reverse engineering, multiple-model reverse engineering, multiple models including expert demonstrators, and a protolanguage condition combining restricted gestures and non-verbal prosody.

Results, unsurprisingly, showed that the protolanguage condition produced significantly higher intra-chain similarity, a greater number of modified solutions, and longer exploration times, indicating more stable and effective transmission of technical strategies. Access to multiple models increased inter-chain similarity, suggesting that exposure to diverse exemplars facilitates the abstraction of technical principles. In contrast, isolated reverse engineering did not lead to cumulative improvements across generations, highlighting the limits of individual rediscovery of knapping techniques.

Overall, these findings support the idea that early stone tools may have relied on proto-cumulative dynamics, in which technical reasoning and socially oriented transmission, rather than environmental richness alone, played a decisive role. More broadly, this work illustrates how micro-societies provide a powerful experimental framework for bridging material culture, technical cognition, and cultural evolution

## B.3 Music training as a powerful tool against cognitive aging in healthy and mildly impaired adults

Clara James<sup>1</sup>, Damien Marie<sup>2</sup>

<sup>1</sup>University of Applied Sciences and Arts Western Switzerland, Geneva, Switzerland. <sup>2</sup>University of Geneva, Geneva, Switzerland.



Age-related cognitive decline threatens healthy aging, independence, and well-being. Deep-rooted beliefs that aging equals inevitable decline discourage older adults from acquiring new skills. We report two randomized controlled trials examining the effects of musical activities in older adults.

In the first study, 150 healthy older non-musicians were randomly assigned to piano practice in dyads or small-group music sensitization. Both interventions lasted 12 months, with weekly lessons and homework. Participants showed improvements in speech-in-noise perception, working memory, verbal long-term memory, cognitive flexibility, and well-being. Structural brain changes included increased gray matter volume and white matter integrity across multiple regions, along with functional network plasticity associated with improved manual dexterity and audio-motor integration. Effects were substantially stronger in the piano group.

The second study involved older adults with mild cognitive impairment (MCI), a high-risk condition for dementia. It compared six months of twice-weekly musical practice on a 13-tone tongue drum with equally paced

psychomotor training. Both MCI groups were compared with a matched healthy passive control group to control for learning effects and normal aging. Musical practice improved verbal fluency, short-term memory, and speech-in-noise perception, while psychomotor training enhanced body schema awareness and balance, reducing fall risk. Manual dexterity improved in both groups. At the neural level, both interventions stabilized hippocampal structure and functional connectivity over six months.

These findings show that non-pharmacological interventions, particularly musical training, enhance brain plasticity, cognitive and sensorimotor functions, and well-being in older adults, including those with MCI, potentially reducing the need for assisted living.

## C.1 Spelling errors and handwriting fluency in children with dyslexia across Latin and Cyrillic scripts in a transparent orthography

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The present research examines the influence of script type on spelling and handwriting performance in Bosnian children with dyslexia. Bosnian-Croatian-Serbian (BHS) language is a transparent orthography written in Latin and Cyrillic scripts, which differ in visual and orthographic characteristics. The first study investigated spelling across scripts. Forty children with dyslexia and age-matched typically developing readers completed five spelling tasks: familiar words, nonwords, words containing orthographic rules, sentence spelling, and composition writing. Errors were classified as phonological, orthographic, or grammatical. Children with dyslexia produced significantly more errors than peers across tasks. In the Latin script, phonological errors predominated, indicating persistent difficulties in phoneme-grapheme mapping. In contrast, orthographic errors were more frequent in the Cyrillic script, particularly in rule-based spelling. A higher proportion of children showed a nonword spelling-impaired profile in Cyrillic than in Latin. The second study examined handwriting across scripts. Children with dyslexia were compared with typically developing children

and a spelling-level-matched group. Three writing tasks were administered: name writing, alphabet writing, and dictation including real words, nonwords, and pseudowords. Temporal handwriting characteristics were measured using Eye and Pen software. Children with dyslexia showed slower pen speed, longer writing durations, and increased pausing. Writing in Cyrillic resulted in longer durations and slower pen speed only in tasks requiring phonological decoding. These findings indicate that script-specific properties shape spelling and handwriting performance in children with dyslexia, even within a transparent orthography.

## C.2

### From cultural marks to neural codes : Investigating the neural basis of logotype recognition

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Across cultures and history, people have marked everyday objects, such as coins, seals, or storefronts, with signs to signal their origin and quality, laying the groundwork for what we now recognize as logotypes. A defining feature of these logotypes is that they are consistently presented in the same format. Leading models of visual word recognition assume that lexical access to common words is largely invariant to surface format (e.g., font, case, color, size), supporting abstractionist models (Dehaene et al., 2005). However, recent behavioral experiments show that logotypes are sensitive to modifications of surface elements (Labusch et al., 2024; Perea et al., 2022). This research has focused on behavioral measures, leaving the underlying neural mechanisms unexplored. The present fMRI experiment addresses this issue by examining whether the visual word form area (VWFA) and related regions are sensitive to font or letter case modifications in logotypes during a semantic categorization task (“is the brand related to transportation?”). Participants viewed logotypes either in their usual visual

format or with a modified font or case. Font modifications slowed responses and elicited increased VWFA activation relative to intact logotypes, whereas case modifications also slowed responses but did not reliably modulate VWFA activity. This functional dissociation challenges strictly abstractionist views of the VWFA, suggesting that neural responses in this region are not uniformly insensitive to surface format. Instead, the VWFA appears flexible, retaining sensitivity to diagnostic perceptual features like font (which are tied to brand identity and orthographic codes) while rapidly normalizing variable features like case.

## C.3

### Principles and mechanisms of neuronal recycling across cultural symbolic systems : what word and music reading reveal about the organization of ventral visual cortex

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Across the last few millennia, increasing cultural complexity has led humans to invent various written symbolic systems. Most notably, scripts that represent speech and language made it possible to externalize thought and support long-term storage and transmission of knowledge. Other systems were developed to represent numerals (eg, for bookkeeping purposes), mathematical symbols, and music.

Because these cultural inventions are relatively recent in evolutionary terms, the human brain cannot have evolved dedicated neural circuitry. Their acquisition must therefore “recycle” pre-existing neural resources in each learner, capitalizing on the brain’s remarkable plasticity. Yet this recycling yields strikingly reproducible outcomes: learning a symbolic system consistently leads to the emergence of dedicated category-selective patches in the ventral occipito-temporal cortex, including regions specialized for written words and for numbers.

This reproducibility raises central questions. What guides functional reorganization toward similar solutions across individuals? What drives a specific location to be optimal for a given domain? And are there broader consequences of “squeezing in” new category-selective regions within this limited cortical space?

I will argue that comparing symbolic systems is a powerful route to identify the principles and mechanisms that underlie neuronal recycling. I will synthesize work drawing parallels between word reading and music reading, combining evidence from adult and developmental studies. First, these studies highlight the role of structural white-matter connectivity in shaping where and how symbol-selective responses emerge: the anatomical pathways linking ventral occipito-temporal cortex to distant language- and auditory-related regions appear to provide a scaffold that constrains specialization.

Second, the work points to a key role of hemispheric lateralization. Musical literacy is associated with marked shifts in lateralization patterns across the ventral visual stream, including increased leftward lateralization in lateral regions and a rightward shift in fusiform regions involved in processing faces and houses. These effects mirror, and potentially illuminate, those observed with reading acquisition and its competition with faces.

Together, these findings indicate that cultural learning not only induces domain-specific specialization but also a broader reorganization and domain-general changes, revealing a complex interplay between competition and transfer across categories in visual cortex.

## D.1

### How Writing shapes how we hear a Second Language

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Research on second language (L2) speech perception has traditionally emphasized the role of first language (L1) phonological categories in shaping how non-native sounds are perceived. While this approach has yielded important insights, it has largely focused on auditory input and has paid limited attention to orthography, despite its central role in instructed L2 learning. Orthographic systems are not neutral representations of speech but culturally and historically shaped conventions that learners acquire early and rely on extensively. Previous studies indicate that written input can influence L2 phonological representations, particularly in situations of orthographic conflict, where similar letters correspond to different sounds across languages (Bürki et al., 2019).

The present study examines how orthographic knowledge modulates L2 vowel perception by native French learners of English, beyond acoustic similarity alone. We investigate whether exposure to written forms biases the perceptual mapping of English vowels onto French vowel categories, with a focus on vowels whose spellings invite cross-linguistic misalignment. Of particular interest is the English vowel /ɪ/ (like in ship), typically spelled with <i>, a letter strongly associated with /i/ in French (closer to the vowel in sheep).

Thirty-five native French speakers of English completed a perceptual assimilation task in which they categorized English vowels using French vowel labels. Three conditions were tested: isolated vowels, vowels embedded in real words and pseudowords presented auditorily only (No\_Ortho), and the same items presented with concurrent orthographic input (Ortho).

Results showed that vowel assimilation was sensitive to phonetic context, but crucially, orthographic input systematically reshaped perceptual mappings in cases of orthographic conflict. The vowel /ɪ/ was more frequently assimilated to French /i/ when orthographic information was available than in the auditory-only condition. Similar effects were observed only for vowels with orthographic conflict.

These findings highlight orthography as a powerful top-down influence on L2 speech perception. Rather than merely accompanying auditory input, orthographic knowledge, rooted in culturally learned letter-sound correspondences, actively shapes how L2 sounds are categorized. Orthography should therefore be considered a central component of models of instructed L2 speech learning.

