



Associazione  
Italiana  
di Psicologia



**SEPNECA**

**SEPEX – SEPNECA – AIP experimental**

**Madrid 2018**

July 3-6, UNED, Madrid

Joint Conference



**Sponsors**





## **First Joint Congress of the SEPEX, SEPNECA and AIP experimental**

XII Congress of the Sociedad Española de Psicología Experimental (SEPEX)  
XI Congress of the Sociedad Española de Psicofisiología y Neurociencia Cognitiva y Afectiva  
(SEPNECA)  
XXIV Congress of the Sezione Sperimentale - Associazione Italiana di Psicologia (AIP  
experimental)

Dear Colleagues and Friends,

We are delighted to welcome you to Madrid, Spain, for the First Joint Congress of SEPEX-SEPNECA-AIP. This is the XII Congreso de la Sociedad Española de Psicología Experimental (SEPEX), the XI Congreso de la Sociedad Española de Psicofisiología y Neurociencia Cognitiva y Afectiva (SEPNECA) and the XXIV Congresso della Sezione Sperimentale - Associazione Italiana di Psicologia (AIP experimental).

The Congress will be held at the Facultad de Psicología and Facultad de Educación, Universidad Nacional de Educación a Distancia, Juan del Rosal 10 and 14, 28040 Madrid. We are looking forward to a vibrant Meeting organized by three Scientific Societies SEPEX, SEPNECA and AIP. The First Joint Meeting of these three Scientific Societies will take place in Madrid (Spain), 3- 6 July 2018.

This Congress will joint researchers and students from different areas of Psychology and Neurosciences. The main objective is to advance and update the knowledge on behavior and cognition, considering its physiological correlates and neural bases.

This Joint Meeting boasts the active participation of psychologists and neuroscientists who are interested in expanding out our understanding of behavior, cognition and its neural underpinnings. The diversity of the participants in this Meeting will allow interesting scientific discussions among researchers from different areas, including Psychophysiology, Experimental Psychology, Cognitive and Affective Neuroscience, among others. This Meeting is composed of Invited Conferences from recognized international researchers, Symposia, Oral Communications and Posters. The Scientific and Organizer Committees invite you to present the results of your research in this Meeting.

On behalf of SEPEX, SEPNECA and IAP experimental we wish you an enjoyable, fruitful and very satisfying Conference and a wonderful stay in Madrid. We hope to see you in Madrid in July, 2018!

The Organizing Committee

## **SCIENTIFIC COMMITTEE**

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## **KEYNOTE SPEAKERS**

**Marisa Carrasco**, New York University, USA  
**Pascal Fries**, Ernst Strüngmann Institute, The Netherlands  
**Helena Matute**, Deusto University, Spain  
**Carlo Miniussi**, University of Trento, Italy

## **CONGRESS INFORMATION**

### **Venue**

Facultad de Psicología, UNED, Madrid (Spain)  
Juan del Rosal, 10  
28040, Madrid  
<https://sepsepssa18.wixsite.com/madrid18>

All the Spoken Sessions of the Congress will take place at the Salón de Actos of the Facultad de Psicología, Salón de Actos de la Facultad de Educación and Salón de Grados de la Facultad de Educación de la UNED (Juan del Rosal, 10 & 14).

## **CONGRESS SECRETARIAT**

### **Fundación UNED**

Guzmán el Bueno, 133 - Edificio Germania, 1ª planta  
28003 Madrid (España)  
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## **SOCIAL ACTIVITIES**

### **Welcome Reception**

Date: Tuesday, 3<sup>rd</sup> July  
Place: Congress venue, Facultad de Psicología, UNED  
Time: 19:00h to 21:30h  
Free for Congress participants

### **Conference Dinner**

Date: Wednesday, 4<sup>th</sup> July  
Place: Restaurante Colonial Norte  
Time: 21:30h

### **Coffee Breaks and Lunch**

Coffee will be available at the Poster Sessions in the Poster Area.  
Lunch will be available on the 4<sup>th</sup> and 5<sup>th</sup> July from 14:00 h to 15:00 h.

## **POSTER SESSIONS**

All posters will take place at the Hall of the Facultad de Psicología (UNED):

**Poster Session 1:** Wednesday, 4<sup>th</sup> July, 10:00 h – 11:00 h.

**Poster Session 2:** Wednesday, 4<sup>th</sup> July, 17:30 h – 19:00 h.

**Poster Session 3:** Thursday, 5<sup>th</sup> July, 10:30 h – 11:30 h.

**Poster Session 4:** Thursday, 5<sup>th</sup> July, 17:30 h – 19:00 h.

## **GENERAL ASSEMBLIES OF THE SOCIETIES**

Thursday 5<sup>th</sup> July, 19:00 h -20:00 h.

**SEPEX:** Salón de Actos, Psychology

**SEPNECA:** Salón de Actos, Education

**AIP experimental:** Salón de Grados, Education

## **INFORMATION FOR PRESENTERS**

### **Symposia**

Each presenter will have 15 minutes for their presentation plus 5 minutes for questions. Some discussion additional time at the end of the presentations is recommended. Symposia organizers should provide instructions to presenters.

### **Spoken Presentations at Thematic Sessions**

Each presenter will have 12-15 minutes, including 3 more minutes for short questions. We kindly asked the first presenter act as Session Chair and to quip the timing. Person chairing sessions will be asked to keep the talks scheduled on time.

### **Poster Presentations**

Poster Sessions will be held in the Psychology Lobby. Each presenter will place and remove their poster at the end of the actual poster session. PLEASE DO NOT LEAVE your poster behind the end of your session.

### **Audiovisual Equipment for talks**

LCD projectors for PowerPoint presentations will be provided in the three rooms where spoken sessions are scheduled.

## **INVITED SPEAKERS**

**SEPNECA CONFERENCE (Salón de Actos, Education), Wednesday, 9:00 -10:00h**

**Rhythms for Cognition: Communication through Coherence**

*Pascal Fries, Ernst Strüngmann Institute, The Netherlands*

**PÍO TUDELA CONFERENCE (Salón de Actos, Education) Wednesday, 19:00-20:00**

**The Illusion of causality**

*Helena Matute, Universidad de Deusto, Spain*

**AIP EXPERIMENTAL CONFERENCE (Salón de Actos, Education) Thursday, 11:30-12:30**

**Transcranial magnetic stimulation and electroencephalography in the exploration of cortical connectivity**

*Carlo Miniussi, Trento University, Italy*

**SEPEX CONFERENCE (Salón de Actos, Education) Friday, 12:00-13:00**

**Dissociating Covert Attention and Presaccadic Attention**

*Marisa Carrasco, New York University, USA*

## **SYMPOSIA**

### **Symposium 1: Disorders of consciousness (DoC): An electrophysiological proposal to improve diagnosis, prognosis and treatment effects assessment.**

*Organizer: Alejandro Galvao-Carmona, Luis Morales, Bárbara Postigo-Alonso, Roberto Llorens & the DOCMA Group*

Wednesday, 11:00-12:30h (Salón de Actos Psicología)

### **Symposium 2: Grasping numbers: Is it really all about the senses? New insights from language**

*Organizer: Luca Rinaldi*

Wednesday, 12:30-14:00h (Salón de Actos Psicología)

### **Symposium 3: Cognitive control: Two control modes or three orthogonal dimensions?**

*Organizers: Carlos Conzález-García & Javier Ortiz-Tudela*

Wednesday, 12:30-14:00h (Salón de Grados Educación)

### **Symposium 4: Music to boost the brain: from perception to cognition**

*Organizer: Lucía Vaquero Zamora, Clément François & Laura Ferreri*

Wednesday, 15:00-16:00h (Salón de Actos Educación)

### **Symposium 5: Nuevas técnicas para el estudio de la conectividad funcional y aplicaciones**

*Organizers: Miguel A. Muñoz y Pedro Montoya*

Wednesday, 16:00-17:30h (Salón de Actos Psicología)

### **Symposium 6: Current evidence on tDCS research: from cognition to exercise performance**

*Organizer: Daniel Sanabria*

Thursday, 9:00-10:30h (Salón de Actos Psicología)

### **Symposium 7: Suppression of irrelevant information in different memory systems and its neural underpinnings in shaping stable memory representation**

*Organizer: Stephan Moratti*

Thursday, 9:00-10:30h (Salón de Grados Educación)

### **Symposium 8: The impact of attention at different stages of memory processing: From iconic to long-term memory representation.**

*Organizers: Valerio Santangelo & Fabiano Botta*

Thursday, 12:30-14:00h (Salón de Actos Psicología)

### **Symposium 9: Neuro-empowerment approach and new technologies**

*Organizers: Michela Balconi & Sara Invitto*

Thursday, 16:00-17:30h (Salón de Actos Psicología)

### **Symposium 10: The embodied nature of virtual reality**

*Organizers: Claudia Repetto and Silvia Serino*

Friday, 10:00-11:30h (Salón de Actos Psicología)

# **INVITED SPEAKERS**



## INVITED SPEAKERS

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Wednesday, 4<sup>th</sup> July 2018

### SEPNECA CONFERENCE

9:00 - 10:00, Salón de Actos de Educación

**Pascal Fries**

*Ernst Strüngmann Institute*

### RHYTHMS FOR COGNITION: COMMUNICATION THROUGH COHERENCE

I will show that free viewing of natural images induces gamma-band oscillations in early visual cortex. If the gamma rhythm in a lower visual area entrains a gamma rhythm in a higher visual area, this might establish an effective communication protocol: The lower area sends a representation of the visual stimulus rhythmically, and the higher area is most excitable precisely when this representation arrives. At other times, the higher area is inhibited, which excludes competing stimuli. I refer to this scenario as the Communication-through-Coherence (CTC) hypothesis. I will show that the gamma rhythm in awake macaque V4 modulates the gain of synaptic inputs. These gain modulation effects would be ideal to lend enhanced effective connectivity to attended stimuli. I will show that this is indeed the case between macaque V1 and V4. When two visual stimuli induce two local gamma rhythms in V1, only the one induced by the attended stimulus entrains V4. I will then investigate how these changes in gamma synchronization between visual areas are controlled by influences from parietal cortex. I will show that posterior parietal cortex influences visual areas primarily via beta-band synchronization. I will show that generally, beta-band influences are stronger in the top-down direction, while gamma-band influences are stronger in the bottom-up direction. This holds across macaques and human subjects, and in both species it allows building a hierarchy of visual areas based on the directed influences. Finally, I will show that attentional selection occurs at a theta rhythm. When two objects are monitored simultaneously, attentional benefits alternate at 4 Hz, consistent with an 8 Hz sampling rhythm, sampling them in alternation.

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### PÍO TUDELA CONFERENCE

19:00 - 20:00, Salón de Actos de Educación

**Helena Matute**

*Universidad de Deusto, Spain*

### THE ILLUSION OF CAUSALITY

Illusions of causality occur when we believe that there is a causal relationship between two events, which are actually uncorrelated. These illusions bias our everyday decisions, sometimes with disastrous consequences. I will review experiments on how cause-effect relationships are learned and will show how this process leads to both accurate and illusory patterns of causal detection. Evidence-based strategies on how to reduce these biases will also be presented.

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Thursday, 5<sup>th</sup> July 2018

### AIP EXPERIMENTAL CONFERENCE

11:30 - 12:30, Salón de Actos de Educación

**Carlo Miniussi**

*Center for Mind/Brain Sciences, Trento University*

### TRANSCRANIAL MAGNETIC STIMULATION AND ELECTROENCEPHALOGRAPHY IN THE EXPLORATION OF CORTICAL CONNECTIVITY

Recent developments in neuroscience have emphasised the importance of integrated distributed networks of brain areas for successful cognitive functioning. Neuroimaging studies adopting analyses from the graph field of mathematics have shown that the brain architecture has a modular organisation in which segregated networks supporting specialised processing are linked through a few long-range connections, ensuring processing integration. Although such architecture is structurally stable, it appears to be flexible in its functioning, enabling long-range connections to regulate the information flow and facilitate communication among the relevant modules, depending on the contingent cognitive demands. Importantly, much of the current understanding of the brain architecture relies on measures of structural connectivity, reflecting anatomical connections, and of

## INVITED SPEAKERS

functional connectivity, reflecting the temporal correlations between cortical activity. These measures cannot fully explain the causal dynamics of connectivity and their relationship with cognition.

The aim of this presentation is to highlight an emerging distinctive approach based on the direct activation of an area by transcranial magnetic stimulation (TMS) and the simultaneous evaluation of the distribution of this activity in cortical networks by electrophysiological recordings (EEG). By presenting TMS-EEG studies on network dynamics at rest and during cognition, it will be showed how TMS-EEG data support the general principles of brain architecture inferred from graph theory and provide further insights into the properties of the functional connectome.

spatial frequency information at the upcoming saccade location. Moreover, this frequency shift takes place automatically even when it is detrimental to the task at hand. These modulations are time-locked to saccade onset, peaking right before the eyes move. We propose that saccade preparation may support transaccadic integration by reshaping the representation of the saccade target to be more fovea-like just before saccade onset.

Third and last, I will discuss similarities and differences among covert–endogenous and exogenous–attention and presaccadic attention, with regard to their temporal dynamics, gain and tuning properties. Systematically investigating their common and differential characteristics will further our understanding of the pervasive selective processing of information, which enables us to make sense of our complex visual world.

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**Friday, 6<sup>th</sup> July 2018**

### **SEPEX CONFERENCE**

**12:00 - 13:00, Salón de Actos de Educación**

***Marisa Carrasco***

*New York University, USA*

### **DISSOCIATING COVERT ATTENTION AND PRESACCADIC ATTENTION**

Visual attention is essential for visual perception. Spatial attention allows us to grant priority in processing and selectively process information at a given location. In this talk, I will compare and contrast two kinds of spatial attention: covert (allocated to the target location, without accompanying eye movements) and presaccadic (allocated to the location of the upcoming saccade's target).