## D.2

### Reading acquisition and neural (re)organization : How does the Visual Word Form Area respond to speech ?

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Reading acquisition is an illustrative example of how cultural practices shape neural organization. A well-known example of this neuroplasticity is the emergence of functional specialization in a specific part of the left ventral occipito-temporal cortex: the Visual Word Form Area (VWFA). Through the association of speech sounds with visual symbols, the neural populations in this region progressively develop a selective response to known scripts (Brem et al., 2010). Interestingly, despite its anatomical location within the visual pathway and its central role in reading, the VWFA also exhibits responses to speech (Dehaene et al., 2010; Planton et al., 2019). This cross-modal activation raises critical questions regarding the functional properties of neurons in this region. Specifically, are these neurons strictly 'visual', with speech-driven activity reflecting the conversion of speech sounds to orthographic representations? Or does the VWFA contain neurons capable of directly processing spoken language? To address these questions, we conducted a series of studies employing a repetition suppression paradigm across three brain-imaging techniques: transcranial magnetic stimulation, fMRI and stereotactic electroencephalography (Pattamadilok et al., 2019; Wang et al., 2025). Converging fin-

dings from these techniques suggest that the VWFA contains not only neurons that respond to written input but also those that directly respond to speech. This observation invites further discussions about the origin of the VWFA and the impact of reading acquisition on the functional reorganization of the human brain. On the one hand, the emergence of neural populations coding for spoken language in the VWFA could be a consequence of the functional reorganization of the visual pathway following reading acquisition, potentially rendering this cross-modal response sensitive to the characteristics of the writing system. On the other hand, neurons coding for spoken language may predate reading acquisition and, therefore, predetermine the location of the VWFA, irrespective of the writing system.

## D.3

### Learning to read increases print–speech convergence in lvOT : A longitudinal voxel-based study in children

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Reading acquisition is accompanied by functional changes in the higher-level visual cortex (the left ventral occipitotemporal cortex, lvOT). In skilled readers, lvOT responds not only to written words but also during spoken-word processing. This raises a developmental question: when does lvOT begin to respond to speech, and does early reading experience shift it from mainly print-selective responses toward more multimodal (print–speech) responses? Different theories either stress learning-driven co-activation between print and speech systems or the refinement of pre-existing structural connectivity with the spoken-language network.

We addressed this question in a longitudinal cohort of 68 typically developing Polish-speaking children followed from the onset of formal reading instruction (T1; Mean age = 6.9 years) to two years later (T2). During fMRI, children were passively exposed to written words, spoken words, symbol strings, and vocoded speech. Within an anatomically defined lvOT mask, we quantified print-specific (print > symbol strings) and speech-specific (speech > vocoded speech) responses at the level of individual voxels. Voxels were classified based on beta values into print-specific, speech-specific, print–speech-specific ( $\beta > 0$  in both contrasts), and non-specific categories.

Voxel-level analyses revealed an increase in lvOT voxels showing print–speech-specific responses at T2, driven largely by voxels that were print-specific at T1 shifting toward joint print–speech sensitivity. This pattern is consistent with reading-related strengthening of speech sensitivity within lvOT. Moreover, at T1, reading skill was positively associated with the number of print–speech-specific voxels and negatively associated with non-specific voxels.

Together, these results suggest that during the first years of literacy, lvOT shows a gradual increase in overlapping responses to print and speech. The degree of emerging multimodal convergence is related to early individual differences in reading ability. More broadly, results illustrate how brain adapts over time and adjust its primary functions to support a newly acquired skill.

## E.1

### Is the visual system more adapted to letters than symbols ? Assessing this through inter-character spacing

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Reading is a culturally acquired skill built on prolonged experience with a conventional set of visual characters, providing a clear test case for how cultural practices can tune early visual processing. To optimize visual word recognition, the Modified Receptive Field (MRF) hypothesis suggests that reading experience entails an adaptation in the size and shape of the receptive fields of the retinotopic letter detectors (Tydgat & Grainger, 2009). Specifically, the size would be reduced and the shape would be left-elongated (in left-to-right languages). This would explain the different serial position functions obtained for letters (W-function) and symbols ( $\Lambda$ -function), where the outer positions benefit from a one-flanker condition—despite greater eccentricity—for letters but not for symbols. Based on this, increasing the inter-character spacing should slightly hinder letter recognition by increasing eccentricity, with reduced crowding having little or no impact for letters; and it should have no impact on symbols, due to a trade-off between reduced crowding and increased eccentricity. The current experiments examine the MRF hypothesis with a slight increase in inter-character spacing (1.5 pt; following Civera et al., 2024) on both letter

and symbol strings, through two paradigms: a 2AFC Reicher-Wheeler identification task and a same-different matching task. Results reveal significant effects supporting the MRF hypothesis. First, letters were overall better identified than symbols, which is consistent with greater tolerance to crowding for letters in horizontally presented strings. Second, we found a sizeable initial-letter advantage across tasks and spacings which is consistent with left-elongation of the retinotopic letter detectors. Third, increased spacing did not facilitate letter identification and instead produced a small cost, consistent with increased eccentricity. In sum, the present experiments strengthen the MRF hypothesis, in which letter detectors can readily cope with perceptual interference from flanker letters.

## E.2

### Languages use technology in different ways : A cross-linguistic French-Italian study of how orthographic depth modulates word writing dynamics in smartphone writing

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Smartphones were initially designed for talking, but many people prefer to text or email rather than call, changing the way we communicate. Moreover, mobile writing modifies certain orthographic and motor processing mechanisms with respect to hand-writing or typing on a computer keyboard. Smartphones include word suggestion systems that offer the possibility of finishing writing a word after having typed the initial letters. Several studies revealed that they decrease spelling errors and cognitive load, but in some situations they increase writing time, which questions the efficiency of using word suggestions. There is a cost-benefit trade-off because word suggestions require a continuous attentional shift between producing letters, reading and selecting them. Most studies were conducted in English, which is an orthographically deep language, presenting numerous sound-letter inconsistencies. When a word is difficult to spell, it may be worth interrupting the writing flow to select a suggestion. Conversely, if sound-letter conversion is straightforward, the cognitive cost of diverting attention to read suggestions may outweigh the potential benefit. Our previous studies in French, a language with a deep orthography, revealed that phoneme-grapheme inconsistency affects writing dynamics in mobile writing and increases

movement time. Phonewriters select word suggestions more often when writing orthographically inconsistent words (e.g., femme (woman) pronounced /fam/) than consistent words (e.g., ferme /ferm/ (farm)). Therefore, phono-graphemic consistency can be a determinant factor in the use of word suggestions and should vary with the orthographic deepness or shallowness of the phonewriter's language. To examine this question, we conducted a study comparing phonewriting in French and Italian, which is an orthographically shallow language. Italian and French native-speaking young adults performed a spelling-to-dictation task on a smartphone. They had to write Italian-French cognates (e.g., banane-banana), in conditions with and without word suggestions. French phonewriters exhibited higher latencies, longer movement times, slower typing speeds, and selected word suggestions more frequently than the Italian participants. These results highlight that the properties of a writing system influence not only reading and handwriting, as widely established, but also affect the dynamics of digital text entry.

## E.3

### Beyond diacritics : Feature asymmetry in early orthographic processing in Serbian Cyrillic

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Visual word recognition models generally assume a progression from low-level features (edges, junctions, curvature) to increasingly abstract orthographic codes. However, how letter features are mapped onto letter identities remains unclear. Critically, most empirical evidence on this mapping comes from Latin-script languages. In these orthographies, it was found that primes that omit diacritics facilitate target recognition almost as much as identity primes (e.g., facil → FÁCIL [easy]), whereas primes that add diacritics reduce priming (e.g., féliz → FELIZ [happy]) (e.g., Benyhe et al., 2023; Marcet et al., 2020). This “diacritic asymmetry” aligns with Bayesian noisy-channel models (Norris & Kinoshita, 2012). However, because diacritics are detachable marks within Latin scripts, it remains unclear whether the observed asymmetry reflects properties specific only to these orthographies, due to the spacing between the diacritical mark and the symbol (Perea et al., 2020), or a more general principle of feature integration in early orthographic processing.

We investigated this question using Serbian Cyrillic, which contains letter pairs differing by a single integrated stroke (Л-Љ; Н-Њ). In a masked priming lexical decision task, 45 native speakers responded to 240 words while primes varied in relation to targets: identity,

visually similar, with a feature omitted (e.g., коница → КОЊИЦА [cavalry]) or added (e.g., коњац → КОНАЦ [thread]), or visually dissimilar (e.g., кодица → КОЊИЦА; кодац → КОНАЦ).

Bayesian linear mixed-effects model analysis of reaction times revealed a clear asymmetry: for complex letters (Љ/Њ), omission primes produced latencies comparable to identity primes (<2 ms difference), whereas addition primes for simple letters (Л/Н) incurred a substantial cost (~25 ms). Accuracy mirrored this interaction. These results replicate previous findings with diacritics in Latin scripts and support the view that the asymmetry reflects a fundamental property of evidence accumulation: the system differentially weights positive evidence (feature presence) over negative evidence (feature absence) (Kinoshita et al., 2021). Crucially, this bias is not limited to detachable marks (Perea et al., 2020).

## F.1

### Hierarchical and culturally modulated social categorization of faces dynamics in smartphone writing

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Social categorization is a fundamental self-referential mechanism identified in social psychology. Individuals automatically classify others into social categories, thereby activating beliefs that guide and adapt social interactions. However, because a single person can belong to multiple categories (socio-economic status, gender, age...), a fundamental question concerns how we process faces when several category memberships are simultaneously available, with the hypothesis that all categories are activated in parallel and are competing, resulting in a hierarchical organization of categorical perception.

Since cultural identities define expectations for social behaviour through norms and institutions, we hypothesised that cultural context modulates this hierarchy. In particular, social categorisation may differ in France compared to other countries, as the French universalist republican model emphasises equality among citizens and may therefore reduce the overt recognition of certain social categories.