First, I will highlight some research on endogenous (voluntary) and exogenous (involuntary) covert spatial attention, which has shown to alter performance and appearance in many basic visual tasks mediated by contrast sensitivity and spatial resolution. I will present a recent study in which we have found that covert attention modulates performance even at the center of gaze without any accompanying eye movements.

Second, I will review studies in which we have shown that presaccadic attention improves performance and increases perceived contrast at the saccade target location. Critically, these modulations change the processing of feature information. Saccade preparation narrows orientation tuning and enhances the gain of high

# **SYMPOSIA**

Wednesday, 4<sup>th</sup> July 2018

**SYMPOSIUM 1**

**11:00 - 12:30, Salón Actos Psychology**

**DISORDERS OF CONSCIOUSNESS: AN ELECTROPHYSIOLOGICAL PROPOSAL**

*Organizer: Alejandro Galvao-Carmona (Universidad Loyola Andalucía, Sevilla), L. Morales (Universidad Loyola Andalucía, Sevilla) B. Postigo-Alonso (Universidad Loyola Andalucía, Sevilla), R. Llorens (Universitat Politècnica de València) & DOCMA Group*

Disorders of Consciousness (DoC) after a brain injury represent a neurological challenge from the diagnostic, prognostic and therapeutic point of view. Over the years, the definition of different clinical states, the development of standardized clinical tools for diagnosis, and the study of the neurophysiological correlates of these alterations have led to a paradigm shift in the treatment of these patients. In this symposium, different electrophysiological tools will be suggested to improve diagnosis and prognosis detection of this clinical population, as well as possible treatment effects regarding non-invasive brain stimulation techniques applied. In the first talk of this symposium, attendees will learn to clinically identify DoC, as well as their neurobiological correlates. In addition, updated information about recovery prognostic models and new therapeutic tools applied to this clinical population will be presented. Special emphasis on clinical practice and from the point of view of neuropsychology will be pointed out. In the second talk, Event Related Desynchronization (ERD) and Event Related Synchronization (ERS) analysis will be presented as a proposal for the assessment of motor control processes via motor imagery in patients with DoC. Evidence concerning motor imagery and time-frequency analysis of patients with DoC will be discussed in view of the technique shown in a previous empirical study with Healthy Controls, which leads to a proposal for the cognitive assessment of these patients with this techniques. In the third talk, a 4-month follow-up single case study assessing Cognitive Evoked Potentials associated with a Transcranial Direct Current Stimulation (tDCS) intervention in a minimally conscious state patient will be presented. EEG-based measurements associated with neurophysiological changes after the intervention will be discussed. The use

of this technique to assess tDCS-related improvements in attention resource allocation (reflected by the P300 amplitude) in this clinical population will be debated. Lastly, in the fourth talk, a proposal regarding preliminary data from a protocol study that evaluates the potential effects of music on cerebral processing in patients with DoC and healthy subjects will be shown. Preliminary results will be discussed in terms of the beneficial effects of music on cognition in the context of an overall cortical arousal related to attentional and emotional processes. Finally, a debate regarding diagnosis, prognosis and non-invasive brain stimulation treatment in this clinical population will be suggested.

**Disorders of consciousness: definition, diagnosis and prognosis. The DoCMA project.**

*R. Llorens, M O'Valle, J Ferri, & E Noé  
Universitat Politècnica de València*

The DoCMA project Abstract: Disorders of consciousness after a brain injury represent a neurological challenge from the diagnostic, prognostic and therapeutic point of view. Over the years, the definition of different clinical states, the development of standardized clinical tools for diagnosis, and the study of the neurophysiological correlates of these alterations have led to a paradigm shift in the treatment of these patients. In this talk, attendees will learn to clinically identify altered states of consciousness, as well as their neurobiological correlate. Likewise, they will receive updated information on the recovery prognostic models, as well as existing therapeutic tools, with special emphasis on clinical practice and from the point of view of neuropsychology.

**ERD and ERS Analysis In Healthy Controls. Towards An Evaluation of Motor Control In DoC Patients**

*B. Postigo-Alonso, M. Hofmann, A A. Kühn, & W.J. Neumann  
Universidad Loyola Andalucía, Sevilla*

This presentation aims to make a proposal for the assessment of motor control processes via motor imagery in patients with disorders of consciousness (DoC). For this purpose, an empirical study on healthy subjects will be presented, followed by a brief review of the evidence in DoC. In the empirical study, 20 right-handed healthy adults were assessed with 64-channel EEG while performing a visuomotor task consisting on navigating as fast as possible on a digitizing tablet to

## SYMPOSIA

reach a target circle shown on the screen with a pen, whose axes representation was equal (automatic mode) or inverted (controlled mode). The time-frequency analysis of source extracted activity from regions of interest (M1L, M1R, SMA, pre-SMA) showed a modulation in the beta ERD before actual movement only in the SMA during the controlled versus the automatic condition, which would reflect its implication in the cognitive control of motor processes. Accordingly, it has been shown that the same brain regions are activated during motor imagery and actual motor performance, where the SMA would play an important role in both by being involved in the programming of movements. Evidence concerning motor imagery and time-frequency analysis of patients with DoC will be discussed in view of the technique shown in the empirical study, which leads to our proposal for the cognitive assessment of these patients.

### **Cognitive evoked potentials associated with a transcranial Direct Current Stimulation intervention in a Minimally Conscious State patient: a 4-month follow-up single case study.**

A. Galvao-Carmona, M. O'Valle, B Postigo-Alonso;  
A. Villalba, M. López-Martín, R. Llorens, J. Ferri & E. Noé

*Universidad Loyola Andalucía, Sevilla*

**Objectives:** To determine the neurophysiological effects of a tDCS intervention (20 sessions, 5 per week, for 4 weeks) in a MCS patient using the Coma Recovery Scale-Revised (CRS-R) score and P3 event-related potentials (ERP) during a 4-month follow-up assessment protocol. **Methods:** The neurophysiological condition of a MCS patient was assessed during a 4-month period, before and 1, 2, 4, 8 and 16 weeks after the tDCS intervention. Assessment included the CRS-R and electroencephalogram (EEG) recording. EEG was recorded from 32 scalp electrodes during the performance of a sustained and selective auditory attention task (oddball paradigm). The latency and amplitude values of the P3 ERP component were calculated. **Results:** CRS-R score did not show any improvement. However, P3 amplitude values showed an increase in weeks 2 and 4 post-treatment (+ 2.84 uV), and a decrease in weeks 8 and 16. **Conclusions:** Although no behavioral changes were detected, EEG-based measurements evidenced neurophysiological changes after the intervention, which could support the use of this technique to assess tDCS-related improvements in attention resource allocation (reflected by the P300 amplitude).