Using the Free Sorting Task (FST), a paradigm commonly used in consumer behavior studies, we first demonstrated the hierarchical organization between the main social categories used to discriminate human faces. In a sample of young French adults, hierarchi-

cal clustering analysis based on principal components provided the first behavioral evidence for a stable, implicit hierarchy in face categorization: age is categorized first, followed by gender, with ethnicity and familiarity contributing equally thereafter. Emotional expression dominated all social dimensions without altering the relative hierarchy of the other categories. Furthermore, a collaborative study with Macau University revealed a partially different hierarchical pattern in young Chinese adults. While emotion remained the predominant factor in social categorization, ethnicity and gender were used less frequently than among European participants.

By using a free and unconstrained sorting paradigm, this study shows that social categorization relies on a hierarchical and competitive process rather than on uniform activation of all available categories. Emotion is weighted more heavily than other dimensions, likely reflecting its adaptive value for guiding social behavior. In addition, while emotion constitutes a cross-cultural constant in social categorization, the use of other social categories, particularly ethnicity, is strongly shaped by cultural context, especially in the perception of outgroup members. These findings highlight social categorization as a flexible process combining universal and culture-dependent mechanisms.

## F.2

### Ideological worldviews and climate engagement beyond partisan politics : Evidence from Qatar

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Research in Western democracies consistently links political ideology to climate change attitudes and pro-environmental behavior. Yet in highly partisan systems, ideological orientation is deeply intertwined with party identity and political polarization. This raises a fundamental question for cross-cultural psychology: Do ideological worldviews shape environmental engagement independently of partisan structures ?

The present study addresses this question in Qatar, a centralized governance system without formal political parties, where political identity is not organized around electoral competition. Drawing on a nationwide survey of 987 adults, we examine whether two ideological belief dimensions, economic individualism and social conservatism, predict climate change concern and willingness to engage in pro-environmental behaviors. We further test whether climate concern mediates the relationship between ideology and behavioral intentions.

Results indicate that ideological worldviews meaningfully structure environmental engagement even in the absence of partisan competition. Economic individualism was negatively associated with pro-environmental behavior, primarily through a direct pathway,

suggesting resistance rooted in beliefs about market autonomy and limited government intervention. In contrast, social conservatism, operationalized through attitudes toward expatriate workers in a highly diverse national context, predicted environmental behavior largely through climate-change concern. Individuals expressing more inclusive intergroup attitudes reported greater concern about climate change, which in turn increased their willingness to engage in pro-environmental actions.

These findings demonstrate that ideological belief systems operate as psychologically coherent frameworks that extend beyond Western party politics. Moreover, the distinct pathways observed for economic and social ideology suggest that different components of belief systems influence environmental engagement through different cognitive mechanisms. By examining a non-partisan political context, this study broadens theoretical understanding of ideology-environment links and highlights the importance of culturally grounded approaches to sustainability communication.

## F.3 Validation and comparison of virtual reality and 3D mobilegames for cognitive assessment

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Current medical and clinical ecosystem for dementia detection is inadequate for its early detection. Traditional cognitive assessments are introduced after cognitive impairment has begun to disrupt the real-world functioning of the person. Moreover, these tools are paper-pen based and fail to replicate the real-world situations wherein the person ultimately lives, acts and grows. The lack of tools for early detection of dementia, combined with absence of reliable pharmacological cure compound the problems associated with dementia diagnosis and care. Advancement of technology has facilitated early prediction of disease like cancer, diabetes, heart disease, but hardly any such translation has been observed for dementia or cognitive impairment. Given this background, we examine the potential of Virtual Reality (VR) and 3D Mobile-based goal-oriented games for cognitive assessment. We evaluate three games (2 in VR, one in mobile) among 82 young participants (aged 18–28 years) and compare and contrast the game-based results with their Addenbrooke Cognitive Examination (ACE-III) scores. Three main analysis methods are used: Correlative, Z-score and Regression

analysis. Positive correlation was observed for ACE-III and game-based scores. Z-scores analysis revealed no difference between the two scores, and stronger statistical significance was found between game scores and cognitive health factors like age, smoking compared to ACE-III. Specific game performances also revealed about real-world traits of participants, like hand-use confusion and direction confusion. Results establish the plausibility of using goal-oriented games for more granular, time-based, and functional cognitive assessment.

## F.4 The medium of mind

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## A.1

### Broad and narrow patterns of adaptation to linguistic and cultural diversity : Development of an adaptability index

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Adaptation to linguistic and cultural diversity is a pervasive aspect of everyday life, particularly in multilingual and multicultural contexts such as India. Successful engagement with diversity is shaped by perceived social and economic benefits relative to cognitive costs, facilitated by social cognition, linguistic proficiency and a dispositional openness to engage with the diversity (Mishra et al., in press; Van der Zee & Van Oudenhoven, 2001). Importantly, individuals vary in the breadth and flexibility with which they modulate these processes across contexts and interlocutors (Green & Abutalebi, 2013), giving rise to broad versus narrow patterns of adaptation . Existing measures examine these processes in isolation, highlighting the need for an integrative measure of adaptive engagement.

Conceptualising adaptation as an integrated regulatory pattern rather than separable dimensions, the present framework defines broader patterns of adaptation as flexible and context-consistent modulation of social behaviour, language use, and regulatory processes across interactional contexts, whereas narrower patterns reflect comparatively constrained modulation. These individual differences in adaptability to diversity were examined through the development of a composite index. A 20-item self-report ques-

tionnaire comprising context-based scenarios reflecting ecologically relevant situations (e.g., switching language choices across interlocutors, navigating new and unfamiliar cultural norms), was administered to 250 multilingual individuals aged 17–32 years (M = 22.75, SD = 3.97), of whom 242 responses were retained after screening. The questionnaire demonstrated acceptable internal consistency (Cronbach's  $\alpha = 0.70$ ), and principal component analysis revealed a dominant first component, indicating substantial shared variance across items and supporting aggregation into a single index. Total scores could range from 20–100 (midpoint = 60); observed scores ranged from 39–88 (M = 67.40, SD = 8.33), indicating substantial between-individual variability. The index yields a continuous score positioning individuals along a spectrum from relatively narrow to broader patterns of adaptive regulation. It also provides an ecologically grounded tool for examining individual differences in adaptive regulation within multilingual and multicultural environments, enabling empirical tests of models linking language control, social cognition, and contextual engagement.

## A.2 Tracking rapid neural adaptation in dyslexia across early literacy

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Developmental dyslexia affects approximately 10% of children, yet its underlying mechanisms remain poorly understood. Reduced neural adaptation to repeated stimuli has been proposed as a domain-general processing difference in dyslexia (Perrachione et al., 2016); however, prior studies have primarily focused on literate individuals, leaving its causal status unclear. We conducted a longitudinal fMRI rapid adaptation (fMRI-RA) study in children tested before (T1) and after three years of formal literacy instruction (T2). We assessed whether adaptation deficits are domain-specific – limited to written words in the left ventral occipito-temporal cortex (VOT) – or domain-general, extending to false fonts, faces, houses, and objects. The longitudinal sample included typical readers (n = 25) and children who developed dyslexia (n = 22); from these, 16 participants per group were matched on age and pre-reading skills at T1.

Whole-brain analyses at T1 revealed significant neural adaptation only to objects in bilateral VOT in typical readers, whereas in dyslexic readers adaptation was present for faces and objects in bilateral VOT and for houses in the right VOT. At T2, typical readers displayed adaptation to words in the left anterior VOT, as well as to faces and objects in

bilateral VOT and to houses in the right VOT. In dyslexic readers at T2, adaptation was present only for words in bilateral occipital cortex. Nevertheless, no significant group, time, or time × group interactions were observed.

ROI analyses for words in the VOT revealed a significant group effect in the left VOT, with dyslexic readers showing reduced adaptation compared to typical readers. ROI analyses in the fusiform face area (FFA) for faces revealed a significant time × group interaction in the right FFA, with typical readers – but not dyslexic readers – showing increased adaptation at T2 relative to T1. No significant effects were observed in the lateral occipital cortex (LOC) for objects. These ROI results were replicated in the full sample.

Overall, neural adaptation in dyslexia does not appear broadly domain-general but emerges atypically with literacy. Reduced adaptation to words, along with absent developmental increases for faces, suggests altered experience-dependent tuning rather than a primary, pre-existing adaptation deficit.

## A.3 The impact of semantic and phonological training on visual word recognition in Arabic : An event-related potential study

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Previous studies have shown that familiarity of novel words and thus their integration into the reader's memory can be improved either by visual or phonological repeated exposure or by repeated association with a meaning. However, the contribution of the different linguistic manipulations to visual word recognition and the effects of specific training strategies that facilitate lexicalization are still not fully understood [1-5]. In this study, we assessed the behavioral and the event related potential (ERPs) correlates of phonologically- and semantically-oriented training on visual word recognition. In the absence of any orthographic information during the training process, it was assumed that both semantic and phonological training would facilitate visual word recognition. For this purpose, participants learned novel words (pseudowords) through their phonology either associated with meaningful images (Semantically trained pseudowords- StPW) or associated with scrambled meaningless images (Phonologically trained pseudowords- PhtPW). ERPs were collected the day after while adult participants performed known – unknown decision task on real words, unknown pseudowords, StPW and PhtPW.

The results showed that the fastest RTs for real words were followed by trained pseudowords and then by untrained pseudowords. The highest accuracy was found for words, but no difference was found between the other conditions. Spatio-temporal analysis of ERP map series, conducted to identify periods of stable field/map configurations, indicated that early components' period (i.e., P100- N170-P2 complex) did not differentiate the four conditions. Later on, the analysis revealed differences in the □440-800ms period. In particular, one map segment appearing at ~600ms was of longer duration in real word than in the other conditions and its duration correlated negatively with participants RTs. The significance of these findings is discussed in the light of previous studies using such analysis procedures and previous literature assessing pseudowords' learning.