### **Boosting cognition with music: Auditory, semantic and emotional oddball in patients with disorders of consciousness**

L. Morales, A. Galvao-Carmona, A. Tajadura, B. Postigo-Alonso & J. Morales.

*Universidad Loyola Andalucía, Sevilla*

Numerous studies have shown that music exposure conveys beneficial cognitive effects, both for normal and pathological cerebral functioning. We present preliminary data from a protocol study that evaluates the potential effects of music on cerebral processing in patients with disorders of consciousness and healthy subjects. To this aim, we measured the P300 event-related potential -an index of discriminative processing to salient information- in patients and healthy controls that were exposed to several musical pieces. P300 component was measured using an oddball paradigm, in which subjects were presented with a sequence of rare (20%) task-relevant target stimuli embedded randomly on a background of frequent (80%) standard stimuli. We evaluated three different processing levels in this task, so that standards and targets differed by physical, semantic or emotional features. Along the experiment, subjects were exposed to several musical excerpts during 2-minute periods between blocks and tasks. Preliminary results are discussed in terms of the beneficial effects of music on cognition in the context of an overall cortical arousal related to attentional and emotional processes.

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## SYMPOSIUM 2

**12:30 - 14:00, Salón Actos Psychology**

### **GRASPING NUMBERS**

*Organizer: Luca Rinaldi (University of Milano-Bicocca, Italy)*

The human capacity for symbolic number and arithmetic is thought to be rooted in basic perceptual processes. This progressively dominant view has led to the implicit assumption that the way in which the literate brain grasps numerical concepts is largely independent from language. Yet, a possible shortcoming of this theoretical account is that it has been mainly corroborated by experimental designs tapping on perceptual-motor mechanisms. This symposium will therefore bring together five studies probing whether language can be

## SYMPOSIA

truly considered as an independent faculty from the numerical core system. By taking a multi-method linguistic approach (including brain-damaged populations, neuroimaging techniques and neural network models), the studies address verbal-number production, arithmetic problem solving, quantification mechanisms and the representation of number words in spontaneous language as well as in the bilingual mind. Overall, the symposium will raise issues of interdisciplinary interest concerning how language has evolved to encode and incorporate numerical information from the senses.

### **Phonemic errors with words but semantic errors with numbers: is number production special?**

M. Guandalini, J.M. Rodríguez, & J. García-Orza  
*Universidad de Málaga, Spain*

Paradoxically, brain-damaged people with impairments in the phonological output buffer produce phonemic paraphasias with content words (e.g., bitar-butter) but semantic paraphasias with number words (e.g., twenty five-thirty eight). This is known as the Stimulus Type Effect on Phonological and Semantic errors (STEPS). Explanations for this phenomenon consider that pre-assembled phonological representations exist for numbers but not for content words in the phonological output buffer. Here we explore two alternative hypotheses based on the existence of two methodological confounds: numbers are always presented in homogeneous blocks and words in heterogeneous blocks; number words are usually word sequences that are compared to single content-words. Two conduction aphasics took part in the study. Experiment 1 did not confirm the role of lists in causing the STEPS. Experiment 2 found more semantic paraphasias (compared to phonemic paraphasias) both in the repetition of multidigits (e.g., 673) and, more importantly, in the repetition of color word sequences (e.g., red-blue-green). The STEPS arises as consequence of differences in resource demands. Number words have not a special status in the phonological output buffer.

### **All roads lead to Rome: Common processing between language and arithmetic**

S. Castro & P. Macizo  
*Universidad de Granada, Spain*

The aim of this study was to demonstrate the existence of universal principles of cognition, common to language and arithmetic. Specifically, we wanted to

determine whether structural principles of increment/restriction of information applied to language comprehension and simple arithmetic problems. To this end, we developed a new paradigm composed of blocks of two trials in which the increase/restriction of information in language and arithmetic was implemented. In the first trial, incremental sentences (e.g., the square is red) and restrictive sentences (e.g., the diamond is not yellow) were presented. Afterwards, two colored figures appeared and participants selected the correct one according to the meaning of the sentence. In the second trial, additions (e.g.,  $7 + 4$ ) and subtractions (e.g.,  $6 - 3$ ) were presented and participants selected the correct result between two possible alternatives. The results showed that the resolution of subtractions was modulated by the increase/restriction of information in the previous sentence. This study shows that, at least for the case of subtraction problems, there are organizational principles common to language and arithmetic.

### **The semantics of numerical symbols in natural language obeys Weber's law**

L. Rinaldi<sup>1,2</sup> & M. Marelli<sup>1</sup>

<sup>1</sup>*University of Milano-Bicocca, Italy*

<sup>2</sup>*Milan Center for Neuroscience, Italy*

It has been suggested that the origins of number words can be traced back to an evolutionarily ancient approximate number system, which represents quantities on a compressed scale and complies with Weber's law. Here, we use a data-driven computational model, which learns to predict one event (a word in a text corpus) from associated events, to implicitly characterize the underlying semantics of number words in natural language, without appeal to perception. We show that the representation of number words induced by the model reliably depends on numerical ratio - a clear signature of Weber's law - thus perfectly mirroring the human and non-human psychophysical performance in comparative judgments of numbers. Most notably, the adherence to Weber's law is robustly replicated cross-culturally in a wide range of languages. Together, these findings imply that the everyday use of number words in language rests upon a pre-verbal approximate number system. They also remarkably indicate that, in principle, humans can grasp the meaning of number words only from language statistics and, thus, independently of any perceptual input.

### **Linguistic traces in core numerical knowledge**

## SYMPOSIA

E. Salillas

*University of Padova, Italy*

To what extent does language play a role in mathematics? A considerable number of studies favor a view of numbers without language. Perhaps the most evident is the research showing that a sense of quantity exists in infants and animals. Hence, the core of mathematics is based on mechanisms with a long phylogenetic origin. However, the quantitatively equipped infant will cope with a world that increases the complexity of mathematical concepts. Language might be a fundamental tool to expand, and modify, ancient numerical knowledge. Bilingualism entails a window to the study of possible language traces in core numerical concepts. This is simply because bilingualism implies two symbolic systems to refer to the same quantity, nonetheless the two systems might not be equally linked to number semantics. We will briefly integrate our different studies (Salillas and Wicha, 2012; Salillas and Carreiras, 2014; Salillas, Barraza and Carreiras, 2015; Salillas and Martinez, 2018) showing that a key factor in determining the relative weight of each numerical symbolic system (i.e. number words in each language) is the language used for early numerical learning. A key role of early math learning in bilinguals, would inform us about when the link between the symbolic system and number semantics is established not only in bilinguals, but also in monolinguals. And overall, our data suggest that bilingual math cognition implies specificities that should not be ignored. The most prominent consequence is the case where bilingualism co-occurs with an already distorted math system, in Bilingual Developmental Dyscalculia.

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### SYMPOSIUM 3

**12:30 - 14:00, Salón Grados Education**

#### **COGNITIVE CONTROL: TWO CONTROL MODES OR THREE ORTHOGONAL DIMENSIONS?**

*Organizers: Carlos Conzález-García (Ghent University) & Javier Ortiz-Tudela (Universidad de Granada; Goethe-Universität)*

Over the last few years, a dual view of cognitive control emphasizing a distinction between proactive and reactive mechanisms has gained popularity. In its original formulation, this proposal set out two main distinctions: sustained and anticipatory vs. transient and

'as a reaction' to demands. However, the wide success of this dual view has led to some confusion, and a plethora of different phenomena are grouped under 'reactive' or 'proactive' categories. The aim of this symposium is two-fold: First, to gather experts on the field to present different ways of manipulating cognitive control. Second, to put forward a working scheme to classify different effects related to cognitive control, capitalizing in three dimensions: agency (who applies control?), proximity (when?), and time scale (for how long?).

#### **Using proactive cues to instruct control and induce expectations**

M. Ruz, C. González-García, A.F. Palenciano, P. Díaz-Gutiérrez, J.E. Arco, A. Sobrado, D. López, J. Ortiz-Tudela, J.M.M. Peñalver, & E. Madrid  
*Mind, Brain & Behavior Research Center, Universidad de Granada, Spain*

Most animals, to different degrees, use information in their environment to learn and optimize their behavior in current and future situations. Humans have significantly extended these skills through the use of language and other symbolic information that points to the relevant stimuli and appropriate responses needed to obtain optimal performance in specific contexts. In this talk I will present several neuroimaging experiments that use Cue-Target paradigms to study the neural mechanisms by which the brain prepares in advance to face specific situations. Results indicate that proactive control relies in the interplay of activity in lateral and medial prefrontal and parietal cortices and sensory-related regions. MVPA and RSA analyses approaches suggest that proactive preparation (i.e. in anticipation of target onset) is specific not only to the content of the information participants are expecting to see, but also to the need of integration across dimensions and response requirements. Future research should aim at understanding the nature of these preactivations and their role in the efficiency of behavior.

#### **Using the previous target as a congruency cue:**

##### **Better don't try it**

L. Jiménez, M.J. Lorda, & C. Méndez  
*Universidad de Santiago de Compostela*

The Dual Mechanisms of Control framework distinguishes between "proactive" and "reactive" control by collapsing a three-dimensional space into a single dimension. Thus proactive control is defined as sustained, preventive, and top-down, whereas reactive

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control is defined as transient, corrective, and bottom-up. Our goal is to distinguish among these three dimensions, by analyzing whether a temporally proactive effect analogous to the Gratton Effect could be produced on a top-down basis. Just as the Gratton effect was initially taken as produced by a top-down expectation for the congruency of the following trial, based on the congruency of the previous trial, we assumed that, if such a top-down mechanism could exert any influence on a trial-by-trial basis, then arranging a contingency between each target and the congruency of the successor should exert at least a similar influence. However, in a series of six experiments we found that relying on these explicit cues did not improve performance, but rather it resulted in significant costs early in training, at least in those conditions in which cueing was manipulated between blocks.

### **Dual tasking can reduce interference by incidentally improving stimuli selection**

F.G. Luna<sup>1,2</sup>, M. Telga<sup>2</sup>, P. Barttfeld<sup>1</sup>, & J. Lupiáñez<sup>2</sup>

<sup>1</sup>*Instituto de Investigaciones Psicológicas (IIPsi), CONICET, Universidad Nacional de Córdoba*

<sup>2</sup>*Brain, Mind, and Behavior Research Center (CIMCYC) University of Granada*

The "proactive" vs. "reactive" dual view of cognitive control considers the former as top-down and the latter as bottom-up control mechanisms. Thus, in a flanker task, properties of stimuli grouping distractors with the target lead to larger interference and subsequently the need of reactive control. On the other hand, loading working memory with a dual task might increase interference due to the reduced allocation of proactive control. In the current study we present data from two experiments, which show a rather more complex pattern. Dual tasking did not systematically lead to increased interference, but rather produced a similar effect of stimulus driven grouping, either increasing or decreasing interference, depending on the nature of the dual task. Indeed, interference was increased when the dual task drew attention to the grouping dimension, but reduced when attention was drawn to an orthogonal dimension, thus breaking grouping of the target with the distractors.

### **Time-based prospective memory in younger and older adults: The influence of monitoring behaviour, cognitive load and executive functions**

G. Mioni<sup>1</sup>, S. Grondin<sup>2</sup>, F. Stablum<sup>1</sup>

<sup>1</sup>*Department of General Psychology, University of Padova, Italy*

<sup>2</sup>*École de Psychologie, Université Laval, Québec, Canada*

Prospective memory (PM) is defined as remembering to perform an intended action in the future while being engaged in an ongoing activity. Researchers have distinguished two broad classes of PM tasks: event-based PM and time-based PM. In this presentation we will focus on time-based PM which is the ability to perform the prospective action at a certain time or when a specified time interval has elapsed (e.g., remembering to make a phone call at 2 p.m. or in ten minutes time). We will discuss age-related differences in time-based PM performance with a particular interest in the multiple components that can modulate time-based PM performance. In particular, we manipulated the accessibility to the clock (free- and fixed- monitoring conditions) and the degree of cognitive load for the ongoing task (high and low cognitive demand). Monitoring behaviour is critical to explain PM performance. Data will be discussed also considering the contribution of age-related differences in executive function and time perception.

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## SYMPOSIUM 4

**15:00 - 16:00, Salón Actos Education**

### **MUSIC TO BOOST THE BRAIN: FROM PERCEPTION TO COGNITION**

*Organizers: Lucía Vaquero Zamora (McGill University), Clément François (IDIBELL-Barcelona) & Laura Ferreri (University of Barcelona)*

This symposium aims to explore music-related neural mechanisms and their implications in boosting cognitive functions and promoting brain plasticity. More specifically, the symposium will consist of four talks based on innovative and multi-methodological approaches followed by a brief general discussion. Each talk will consider the potential role of music for boosting auditory-motor learning, speech perception, and memory encoding, with a particular emphasis on reward-related processes as well as on auditory-motor integration mechanisms. Specifically, François and collaborators provide causal evidence based on two longitudinal studies in children and infants showing that musical practice and songs facilitate speech processing. Schön's work provides converging evidence for the role



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of rhythm in enhancing speech processing, both in children with dyslexia and in children with cochlear implants, as well as the underlying neural dynamics. Ferreri and colleagues demonstrate the involvement of the dopaminergic system in experiencing musical pleasure and enhancing the encoding of memory traces. Finally, Vaquero and collaborators' work focuses on both short- and long-term functional and structural neuroplastic changes in musicians and non-musicians. We are highly confident that this symposium will foster an exciting discussion on the plasticity mechanisms triggered by musical practice and on the role of music-related reward for pedagogical and clinical purposes.