## A.4

### In search of (a) piece of mind : The quest to decipher whether theory of mind is consistent and a universal cognitive trait, or a plastic trait

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Theory of mind (ToM) is the universal understanding of beliefs and knowledge of conspecifics. ToM comprehension could be a significant step in assessing the mental states of others that could facilitate socio-cognitive mechanisms of information transfer, such as teaching. However, the test designs implemented (including the classic Sally-Anne test) across diverse communities have produced inconsistent results, contradicting the consistency of the developmental timing of ToM. Communities with diverse social systems, subsistence means, and parental practices have also been largely ignored in false-belief studies. In addition, the studies fail to attribute reasoning for the emergence of ToM in human evolutionary history and whether ToM perception is susceptible to cultural/environmental triggers. Our study is the first attempt to conduct a series of tests (Sally Anne test with human actors, Smarties test and Toy test) on four hunter-gatherer groups (Agta, Mbendjele BaYaka, Baka and O'Hongana Manyawa) and farmer groups (Filipino, Congolese Bantu, Indonesian) from three different countries (Philippines, Congo-Brazzaville, and Indonesia) varying in subsistence

and access to education. Our study assesses and compares the passing rates of children and adolescents across the different populations in the aforementioned tests. We also aimed to investigate whether ToM is a universal socio-cognitive trait having a consistent developmental timing across different groups or is triggered by socioecological pressures such as schooling. Nevertheless, we found that participants performed significantly better in the Smarties test and slightly better in the toy test compared to the Sally Anne Test. Our study showed no influence of schooling on test passing in the Congolese population but demonstrated some influence of schooling on test passing in the Filipino population. The study shows that ToM is potentially a plastic socio-cognitive trait susceptible to different socio-ecological pressures.

## A.5

### Meaning-specific neural alignment to words between interlocutors

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Neural alignment is the observation that the brain activity of speakers and listeners becomes correlated during communication (e.g., Stephens et al., 2010). This phenomenon is thought to index an important cortical mechanism to ensure successful interaction between interlocutors.

However, research on neural alignment has mainly focussed on a broad, global level of communication, without disentangling which specific linguistic features, if any, are reflected by the synchrony.

Drawing upon another alignment phenomenon, linguistic alignment, where interlocutors copy each other's language use across virtually all levels of language processing (e.g., Pickering and Garrod, 2021), we hypothesised that neural alignment too may be sensitive to such more discrete, granular levels of processing, rather than communication at large.

To test this, we implemented a novel interactional paradigm (Kerr et al., 2025) in which pairs of participants engaged in a structured semantic association game while simultaneously recording their EEG activity (EEG hyperscanning). The association game assigned specific roles: Interlocutor A named a displayed image (e.g., dog), and Interlocutor

B had to respond to Interlocutor A's utterance with a semantically related word (e.g., cat). Word stimuli were limited to two categories—animals and tools—which are known for their distinct semantic representations in the brain (e.g., Caramazza & Mahon, 2003). This approach allowed us to contrast Inter-Brain Synchrony (IBS) between the interlocutors when interacting about animal versus tool words, in order to investigate whether specific word meanings elicit neural alignment.

The results demonstrated significant IBS for the animal-tool contrast in the theta-band which emerged after Interlocutor A's utterance and prior to Interlocutor B's reply. Multivariate pattern analyses (MVPA) complemented this finding by showing significant classification of animal versus tool words in both interlocutors simultaneously a few 100ms before Interlocutor B's reply to Interlocutor A. Taken together, these findings serve as proof that neural alignment is not merely a domain-general communicative phenomenon but can reflect more granular levels of language processing, namely meaning-specific information of words. This supports the possibility that neural alignment is the brain's signature of linguistic alignment, linking brain and behaviour for this important conversational mechanism.

## A.6 Development of reading-and spelling skills in prematurely born primary school children

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**Introduction** Approximately one in ten births worldwide occurs preterm (Ohuma et al., 2023). Advances in neonatal care have substantially improved survival rates, yet preterm birth remains associated with elevated risks for later learning difficulties, including developmental dyslexia (e.g., Aarnoudse-Moens et al., 2009). Research on dyslexia prediction has traditionally focused on preschool (often phonological) variables, such as letter knowledge, rapid automatized naming (RAN), and Non-word-repetition (e.g., Ozernov-Palchik et al., 2016). However, far less is known about how these early difficulties emerge in children born preterm, and whether their developmental pathways differ from those of full term children. In particular, the potential role of broader developmental domains, such as executive functioning, in the development of later reading and spelling outcomes in preterm children remains insufficiently explored. This study aims to address this gap by examining early predictors of school performance in preterm versus full term children.

**Methods** We followed a cohort of 44 preterm children from birth and assessed them, together with 23 full term controls, in the third year of kindergarten (5 year) and in the second year of primary school (7 year). In kindergarten, we measured key preschool predictors of literacy development: letter knowledge, RAN, nonword repetition, phonological awareness and executive functioning. In the second grade, we assessed similar phonological and executive functioning measures, as well reading and spelling abilities. Our first objective is to determine whether preterm children differ from full term peers in early reading and spelling performance. Our second objective is to investigate whether the predictors of reading and spelling outcomes differ between groups. We hypothesize that executive functioning will play a stronger predictive role in preterm children, whereas literacy outcomes in full term children will be more strongly associated with traditional (phonological) predictors.

**Results** Data collection is ongoing. Full analyses will be completed prior to the start of the conference.

## A.7 Neurophysiological mechanisms of optimized graphomotor performance in biscriptuals

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Many literate adults master two writing systems: a phenomenon termed biscriptuality. Biscriptuals don't just juggle two scripts—their graphomotor coordination also generally outperforms that of monoscriptuals, suggesting that some components of their motor system have been optimized. To uncover the neurocognitive foundations of this biscriptual advantage, we synchronized a loop-tracing task on a digitizing tablet with electroencephalographical (EEG) recordings. Theta (4-7 Hz) and beta (13-30 Hz) oscillatory dynamics were analyzed to test whether biscriptuals display better optimized planning and monitoring, and/or better sensorimotor control. At the behavioral level, biscriptuals displayed a robust advantage in tracing frequency and stability compared to monoscriptuals. At the neural level, biscriptuals showed lower frontal theta power than monoscriptuals, with frontal theta power positively correlated with behavioral variability. Optimization of predictive inference mediated by midfrontal theta oscillations thus stands out as a hallmark of the biscriptual advantage. Biscriptuals also

displayed a lower degree of beta synchronization over parieto-occipital electrodes than monoscriptuals, with beta power being less correlated with kinematic dynamics. Similar effects in the beta band were observed for all participants when task difficulty decreased. These effects suggest higher reliance on sensory feedback when graphomotor execution is more demanding. Overall, these results call for a model of handwriting control where prefrontal and sensorimotor components contribute to implementing internal predictive models, whose accuracy and reliability depend on the type of expertise acquired when learning to write.

## A.8 Toward a comprehensive account of literacy : Evidence from braille

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All writing systems are cultural tools tuned to human perception; braille is a particularly clear instance of this tuning in the tactile modality, enabling individuals to read through the sense of touch. Although letter recognition research in the visual modality has informed reading instruction debates, the processes underlying braille letter recognition have received comparatively less attention, which has led to limited input from researchers toward educational practices. In this study, we first quantified the formal properties of braille dots using measures of cue validity and entropy-based informativeness, and we tested whether the 26 letters of the braille alphabet were linearly separable in the six-dimensional binary space defined by dot presence. We then examined letter discriminability in fluent Spanish braille readers using a same-different task that included all possible letter combinations. From participants' accuracy and response time data, we constructed perceptual similarity matrices and applied hierarchical clustering to characterize the structure of

braille letter similarity. The resulting clusters revealed a structured perceptual space that reflected both local dot features and global configurations. Beyond offering a formal account of tactile letter perception, these findings contribute to understanding braille as an autonomous literacy system that develops within shared reading practices and instructional traditions shaped by the constraints of tactile perception. In this sense, the perceptual organization of the braille alphabet both reflects and constrains how braille is taught, learned, and transmitted across generations of readers.

## A.9 From cultural marks to neural codes : Investigating the neural basis of logotype recognition

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Background: Music can have positive effects for people with dementia. In this study, we investigated the effects of slow and fast music of positive valence in people with dementia living in the community.

Methods: In a within-subject intervention study, a total of 17 person-with-dementia-and-caregiver dyads underwent 6-week periods of music listening interventions including a period with fast, positively valenced music and a period with slow, positively valenced music (counter-balanced order). Half of the dyads also underwent a control period (care-as-usual). Outcomes included cognition, well-being, quality of life, behavioral and psychiatric symptom severity as indicated by caregivers, and experiences of usability.

Results: Fast, positively valenced music was associated with better delayed recall at the end of the respective intervention period (fast vs. slow music: 1.04,  $p=0.028$ ). Participants' experiences described 'in-the-moment' effects such as improved mood and movement (e.g. clapping) and relaxation.

Conclusion: The findings suggests that fast, positively valenced music may have a positive effect on cognition in people with dementia. Music listening may also improve momentary well-being, which has to be validated in future studies.