### **The benefit of music on speech segmentation in children and infants**

C. François

*IDIBELL and Institut de Recerca Pediàtrica Hospital Sant Joan de Déu, Barcelona, Spain*

Recently, a whole line of research has been developed that aims at using musical training as a tool for boosting specific perceptual, motor and cognitive skills both in healthy population and in children with language learning disorders. In the first part of this talk, I will present the results of a two-year longitudinal study in 7 year-old children showing that learning to play a musical instrument causally induces substantial neuroplastic changes in speech processing networks supporting enhanced phonological processing and speech segmentation abilities. I will also present recent data obtained in a longitudinal study with infants showing that the melodic information contained in songs is beneficial for speech segmentation as early as few days after birth and that neonatal brain sensitivity to songs can predict expressive vocabulary at 18 months of age. These last findings show the importance of musically enriched inputs in infancy and open a discussion on the potential of using music for the early treatment of children and infants with language-based learning disorders.

### **Rhythmic facilitation of language processing**

D. Schön

*Aix-Marseille University, Marseille, France*

In the present talk, I will bring together different perspectives on the investigation and understanding of temporal processing and temporal expectations. The aim is to bridge different temporal deficit hypotheses in dyslexia, dysphasia or deafness in a larger framework taking into account multiple nested temporal scales. I

will present data testing the hypothesis that temporal attention can be influenced by an external rhythmic auditory stimulation (i.e., musical rhythm) and benefit to subsequent language processing including syntax processing and speech production. I will also present data testing the hypothesis that phonological awareness can be influenced by several months of musical training and more particularly rhythmic training, which in turn improves reading skills. All together our data support the hypothesis of a causal role of rhythm-based processing for language processing and language acquisition. These results open new avenues onto music-based remediation of language and hearing impairment. I will end presenting data that are important in terms of explanatory mechanisms: carryover effects from a preceding musical cue to a speech stimulus evident in the continuation of neural phase entrainment to periodicities that are present in both music and speech. These findings underscore the highly adaptive nature of neural phase entrainment across fundamentally different auditory stimuli. They also support current models of neural phase entrainment as a tool of predictive timing and attentional selection across cognitive domains.

### **Music-related reward responses and their implications in episodic memory**

L. Ferreri

*University of Barcelona, Barcelona, Spain*

Music is a unique reward able to evoke intense pleasure through the activation of the dopaminergic mesolimbic system. Cognitive neuroscience research clearly showed that the interaction between the reward network and the memory circuit (ventral-tegmental area – hippocampal loop) drives an effect of motivation on cognitive functions, and specifically learning and memory. However, the exciting possibility that differences in music-related reward responses can drive memory performance remains almost unexplored. This talk will present behavioral and pharmacological findings in support of the hypotheses that musical pleasure is driven by dopaminergic system, and that such system is causally implicated in the modulation of music-related cognitive performance, and in particular memory. This will allow opening a discussion in terms of both theoretical contributions and application paradigms for memory stimulation.

### **Brain structural predispositions, training, and age-of-onset effects in music skill**

L. Vaquero

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*Concordia University  
McGill University*

It has been recently suggested that differences in brain structure observed between musicians and non-musicians are not only a consequence of musical sustained practice, but more likely the result of an interaction between individual predispositions (largely explained by genetics) and training-induced plasticity. Music training seems to create a favorable environment for brain-plasticity mechanisms to take place, especially if learning occurs early in life. Previous reports show that musicians outperform non-musicians in apparently non-musical related tasks such as those involving linguistic perception and production. Here, I will expose brain-structural findings in professional musicians, including the discussion of sensitive-periods of music learning and transfer effects from music skills to foreign-language imitation abilities, as well as the role of individual differences in brain structural connectivity in predicting music learning in individuals with no musical training.

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### SYMPOSIUM 5

**16:00 - 17:30, Salón Actos Psychology**

#### **NUEVAS TÉCNICAS PARA EL ESTUDIO DE LA CONECTIVIDAD FUNCIONAL Y APLICACIONES**

*Organizers: Miguel A. Muñoz (University of Granada)  
& Pedro Montoya (University of Balearic Islands)*

Functional connectivity can be defined as the temporal correlation between spatially remote neurophysiological events, expressed as deviation from statistical independence across these events in distributed neuronal groups and areas. In the last 15 years several methods have been developed in order to improve the analysis of functional connectivity applies to both resting state and task-state studies. This symposium shows these development and applications.

#### **The time evolving functional brain networks**

J. G. Vivas Miranda  
*Federal University of Bahia*

The dynamical approach represents a new branch in the understanding of functional brain networks. This study shows an innovative way to take into account time

evolution of synchronization patterns in EEG data. We used the time varying graph theory and the motif synchronization method to build a set of graphs representing the time evolution of for some brain cognitive phenomena. Using simple indices to represent time connectivity and topological stability, we evaluate the hypothesis of increased stability during the meditation state in comparison to the relaxation state; applying the method to ADHD subjects, we evaluate the spreading effect of Transcranial direct-current stimulation; and evaluate the hypothesis of a functional signature in healthy individuals.

#### **Dynamic functional connectivity (dFC), methods and issues to obtain better understanding of non-stationary pathologies**

I. Cifre  
*Universitat Ramon Llull, Blanquerna, FPCEE,  
Barcelon, Spain*

Spain Recently there have been developed several methods to compute dynamic functional connectivity (dFC), to study the fluctuations a long time in connectivity. The most popular methods are sliding-windows analysis, spontaneous coactivation patterns or time-frequency analysis. In this communication we will talk about advances, advantages and issues that have been arising during the last years, in order to show a better understanding of what dFC means. Point Process is a method based on the compression of the functional magnetic resonance signal to points above and below a threshold. This method has proved to be useful for performing connectivity analyses, regardless of large computational requirements, and has also been able to replicate current connectivity studies with few scan points. We will show applications of these methods, which are: the Point Process analysis of the signal, Rbeta dynamic connectivity and Coherence Density Peak Clustering (CDPC). As a conclusion, dFC is a young but promising field to explore different data which is not supposed to be stable over time, but more validation of these methods should be done.

#### **How continuous pain affect to emotional modulation? A Motif-Synchronization study**

G. Alba  
*Brain, Mind and Behavior Research Center at  
University of Granada (CIMCYC-UGR), Spain*

Recent studies investigate the presence of alexithymia in patients suffering from different chronic pain

conditions. Thus, patients with fibromyalgia show a reduced functional connectivity of the anterior cingulate cortex with amygdala and periaqueductal gray matter. The aim of this research was evaluated the effect of continuous pain on EEG Motif-Synchronization in different emotional conditions. A sample of 40 university students viewed 6 blocks of unpleasant, neutral and pleasant pictures, while warm-pain stimulation was delivered. The EEG activity was recorded for all task. The results revealed that unpleasant condition show more reduced Motif-Synchronization than pleasant and neutral conditions. Continuous pain enhanced the Motif-Synchronization and changed the emotional network distribution comparing with no pain conditions.

**Power spectral density and functional connectivity changes due to a sensorimotor neurofeedback training in fibromyalgia patients**

J.I. Terrasa<sup>1</sup>, P. Montoya<sup>1</sup> & M.A. Muñoz<sup>1,2</sup>

<sup>1</sup>Research Institute on Health Sciences (IUNICS), University of Balearic Islands, Palma, Spain

<sup>2</sup>Brain, Mind and Behavior Research Center at University of Granada (CIMCYC-UGR), Spain

Neurofeedback is a form of neuromodulation based on learning to modify some aspect of cortical activity. Sensorimotor rhythm (SMR) oscillations are one of the most used frequency bands in neurofeedback. Several studies have shown that subjects can learn to modulate SMR power to control output devices but little is known about possible related changes in brain networks. Fibromyalgia (FMS) is a chronic, painful disorder often associated with somatosensory alterations. Thus, the aim of this study was to investigate the changes in EEG power on somatosensory brain areas due to a SMR neurofeedback training and its impact on functional connectivity in FMS patients. A six-session EEG neurofeedback protocol based on learning to synchronize and desynchronize (modulate) the SMR was implemented. Moreover, participants performed the first and last sessions inside the magnetic resonance imaging scanner. At the end of the training, participants showed a successful performance enhancement, an increase of SMR power specific to somatosensory locations and higher functional connectivity between areas associated with somatosensory activity. Our research increases the better understanding of the relation between EEG neuromodulation and metabolic changes and the use of SMR training in FMS.

**SYMPOSIUM 6**

**09:00 - 10:30, Salón Actos Psychology**

**CURRENT EVIDENCE ON tDCS RESEARCH: FROM COGNITION TO EXERCISE PERFORMANCE**

*Organizer: Daniel Sanabria (Universidad de Granada)*

Transcranial direct current stimulation (tDCS) and transcranial alternating current stimulation (tACS) are brain stimulation techniques that are gaining increased popularity among cognitive neuroscience and sport science researchers. The former are using tDCS/tACS as a mean to influence cognitive and brain functioning, with both theoretical and practical interests. The primary aim of the latter is to investigate whether sport/physical performance can be boosted via tDCS. In this symposium, Abellaneda et al. will present novel data on the effect of tDCS and tACS over brain function at rest and while performing a cognitive task. Holgado et al. will report the results of a meta-analysis that addresses the question of whether an acute session of tDCS can indeed enhance physical/sport performance. Luna et al., will share with the audience the outcome of a recent experiment that used tDCS to try and dissociate two components of vigilance. Finally, Sánchez et al. will present a novel study on the influence of tDCS on deceptive behavior.

**Transcranial Direct and Alternating Current Stimulation display differential modulatory effects in brain networks during rest and a cognitive task: A pilot fMRI study**

K. Abellaneda<sup>\*1,2</sup>, L. Vaqué-Alcázar<sup>\*1,2</sup>, R. Sala-Llonch<sup>3</sup>, N. Bargalló<sup>4,5</sup>, A. Pascual-Leone<sup>6,7</sup>, D. Bartrés-Faz<sup>1,2</sup>

<sup>1</sup>Department of Medicine, Faculty of Medicine and Health Sciences, Institute of Neurosciences, University of Barcelona, Barcelona

<sup>2</sup>Institute of Biomedical Research August Pi i Sunyer (IDIBAPS), Barcelona

<sup>3</sup>Department of Biomedicine, Faculty of Medicine and Health Sciences, University of Barcelona, Barcelona

<sup>4</sup>Hospital Clínic de Barcelona, Magnetic Resonance Image Core Facility (IDIBAPS), Barcelona

<sup>5</sup>Hospital Clínic de Barcelona, Neuroradiology Section, Radiology Service, Centre de Diagnòstic per la Imatge, Barcelona

<sup>6</sup>*Berenson-Allen Center for Noninvasive Brain Stimulation and Division of Cognitive Neurology, Department of Neurology, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston*

<sup>7</sup>*Autonomous University of Barcelona, Institut Universitari de Neurorehabilitació Guttmann, Badalona*

\*These authors contributed equally to this work

Transcranial electrical stimulation (tES) techniques produces a neuromodulatory effect through weak electrical currents applied to the scalp. Among these techniques, direct (tDCS) and alternating (tACS) current stimulation approaches have acquired a relevant role to enhance cognitive performance and to manipulate brain activity. Nonetheless, the comparability of these approaches regarding the underlying neurophysiological mechanisms sustaining their effects has been poorly investigated. In the present study, we applied tES simultaneously with functional magnetic resonance imaging (tES-fMRI) to compare tDCS and tACS effects over brain networks while individuals were in rest and during a working memory (WM) task. Methods. Forty-four subjects (age mean  $\pm$  SD, 25.25  $\pm$  4.22 years, 20 females) were randomly assigned to receive tDCS (N=15), theta-tACS (N=14) and sham (N=15). The anode was centered over the left dorsolateral prefrontal cortex (L-DLPFC) and the cathode over the right supraorbital region. TES was applied inside a 3T Siemens MR with a compatible device. During the MRI acquisition, subjects were at rest and performed two N-back tasks, one during and another after stimulation. Results. The groups did not differ in age, gender, education nor intelligence quotient (IQ) estimates. During resting-state, functional connectivity (FC) was higher in tDCS compared to sham and tACS within the default-mode network (DMN), and higher in tDCS compared to sham within the left frontoparietal network (LFPN). Further, in a seed-to-brain approach, after locating the seed over the L-DLPFC, greater connectivity was found in tDCS compared to tACS over frontal and temporal regions, resembling the anterior and temporal DMN nodes. During the first WM task, tACS displayed more brain activity in frontal and parietal regions as compared to sham and tDCS. In the second WM task, tACS displayed greater activation also over frontal and parietal regions as compared to tDCS, and tDCS displayed greater activity mainly in frontal areas as compared to sham. Conclusion. On the one hand, our results revealed that tDCS may display clearer neurophysiological effects than tACS at rest, without ignoring possible interferences that tACS may cause in the archetypal resting-state low-frequency fluctuations. On the other, when subjects are performing a cognitive

task, tACS seems to acquire a primordial role, especially during the stimulation, although tDCS display some residual effects after the stimulation cessation. These results suggests that reliant on the experimental question, although both approaches have potential to modulate brain networks, one technique or another will probably be more efficient to accomplish a particular objective.

### **The effects of tDCS on Sport Performance: a Meta-analysis**

D. Holgado<sup>1,2</sup>, M.Á. Vadillo<sup>3</sup>, & D. Sanabria<sup>1</sup>

<sup>1</sup>*Centro de Investigación Mente Cerebro y Comportamiento (CIMCYC), Universidad de Granada*

<sup>2</sup>*Departamento de Educación Física y Deportiva, Facultad de Ciencias del Deporte, Universidad de Granada*

<sup>3</sup>*Facultad de Psicología, Universidad Autónoma de Madrid*

Transcranial direct current stimulation (tDCS) is a non-invasive brain stimulation technique, which is increasing in popularity amongst sport scientists. The rationale of using tDCS as a tool in sport is that stimulating brain areas related to exercise performance would make athletes to boost their physical performance. In a sport context becoming more and more competitive, either to run faster, push more watts, lift more weight or jump farther, athletes are pressed to push their physical boundaries. However, the results of the published research appear contradictory, with methodological flaws in some instances, such as low sample size, low statistical power, low current intensity, etc...In this meta-analysis, we show that there is not a clear sign of bias in the field of tDCS and sport performance, but we have estimated that the average statistical power for the published articles in this field is only 15-19%. At this point, we believe that research on this topic will benefit from further empirical research in order to accumulate evidence on whether an acute session of tDCS affect sport performance or not.