## A.10 From symbols to letters : Emergence of the transposition effect with decoding skills

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Reading is a culturally acquired skill that builds on two pre-existing cognitive systems: visual form recognition and spoken language processing (Grainger et al., 2012). A fundamental stage of reading acquisition involves the ability to identify letters and encode their positions within a word. A hallmark of this process is the transposition effect, whereby the cognitive system develops sufficiently precise positional encoding to distinguish orthographic neighbors (e.g., bread vs. beard), while maintaining enough flexibility to support the development of parallel processing during reading. This flexibility, however, comes at a cost, resulting in decreased sensitivity to certain letter-position errors, such as “jugde” for “judge”. So far, the transposition effect has mainly been studied in children or adults who already possess some degree of reading fluency, consistently reporting a stronger effect for letters than symbols (Massol et al., 2025). This observation indicates that, beyond general properties of the visual system (Gómez et al., 2008), the effect might also be supported by language-specific mechanisms (Grainger & van Heuven, 2004). The question remains whether the flexibility of letter position coding emerges gradually with decoding skills, or whether it appears abruptly once children master grapheme-phoneme rules that are the basis for the development of reading fluency.

To address this question, we investigated the emergence of the transposition effect at the earliest stages of reading acquisition. Specifically, we employed a same-different perceptual judgment task using letter and symbol strings and conducted a fine-grained assessment of decoding skills in 164 children (aged 5 to 7 years). Our results showed that the transposition effect was already present at the very earliest stages of reading acquisition, manifesting across both linguistic and non-linguistic materials. Critically, rather than showing a gradual increase with decoding skills, the magnitude of the effect increased abruptly once children achieved the ability to decode pseudowords with context-dependent pronunciations. Interestingly, this stage also coincided with the emergence of a processing advantage for letters over symbols, indicating the onset of orthographic processing automatization. Together, these findings provide novel developmental evidence on the emergence and mechanisms of the transposition effect, shedding light on how literacy acquisition reshapes visual information processing.

## A.11 The serendipity myth : An emergent product of social transmission ?

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Serendipity refers to an accidental innovation—unintentional and catalyzed by an unexpected event. Despite its significance, it remains empirically understudied due to the inherent difficulty of manipulating randomness and innovation within a laboratory setting. Yet, this phenomenon is central to elucidating the cognitive mechanisms underlying human innovation, a cornerstone of our species' unique cumulative technological culture (Legare & Nielsen, 2015). Some argue that innovation stems from incremental, collective, and often involuntary modifications (Muthukrishna & Henrich, 2016). Conversely, as Louis Pasteur remarked, «chance favors only the prepared mind.» Individual causal understanding may indeed be paramount: a «happy accident» only transforms into an innovation if it elicits surprise in a discerning observer, thereby commanding the necessary attention (Ross & Copeland, 2022). This surprise suggests the event contradicts the observer's expectations, which emerge from a codex of causal relationships established through prior experience. While culture expands one's repertoire, serendipity may require a robust causal machinery, rendering luck a mere latent potential.

The objective of this project is to examine whether the perception of serendipity in scientific discovery is less an objective pro-

perty of events than a post-hoc narrative reconstruction. We hypothesize that a reasoning bias leads individuals to overemphasize what they understand best—the anecdotal or «lucky» element—at the expense of the often opaque causal process.

To test this, two studies were designed. Study 1 presented 16 versions of a scientific narrative by manipulating four factors: expertise, effort, the accidental nature and the magnitude of consequences. Participants evaluated the role of chance and perceived serendipity, establishing a narrative ranking. Study 2 (data collection underway) explores how these scientific discovery narratives evolve when transmitted through a chain, using a paradigm inspired by research on the transmission of social representations (Bangerter & Lehmann, 1997). Two texts were selected from Study 1 (highest and lowest serendipity scores). We hypothesize that the narrative initially low in serendipity will progressively transform to emphasize chance, converging toward the «fortuitous discovery» archetype, while the highly serendipitous narrative will remain stable, demonstrating that serendipity is, in part, an emergent property of narratives and their transmission.

## A.12 Spontaneous inner speech in multilinguals : Smartphone-based evidence of short and long-term effects on code-switching

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In this study, we explored language switching (code-switching) in spontaneous inner speech in multilingual native Arabic speakers living in Israel. The aim of this study was to test the effects of both long-term variables (education and proficiency in Hebrew and English as non-native languages) and short-term variables (linguistic context and mood) on code-switching (CS). Data was collected via a custom smartphone application that prompted 49 female participants twice daily for two weeks, alongside a questionnaire regarding their linguistic background and usage. Results indicate that the short-term variable linguistic context affected language use in inner speech: a more mixed linguistic context led to increased code-switching, whereas mood showed no effect. Furthermore, Hierarchical

Regression showed that long-term variables—specifically Education and Hebrew proficiency (though not English)—explained most of the variability in code-switching in inner speech. These findings are discussed through the lenses of language status in the minds of multilinguals, control and inhibition theories, and the characteristics of inner speech.

## A.13 Does the integration of play and learning in higher education affect creativity ? Relations between creativity, creative reasoning, cognitive flexibility and learning styles among university students – a pilot study

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It is well established that creativity can be enhanced in adulthood through purposefully structured interventions (Scott et al., 2004; Sio & Lortie-Forgues, 2024). Moreover, complex creativity trainings have been identified as among the most effective means of fostering creative development (Haase et al., 2025). However, the mechanisms by which such programs influence creative performance remain incompletely understood. The study aims to examine how various aspects related to creativity are affected by a higher education intervention centered on play, exemplified by the Play and Creativity in Adult Education course at the University of Belgrade's Faculty of Philosophy. This course is deliberately structured around playful, performative, and workshop-based learning methods, including drama techniques, improvisation, role-play, storytelling, reflective dialogue, embodied learning activities and collaborative meaning-making practices, serving simultaneously as both the learning content and method. We hypothesize that participation in such complex programs differentially influences creativity, creative reasoning, learning styles, cognitive flexibility, while controlling for fluid intelligence and prior creative experience. The relationship between creativity and intelligence remains debatable. A recent meta-analysis reported a weak-to-moderate association between creative achievement

and intelligence, with stronger effects observed in scientific than in artistic domains (Karwowski et al., 2021), whereas creative achievement demonstrated a stronger relationship with divergent thinking (Kim, 2008). Creative reasoning, however, involves the integration of both divergent and convergent capacities to generate solutions that are both original and effective (Jaarsveld & Lachmann, 2017). The creativity and learning styles association remains ambiguous and debated (Alkathiri et al., 2018), while creativity and cognitive flexibility show more complex relationship, e.g., improvements in creativity through training can be explained by enhanced divergent thinking, mediated by cognitive flexibility as an underlying mechanism (Ritter & Mostert, 2017).

To inform the main study, we conducted a pilot investigation with 51 undergraduate students of Andragogy (University of Belgrade), aiming to map the relationships among creativity-related constructs. Student performance/skills were assessed using a combination of standardized tests and self-report questionnaires, including: Advanced Progressive Matrices, Creative Reasoning Task, Creative Thinking Test – Drawing Production, Alternative Uses Test, Creative Achievement Questionnaire, Learning Style Inventory and the Cognitive Flexibility Scale. Preliminary results will be presented and discussed.

## A.14 Valence perception of poetic justice differs between children growing up in Germany and France

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An important carrier of cultural norms and values are fictional narratives. Conversely, reader's affective responses can provide insight into culturally shaped patterns of emotion perception and evaluation. In this context, Poetic Justice and Poetic Injustice describe narrative structures in which villains are either punished (the classic happy end) or succeed over sympathetic protagonists (omission of justice in the story). These contrasting endings provide a valuable tool to examine how individuals perceive and react to such complex social situations.

Previous research has demonstrated cross-cultural differences in norms of emotional expression between countries. For instance, Krys et al. (2021) reported lower levels of expressed emotion among participants in France for both positive and negative emotions compared to participants in Germany, a pattern supported by valence ratings of narratives in Kaakinen et al. (2022). The present study examines whether such differences already emerge in childhood.

We exposed 9-year-old children to two stories, one of which ended in Poetic Justice and the other ended in Poetic Injustice. At three

different time points in the narrative (beginning, middle, end) children indicated their emotional experience on a 5-point valence scale. Additional tests were conducted covering IQ, emotion vocabulary, and adaptive and maladaptive emotion regulation strategies. The study was carried out in public schools with a socially mixed public in Berlin, Germany (N= 44) and Montpellier, France (N=55). In line with expectations, children in Germany showed a larger differentiation in valence ratings between the two endings—evaluating Poetic Justice endings more positively and Poetic Injustice endings more negatively—than children in France.

Interpretations are discussed in the context of existing research from literature studies, comparative cultural psychology and other fields. Beyond cultural norms about emotion expression, a lack of habituation by the sample from Germany may also play a role, as it has been shown that violence is reduced in German-speaking Children's literature (Ewers, Lehnert, O'Sullivan, 2016).

## B.1 Kinematic analysis of typing : pipeline for tracking finger motion and analyzing typing styles

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Previous literature has identified that everyday typists substantially deviate from the typical touch-typing method developed when typewriters were first invented. Nonetheless, being consistent in finger-to-key mapping and using many fingers to type have been associated with high typing proficiency.

Accessing these indices of typing performance typically requires elaborate motion capture systems and analysis. Here, we present a pipeline to extract finger use during typing through kinematic analysis of finger movements from videos recorded above the keyboard when proficient (but non-professional) typists write on a regular QWERTY keyboard. The toolbox DeepLabCut (DLC) was used to train a model to track finger movements, and we developed a pipeline in Python to extract typing patterns among the typists. Data from 6 participants (3 sessions each) were analyzed. The DLC output (x and y position of each finger for each video frame) was combined with a log of the keypresses and their timestamps.

Our results show styles of typing that vary between participants but are consistent across sessions. Participants used 6 to 8 fingers ( $6.7 \pm .8$  on average) to type, with high inter-session consistency ( $SD = .1$ ). Out of the

fingers used by each participant,  $76.9 \pm 21.5$  % of them were used to type consistently the same key (range = 50 to 100%). On average, a finger was responsible for typing  $1.5 \pm 1.4$  keys, with index fingers typing more keys consistently than any other fingers (left index:  $4.3 \pm 2$  keys, right index:  $2.6 \pm 1.3$  keys); middle, ring and pinky fingers all typed less than 2 keys consistently (range:  $0.1 \pm .3$  to  $1.6 \pm 1$ ). Similar results were obtained when the DLC model was trained with videos from different participants than the participants reported here, showing good generalization of the finger tracking algorithm for this type of video recordings.

Overall, our results confirm the variability previously observed in typing styles. Even high-proficient typists did not necessarily use all their fingers, nor achieved a high finger-key consistency for all finger-to-key mappings. Future work will further test the adaptability of the pipeline to different typing situations and expertise.

## B.2

### Is thalamic sub-cortical connectivity a primary predictor of dyslexia? Examining the mediating role of auditory skills and the impact of SES

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Developmental dyslexia is a persistent neurodevelopmental disorder characterized by significant reading and spelling difficulties. While neurological research has traditionally focused on the cerebral cortex, evidences suggest that subcortical structures, specifically the thalamus, play a foundational role in dyslexia (Galaburda et al., 1983, 1994; Jednoroog et al., 2015) and its cognitive predictors, such as auditory processing (Maffei et al., 2018). Crucially, recent studies indicate that Socioeconomic Status (SES) significantly modulates both thalamic structural connectivity development (Sydnor et al., 2025) and reading outcomes (Dolean et al., 2019; Lefèvre et al., 2025). Despite these findings, the interaction between SES, subcortical structural connectivity, and reading acquisition remains largely overlooked.

Utilizing a longitudinal design, this study synthesized data from three cohorts (N = 150) following children from kindergarten to Grade 2. We examine the bilateral acoustic radiation, i.e. the tract connecting the medial geniculate nucleus (MGN) of the thalamus with Heschl's Gyrus (auditory cortex), as a tract of interest for explaining impaired auditory skills in dyslexia. Specifically, auditory skills were

assessed via amplitude rise-time sensitivity (the ability to perceive speech rhythm and onset), a crucial auditory mechanism for literacy (Law et al., 2014; 2017). To evaluate environmental influence, we utilized an SES index derived from parental education levels.

This study addresses two primary research questions:

1. How does the integrity of thalamic acoustic radiations differ in pre-readers who later develop dyslexia and those who don't?
2. Does amplitude rise-time sensitivity mediate the relationship between thalamo-cortical measures and subsequent reading proficiency, and does SES act as moderator in this pathway?

By analyzing acoustic radiation integrity, we aim to determine if subcortical connectivity is a primary predictor of dyslexia or if its impact on reading is buffered by environmental factors. This research provides a comprehensive look at how biological vulnerability and environmental context converge to shape the reading brain.

## B.3

### Effects of colored syllables in different stages of reading acquisition: evidence from eye movements and behavioral data

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Reading is a cultural technique which plays a major role in everyday life. Learning to read is crucial for knowledge acquisition, academic achievement, and active participation in society. In educational contexts, numerous methods have been proposed to support reading acquisition. One such method involves the alternate coloring of syllables within a word. Syllables have been shown to be a relevant processing unit in visual word recognition and lexical access. By visually structuring sublexical units, the coloring method is intended to support early stages of reading acquisition, especially before holistic word processing has been established.

To date, only a few studies have investigated the effects of colored syllables on reading performance and gaze behavior. While the coloring method appears to be of no effect for adult skilled readers, studies with children reported mixed results. A study with Finnish children showed no effect on reading performance, whereas research with Brazilian-Portuguese children reported a facilitatory effect of colored syllables as well as differential effects depending on individual reading ability. Studies including eye-tracking found no effect of colored syllables on gaze

behavior. However, because of differences in orthography and participants' varying stages of reading development, previous results are difficult to generalize to beginning readers of German.

To address this gap, the present study investigates the effect of colored syllables across different stages of reading acquisition. Students from all four grade levels of a German primary school (n = 114) read texts with and without colored syllables. Reading comprehension, reading accuracy, reading speed, and gaze behavior were recorded and compared using a mixed design approach.

The results indicate that colored syllables facilitate reading accuracy in the middle of first grade, but have a negative effect on reading comprehension at the end of first grade. Furthermore, analyses of eye movements reveal differences in gaze behavior depending on syllable coloring, suggesting that colored syllables might influence reading strategies during early reading acquisition.

## B.4 Speech processing in Dutch speaking pre-readers in Flanders at familial risk for dyslexia

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Spoken and written language are essential tools that enable participation in educational and broader social life. Yet acquiring literacy is not guaranteed. Approximately 7% of the population is diagnosed with developmental dyslexia (Peterson & Pennington, 2015), characterised by persistent difficulties in literacy acquisition despite adequate instruction and intelligence. Importantly, the prevalence and manifestation of dyslexia vary across languages (Ziegler et al., 2003) and cultural environments (Lachmann & Bergström, 2023), highlighting that literacy difficulties emerge within specific cultural-linguistic contexts. It is therefore important to study how dyslexia develops in various linguistic environments. Consequently, in this study, we focus on Dutch-speaking children in Flanders, allowing us to investigate how neural and phonological development unfolds within this specific cultural-linguistic climate.

Although dyslexia manifests most clearly in literacy, it is considered to have a phonological origin (Bruck, 1992). Proposed phonological deficits extend beyond low-level auditory processing to higher-order operations such as contextual integration and lexical access (Vukovic & Siegel, 2006; Wolf & Bowers, 1999). Yet, the development of these deficits remains insufficiently understood.

Neural Tracking, the brain's time-locked response to continuous speech, provides a powerful method for examining speech processing. Its sensitivity to both acoustic and linguistic processing (Broderick et al., 2018; Gillis et al., 2021) enables investigation of phonological encoding during naturalistic language exposure.

We recorded EEG while three-year-old (N = 46) and five-year-old (N = 32) children with and without familial risk for dyslexia listened to spoken stories. Acoustic processing was assessed by modelling neural responses to the speech envelope. Higher-order phonological processing was examined by studying the neural responses to phoneme surprisaland phoneme entropy (Gillis et al., 2021). Encoding models were used to derive temporal response functions (TRFs), enabling assessment of both the latency and amplitude of neural responses (Gillis et al., 2022). Analyses are ongoing, and results will be presented at the conference. These results will provide insight into speech processing in Dutch-speaking children in Flanders

## B.5 From mentalizing to society : Toward a neural account of the institutional stance

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Human social cognition is often treated as synonymous with Theory of Mind: the capacity to represent others' beliefs and desires. In a recent target article in Behavioral and Brain Sciences, Jara-Ettinger and Dunham (2026) propose a complementary and co-equal system—the institutional stance—through which humans interpret behavior in terms of culturally structured roles, norms, and rule-governed expectations. This proposal has major implications for cognitive science of culture, yet it leaves largely open how such a stance is implemented in the brain.

Here, I discuss this institutional stance from the perspective of social neuroscience, asking whether culturally scaffolded role-based reasoning relies on the same neural mechanisms as mentalizing, or whether it recruits partially distinct systems. Neuroimaging research has identified a robust and selective network supporting mental state attribution, centered on the temporo-parietal junction and medial prefrontal cortex (Schurz et al., 2014). However, many social interactions—particularly those embedded in institutions—are efficiently navigated without attributing beliefs or desires, instead relying on shared cultural knowledge about roles and norms.

I argue that the institutional stance provides a promising framework for integrating fin-

dings from neuroscience showing that social reasoning is shaped by culturally learned structures rather than solely by universal mentalistic mechanisms. Evidence from norm compliance, scripted interactions, and hierarchical role processing suggests greater involvement of lateral temporal, inferior parietal, and fronto-parietal control networks associated with semantic knowledge, rule processing, and social regularities. This pattern is consistent with the hypothesis that institutional reasoning down-regulates mentalizing in familiar cultural contexts, trading flexibility for efficiency.

Drawing on my own neuroimaging work on social inference and human-agent interaction, I outline experimental strategies to dissociate neural responses to mental states versus roles while holding observed behavior constant. Such designs allow us to test whether institutional reasoning constitutes a distinct mode of social cognition, and how it becomes culturally entrenched in the brain.

By bridging the institutional stance with neuroscience, this work contributes to a cultural cognitive science that treats institutions not merely as social constructs, but as culturally learned frameworks that shape how the brain predicts, explains, and regulates social behavior.

## B.6

### Noun bias as a fundamental strategy in language acquisition : A longitudinal study focusing on minimally verbal Assamese-speaking children diagnosed with autism.

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The six-month longitudinal research aimed to explore whether noun bias, which is well documented as a phenomenon of typical language development, i.e., young children learning nouns more easily than verbs, is similar in children with autism spectrum disorder (ASD). Although it is considered an inherent part of language acquisition, it was of interest to understand whether differences in social and communication skills would affect this pattern of learning. The research consisted of 82 minimally verbal children with ASD. The participants were recruited from four intervention centers located within the Guwahati area of Assam. All of the participants were given a clinical diagnosis of ASD, which was further validated by the Autism Diagnostic Observation Schedule (ADOS). The participants were excluded if they had other neurological impairments, hearing difficulties, or if their parents did not give consent to be part of the research. The research used a variety of tools to collect data, which included the Behavior Checklist, Childhood Autism Rating Scale (CARS), and the Receptive-Expressive Emergent Language Test (REEL), as well as observations and face-to-face interviews. The participants were given four nouns: head, tummy, pencil, and water bottle. The participants were also given four verbs: cry, arms up, jump, and sleep. The responses to the nouns and verbs were then assessed as positive and

negative. The responses of the participants were then tracked longitudinally to assess whether their understanding of vocabulary remained constant after six months.

Children with autism have a tendency to associate new words more with objects rather than actions. This study reveals that noun bias is a primary language acquisition mechanism that occurs before autism-related social difficulties and language and speech problems. In this study, it was found that noun bias occurs shortly after diagnosis and even after initial speech therapy and ABA interventions, which means that language therapy does not affect noun bias. Over a period of six months, there were no changes in the results. This study reveals that noun bias occurs independently of language therapy interventions and that it is a primary language acquisition mechanism.

## B.7

### Cultural differences in aesthetic experience : A multidimensional study of art perception in Germany and Portugal

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Understanding how individuals from different cultural backgrounds perceive and evaluate visual art is central to the psychology of aesthetics. This study presents a cross-cultural comparison between native German (n = 131) and Portuguese (n = 131) participants, who rated 101 human-made paintings from the WikiArt database in their respective native language, thematically categorized into people, objects, and places. Each artwork was evaluated across nine dimensions spanning perceptual (Aesthetic Appeal, Visual Complexity, and Concreteness), emotional (Arousal, Valence, and Felt Involvement), and cognitive (Creative Inspiration, Familiarity, and Memory Evocation) components of aesthetic experience.

Results showed significant cultural differences: German participants assigned higher ratings to Visual Complexity and Creative Inspiration, whereas Portuguese participants assigned higher ratings to Aesthetic Appeal, Valence, Felt Involvement, Concreteness, and Memory Evocation. Both groups showed comparable patterns in Arousal and Familiarity. Category-level analysis showed that place-related images received higher ratings for visual complexity and concreteness, while object-based images were associated with lower arousal and memory evocation.

Mixed factorial ANOVA confirmed main effects of Category, Country, and Dimension, as well as their interactions. Additionally, a Pearson's correlation analyses revealed strong positive associations among core evaluative dimensions, especially between Aesthetic Appeal, Valence, and Creative Inspiration, only within their own population group. No significant cross-cultural correlations were found, suggesting that while the structure of aesthetic experience is universally grounded, its relative weighting is culturally modulated.

These findings suggest that aesthetic experience relies on broadly shared perceptual and emotional associations that are preserved across German and Portuguese groups, while the relative emphasis placed on specific evaluative dimensions is modulated by cultural context. The study highlights the importance of examining intra-European cultural variability in aesthetic evaluation and provides a foundation for future cross-cultural research in empirical aesthetics.

## B.8 An exploratory study of induced expectancy, beliefs, and sustained attention performance

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Expectancy induced by narratives and shaped by belief orientations may influence sustained attentional performance, yet their effects remain underexamined within controlled experimental paradigms. This exploratory study operationalizes narrative-induced expectancy and pre-existing belief orientation as variables and both their relationship to one another and their association with variation in attentional performance are examined.

Participants ( $N \approx 45$ ) complete a baseline self-report inventory assessing their existing orientation towards perceived efficacy of traditional contemplative practices followed by baseline assessment using the Sustained Attention to Response Task (SART). Participants are then randomly assigned to one of the three, seven-day supervised exposure protocols: (1) a structured phonetic repetition practice accompanied by narrative framing derived from contemplative attentional training traditions, (2) a passive auditory exposure condition without narrative framing, or (3) a neutral control condition. The duration and scheduling of the exposure conditions are standardized.

After the exposure protocol, attentional performance is assessed using SART indices including reaction time, response variability, commission errors, and omission errors. Mixed-design analyses of variance assess whether attentional performance changes differ across experimental conditions over time, while regression models examine the relationship between baseline belief orientation and task performance metrics.

This design examines whether sustained attentional performance changes as a function of induced expectancy, belief orientation, or their interaction, providing an empirical basis for further investigation into how belief-driven expectancy, rather than intrinsic characteristics of the repetition practice itself, may have shaped sustained attentional performance

## B.9 Graphomotor preferences : Cultural or biomechanical determinants of directional biases ?

**Gaelle Alhaddad<sup>1</sup>, Marieke Longcamp<sup>1</sup>, Jyotsna Vaid<sup>2</sup>**

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Directional and rotational preferences in handwriting are commonly attributed either to biomechanical constraints of the motor system, such as handedness, or to constraints imposed by the directional and rotational features of the writing system in which individuals learn to read and write. No study to date has attempted to identify the relative importance of each of these constraints.

Across two complementary studies, we tested whether preferential directionality in graphic movements is primarily determined by biological predispositions or by the predominant directional structure of writing systems practiced.

Participants performed a loop-tracing task indexing graphomotor coordination dynamics through relative phase (RP), coordination stability (RP standard deviation), movement frequency, and loop slant, where they traced loops from left to right and left to right.

Study 1 focused on script constraints. We compared simultaneous and consecutive biscriptuals (participants who write in two different graphical systems), who differed in age of acquisition and current exposure to Arabic (written from right to left) and Latin-based scripts (written from left to right), including individuals residing in balanced biscriptual

environments and expatriates immersed in predominantly Latin-script contexts. Main effects and interactions indicated that age of acquisition significantly influenced movement frequency and coordination stability, while current exposure modulated the relative phase. Left-to-right directional preferences were observed across groups, but they were not systematically altered by exposure or acquisition factors.

Study 2 examined left- and right-handed adults to specifically assess the contribution of biomechanical constraints. In contrast to the first study, handedness did not significantly alter directional or rotational preferences.

These findings indicate that neither biomechanical predispositions nor script directionality alone account for preferential directional behavior. Instead, directional preferences are primarily shaped by ongoing exposure and continued practice of a given script and its inherent directional structure. Indeed, prolonged practice and immersion play the most central role in shaping the stability, speed, and orientation of graphomotor patterns.

## B.10 Do subtitles always «steal the show»? Language familiarity and social status modulate subtitle viewing

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Subtitles help access audiovisual content across languages (Gernsbacher, 2015). Although subtitles have been characterized as “attentional magnets” (D’Ydewalle & De Bruycker, 2007), an open question is the extent to which this pattern is modulated by script/orthographic familiarity and language status (Mohanty, 2010). We examined this issue in three eye-tracking experiments with instructional videos (Mayer et al., 2020). In Experiment 1, monolingual English speakers viewed videos with subtitles in English, Spanish, or Hindi. Results showed longer subtitle viewing times for English, followed by Spanish (Latin script), and then Hindi (Devanagari script). In Experiment 2 (monolingual English speakers), all videos also had English audio, and subtitles were either English or two Latin-script artificial languages, one containing cognate-like forms with English. Viewers looked more at English subtitles than at the artificial languages, with no difference between the two artificial languages. In Experiment 3, Hindi–English bilingual university students who had recently moved to the UK viewed three subtitled instructional videos:

two intralingual (Hindi audio/Hindi subtitles; English audio/English subtitles) and one interlingual (English audio/Hindi subtitles). Participants looked most at subtitles in the English–English condition, followed by Hindi–Hindi, and least in the English–audio/Hindi–subtitle condition. Taken together, these findings demonstrate that subtitle engagement is shaped by both script familiarity and language status.

## B.11 Can teaching overcome the opacity of the information transmitted in a micro-society paradigm?

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Human cultures show a high degree of opacity and complexity unmatched in any other species<sup>1</sup>, with an accumulation of complexity between generations<sup>2</sup>. Some cultural artifacts (such as tools) rest upon complex and abstract physical principles. While reverse engineering have been shown to be sufficient to allow the transmission of physical principles understanding<sup>3</sup>, little is known about the transmission of understanding when the information is highly opaque. Teaching, a behaviour that evolved to facilitate learning in others<sup>4</sup>, could compensate for this opacity and allow the transmission of physical principles understanding.

With a micro-society paradigm, we simulated the acquisition and transmission of physical principle understanding. We submitted the participants to a problem solving task, in which they were asked to find the solution to maximise the hydrostatic pressure in a combination of pipes. The hydrostatic pressure is determined by Pascal’s law, which states that the pressure only depends on the height of the fluid column.

We compared two transmission conditions : reverse engineering and teaching. Reverse engineering is the transmission of solutions, without any direct contact between participants. Teaching is operationalized as a free

exchange between a participant who took the task, and a participant new to the task. We also compared two types of information available : poor - a relative comparison between different solutions - and absolute - with a precise measurement of the pressure for each solution. We measured both performance to the task - the ability to produce efficient solutions - and the understanding of the underlying physical principle. We hypothesized that teaching would outperform reverse engineering in both informational conditions for both performance and understanding, but especially when the information is absolute. However, while we demonstrated an accumulation effect along chains of participants, teaching did not seem to allow a better understanding of the underlying physical principle. This questions the assumption that teaching suffice to overcome the opacity of information when it come to the abstract understanding of a physical principle.

## B.12 Spatial ability and Chinese language : is there a link ?

**Maksim Likhonov**

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Spatial ability (SA) involves manipulating visuo-spatial information and is fundamental for many cognitive processes, including mathematics, memory and language learning. In my talk I will present results of the two studies on the links between Chinese language and SA.

The first exploratory study aimed to explore the factorial structure of SA and country-level differences in samples of 921 Russian and 229 Chinese university students. A gamified spatial abilities battery which consisted of 10 tasks tapping into different facets of SA was administered to all participants. The results of the factor analysis showed a somewhat different pattern for different samples. In the Russian sample, the unifactorial structure, shown previously in a large UK sample (Rimfeld et al., 2017), was replicated. A single factor explained 40% of the variance. However, in the Chinese sample two factors emerged: the first factor explained 26% of the variance and the second factor, including only mechanical reasoning and cross-sections tests, explained 14%. The results also showed that the Chinese sample significantly outperformed the Russian sample in five out of the 10 tests. Russian students showed better performance in only two of the tests. Chinese advantage in SA was discussed in the framework of differences in educational systems and language systems.

The second study investigated whether SA might be improved via learning character-based language - Chinese as a second language (CSL). The study employed a sample of Russian schoolchildren (N= 283), who learnt: English only, English and Spanish; or English and Chinese from Year 2 to Year 7. Participants completed Raven's progressive matrices and Mental rotation task at the age of 8 and again at the age of 14. Our data showed negligible group differences in the initial SA level at Year 2 (before learning second language). Similar negligible differences were found at Year 7. Regression analysis showed that SA was predicted by intelligence (Raven's) and gender but not language learnt at both ages. The findings are discussed in the framework of length, intensity and context of learning as moderators of the effect. Prospects for future research will also be discussed during this talk.





With more than 80,000 students across five major campuses, **Aix Marseille Université** is the largest university in France. Located at the heart of the Mediterranean region and spanning ten cities, from the Southern Alps to the Mediterranean coastline, the University benefits from an exceptional environment that fosters openness, experimentation, and innovation. Structured around four academic departments and encompassing seven faculties, four schools, and six institutes, AMU offers over 1,000 degree programs across five broad fields of study: Arts, Humanities and Languages; Social Sciences; Law, Economics and Management; Health; and Science and Technology.

As a leading research-intensive institution, Aix Marseille Université collaborates closely with major national research organizations such as CNRS, Inserm, IRD, and CEA. Its strong commitment to interdisciplinary research has earned it international recognition, including a position among the top 100 universities worldwide in interdisciplinary sciences in the 2025 Times Higher Education rankings. Ranked between 101st and 150th globally in the 2024 Academic Ranking of World Universities (Shanghai Ranking), AMU stands out particu-

larly in physics, oceanography, mathematics, and public health. The University's Initiative of Excellence (IdEx) label has further strengthened its global visibility and capacity for innovation in research and education.

Deeply rooted in its territory yet firmly oriented toward the world, Aix Marseille Université actively contributes to economic and social development through partnerships with industry, support for entrepreneurship, and the creation of start-ups stemming from its laboratories. As the coordinating institution of the European University Alliance CIVIS, AMU is part of an inter-university campus bringing together 500,000 students and 80,000 staff members across Europe and Africa. Welcoming more than 12,000 international students and maintaining partnerships with over 680 institutions in 97 countries, the University embodies a model of cooperation, inclusion, and innovation. Through its commitment to equality, sustainability, open science, and societal engagement, Aix Marseille Université strives not only to advance knowledge, but also to shape a more responsible and forward-looking society.



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## The Institute of Language, Communication and the Brain (ILCB) : An interdisciplinary research institute on language and communication



**The Institute of Language, Communication and the Brain (ILCB)** is an interdisciplinary research institute dedicated to understanding the cerebral and cognitive bases of language and communication. Its central objective is to explain language as a dynamic and complex system, integrating insights from neuroscience, linguistics, psychology, mathematics, computer science, ethology, and medicine. Through experimentally grounded theoretical frameworks, ILCB aims to bridge multiple levels of analysis—from neural mechanisms to behavior, development, and evolution.

The institute brings together 11 research units across Aix-Marseille University and CNRS, and operates through a highly integrated research infrastructure that includes six experimental platforms. ILCB members have privileged access to a comprehensive set of experimental facilities, including neuroimaging platforms (MRI, MEG, EEG, NIRS), transcranial magnetic stimulation (TMS), virtual reality environments, primatology facilities, speech analysis laboratories, and advanced computational resources. These infrastructures are supported by the Experimentation Resource Centre, a multidisciplinary team of engineers specializing in neuroimaging, electrophysiology, eye-tracking, human-machine interfaces, statistics, and machine learning. Together, these resources enable the development of ambitious interdisciplinary projects combining experimental, computational, and theoretical approaches.

ILCB's activities are organized around four major research priorities :

- **Evolution and development of language** : origins of language and communication across species and across the lifespan
- **Dynamics of Language and Communication** : synchronisation and coordination processes from speech perception to conversation
- **Computational modelling and complex systems** : mathematical and computational approaches to the dynamics of language and communication
- **Language and communication disorders** : diagnostic tools, remediation methods, and interventions for education and health

In addition to its research mission, ILCB contributes to the training of the next generation of scientists through an interdisciplinary Master's programme in Cognitive Science, a PhD training programme, and international summer schools. By combining cutting-edge infrastructures, interdisciplinary collaborations, and advanced training, ILCB aims to advance fundamental knowledge on language and communication while fostering applications in health, technology, and education.

## The Ampiric Pilot Centre: an interdisciplinary research program to improve foundational learning in France



**AMPIRIC (Aix-Marseille – Pôle d'Innovation, de Recherche, d'Enseignement pour l'Éducation)** is one of three nationally funded so-called « pilot centres » in France designed to foster innovation in teacher education and empirical research on learning. Its central objective is to enhance the teaching and acquisition of foundational skills—particularly literacy and numeracy—across the school continuum. Anchored in interdisciplinary and evidence-based approaches, AMPIRIC promotes the development of rigorous research, to support both pre-service and in-service teacher training, and the co-construction of effective pedagogical interventions.

The programme brings together 25 research laboratories across Aix-Marseille University, CNRS, Université Côte d'Azur, and Avignon University. It operates in close collaboration with school communities in the Région Sud and with key stakeholders at both local and regional levels of the French education system. This integrated structure enables a productive interface between academic research, teacher training, and classroom practice, fostering iterative cycles of knowledge production, transfer, and implementation.

AMPIRIC's activities are organized around five strategic priorities :

- Improving teacher training and pedagogical practices
- Enhancing researcher - practitioner partnerships
- Advancing research on the cognitive and didactic underpinnings of foundational learning
- Co-developing digital tools and innovative pedagogies
- Disseminating research-informed practices, tools and resources at scale

As a national pilot, AMPIRIC aims to contribute to systemic educational improvement through scalable, research-informed innovations, while also advancing theoretical and methodological frameworks within the field of educational sciences



## A BRIEF HISTORY OF AIX-EN-PROVENCE

Founded in 122 BC by the Roman consul Sextius Calvinus, Aix-en-Provence, then known as Aquae Sextiae, owes its origins to water. Built around natural thermal springs, the city quickly became a prosperous Roman settlement, traces of which can still be discovered in its ancient foundations and archaeological remains. During the Middle Ages, Aix rose to prominence as the capital of Provence, notably under the reign of the Counts of Provence in the 12th and 13th centuries. In the 15th century, King René of Anjou transformed the city into a vibrant cultural and artistic center, fostering a refined courtly life that shaped its identity for centuries to come.

From the 17th century onward, Aix flourished as a parliamentary and aristocratic city. The construction of elegant mansions and the creation of the Cours Mirabeau, today its most emblematic avenue, gave the city its distinctive architectural character. Fountains, private townhouses, and shaded squares reflected both prosperity and a deep attachment to art de vivre. In the 19th century, Aix continued to cultivate its intellectual and artistic reputation, becoming closely associated with the painter Paul Cézanne, who was born there and immortalized the landscapes of the nearby Montagne Sainte-Victoire. His legacy remains deeply embedded in the city's cultural heritage.

Today, Aix-en-Provence harmoniously blends historical heritage with contemporary vibrancy. A city of art and culture, it hosts internationally renowned events such as the Festival d'Aix-en-Provence, attracting artists and audiences from around the world. Its lively markets, elegant boutiques, and café terraces perpetuate a Mediterranean way of life rooted in conviviality and refinement. Regularly ranked among France's most desirable places to live, Aix-en-Provence combines a rich historical past, architectural beauty, academic excellence, and an exceptional quality of life under the sun

Architecture Aix-en-Provence



## THE SOCIETY FOR THE COGNITIVE SCIENCE OF CULTURE (SCSC)



Traditional cognitive science has largely ignored cultural influences on cognition and has also predominantly concentrated on a group of people who are not particularly representative of the world's population as a whole. Yet, today, we have an increasing amount of empirical and theoretical work that emphasizes cultural and social influences on mind and brain, including through bodily modulations. An increasing number of researchers believe that cognitive science cannot ignore culture as a crucial factor impacting mental processes and brain functioning. A focus on individuals and their experiences in cultural environments has become more and more important. This approach has emerged in all fields that have been associated with cognitive science, from neuroscience to philosophy of mind.

It is indispensable to look at different cultures and diverse participant populations to understand what kind of findings from the mostly Western research body generalize (or not) to diverse populations and across cultures. Important questions are, for example, how cultural inventions like written words, numbers, music, and belief systems shape the mind and brain from the beginning of our lives and how exposure to cultural objects can shape the mind and brain during the

lifespan. We welcome contributions from all these fields of research. The society aims to encourage discussion of the latest developments in the cognitive science of culture, to provide a platform for exchanging ideas, and a network to foster collaborations among interested researchers. We particularly encourage research involving non-WEIRD participant populations. We want to understand the human mind (and not just the minds of Western undergraduates) and how cultural objects (e.g., literacy; religion), including those within culture at the macro-level, can shape the human brain and mind. We especially encourage participation by researchers from all parts of the world. Another important aim of the society is public outreach, for instance, to promote the application of research findings for the greater good of humanity.

Join the society, visit the web site



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The journal covers major topics related to cognition, culture, and the brain as well as the interface of those broad subjects, publishing articles that probe cognitive processes such as attention, perception, language, memory, and decision making as well as current trends in anthropology, education, and artificial intelligence. Emphasis is placed on the cognitive prerequisites and consequences of bi-, tri- and multilingualism in different cultures; literacy; poverty; socioeconomic status; and culture on cognition. The coverage encompasses all major research areas of cognitive science, including Psychology, Cognitive neuroscience, Linguistics, Computational modeling, Anthropology, Education, Evolutionary/genetic approaches, Philosophy of mind, Artificial intelligence and more. International in scope, the journal presents research articles that seek rigorous answers to its core themes and thought-provoking theoretical articles that challenge prevailing views and explore new directions.

The journal is associated with the Society for the Cognitive Science of Culture







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