### **Executive and Arousal Vigilance: A tDCS study**

F.G. Luna<sup>1,2</sup>, J. Lupiáñez<sup>2</sup>, R. Román-Caballero<sup>2</sup>, P. Barttfeld<sup>1</sup>, & E. Martín-Arévalo<sup>2</sup>

<sup>1</sup>*Instituto de Investigaciones Psicológicas (IIPsi), CONICET, Universidad Nacional de Córdoba*

<sup>2</sup>*Departement of Experimental Psychology; Brain, Mind, and Behavior Research Center (CIMCYC) University of Granada*

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The current work aimed at finding further evidence dissociating two different components of vigilance – the human ability of sustaining attention for extended periods of time. While one of these components (executive vigilance) implicate an executive and goal-directed behavior, and its decrement over time is usually observed as a decline in detecting infrequent but critical events, the other component (arousal vigilance) is mainly involved in sustaining a tonic arousal level, and its decrement corresponds to an increment in reaction time, especially its trial-to-trial intraindividual variability (IIV). Using a High-Definition Transcranial direct current stimulation (tDCS) procedure, we conducted an exploratory study, stimulating different brain regions over the right fronto-parietal attentional network. Participants (n= 90) were randomly assigned to one of three groups (frontal stimulation, parietal stimulation, and sham condition). All of them performed – in combination with the tDCS protocol – an attentional networks task (ANTI-Vea) that assesses simultaneously both vigilance's components, together with three typical attentional functions: phasic alertness, orienting, and executive control. We expected to observe differential modulations over the functioning of both vigilance's components depending on the tDCS group. We will discuss the results obtained and will propose further experiments to dissociate vigilance components.

### **Modulating deceptive behavior with tDCS of the ventrolateral prefrontal cortex**

N. Sánchez<sup>1,2</sup>, J. Masip<sup>2</sup>, & C.J. Gómez-Ariza<sup>1</sup>

*1Universidad de Jaén, Spain*

*2Universidad de Salamanca, Spain*

Recent neuroimaging studies support the notion that working memory and inhibitory control are largely involved in deception. Thus, it has been hypothesized that working memory plays a key role in keeping the truth in mind while formulating a deceptive response, whereas inhibitory control downregulates truthful information/responses. We explored this idea by parametrically manipulating cognitive load and stimulating the ventrolateral prefrontal cortex (VLPFC). 120 participants were randomly assigned to five stimulation groups (anodal-left-VLPFC, cathodal-left-VLPFC, anodal-right-VLPFC, cathodal-right-VLPFC, and Sham). The reference electrode was always placed extracephalically. All participants read sentences describing general knowledge facts and were asked to respond as fast as possible. The sentences were presented in blocks ranging from 2 to 5 sentences. For half of the sentences the participants were to respond

truthfully (according to the content of the sentence), whereas for the other half they had to lie. In addition, participants had to remember the final word of each sentence comprising a block. Results show that tDCS over the VLPFC modulated deceptive behavior, but only when individual differences in working memory were taken into account.

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## SYMPOSIUM 7

**9:00 - 10:30, Salón Grados Education**

### **SUPPRESSION OF IRRELEVANT INFORMATION**

*Organizer: Stephan Moratti (Complutense University of Madrid)*

In order to establish stable and well discriminable representations of sensory information within different memory systems, it is not only of importance to enhance relevant but also to suppress irrelevant information. Here, we present recent data on this shaping process in different memory systems. Stephan Moratti will show that sensory representation of fear conditioned visual stimuli is enhanced during Pavlovian learning, but also that activity for fear irrelevant stimuli is inhibited. Further, he will demonstrate that these short-term plasticity changes in fear learning occur very fast within 3 to 4 trials. Claudia Poch will show that EEG alpha band activity is associated with successful suppression of irrelevant information during working memory tasks improving performance. Lluís Fuentemilla will show that pruning of irrelevant information can shape overlapping long-term memory representations by selective memory reactivation during sleep; a process associated with EEG theta and beta band activity. Finally, Pedro M. Paz-Alonso will present a series of behavioral and MRI studies that support the notion that visual imagery strengthen memory control by more efficient suppression of irrelevant information.

### **Excitatory and inhibitory sensory gain modulations in early visual cortex during Pavlovian fear conditioning**

S. Moratti, M. Yuan, C. Bértolo-Méndez, & T. Giménez-Fernández

*Complutense University of Madrid*

Prioritizing motivationally relevant information in sensory systems helps to detect and discriminate them

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faster and better; an ability that is crucial for survival. Recent research has been focusing on how acquired fear relevant stimuli provoke increased neural responses in sensory system such as the visual cortex. However, classic learning theories such as the Rescorla-Wagner model predict inhibition of fear irrelevant stimuli. Here, we present recent data on how acquired fear relevant visual stimuli increase activity in the visual cortex but also on how a fear irrelevant stimulus representation is actively suppressed. Thereby, stimulus driven oscillatory neuromagnetic activity has been recorded by Magnetoencephalography using a discriminative delay-conditioning paradigm. We relate these findings to the Rescorla-Wagner model and recent neurobiological models on how CS-US contingencies modify local neural circuits in early sensory cortex.

### **Suppression of no-longer relevant information in Working Memory: An alpha-power related mechanism?**

C. Poch, A. Capilla, J.A. Hinojosa, & P. Campo  
*Complutense University of Madrid*

Selective attention can enhance Working Memory (WM) performance by selecting relevant information, while preventing distracting items from encoding or from further maintenance. In visuospatial attention an enhancement of alpha power is observed in the ipsilateral posterior cortex to the locus of attention, along with suppression in the contralateral hemisphere. An influential model proposes that alpha enhancement is related to information suppression. However, whether ipsilateral alpha power represents a mechanism through which no longer relevant WM representations are inhibited has yet not been explored. Here we examined whether the amount of distractors to be suppressed during WM maintenance is functionally related to alpha power lateralized activity. We measure EEG activity while participants performed a retro-cue task in which the WM load was varied across the relevant/irrelevant post-cue hemifield. We found that alpha activity was lateralized respect to the locus of attention, but did not track post-cue irrelevant load. Additionally, non-lateralized alpha activity increased with post-cue relevant load. We propose that alpha lateralization associated to retro-cuing might be related to a general orienting mechanism toward relevant representation.

### **Targeted Memory Reactivation during Sleep Adaptively Promotes the Strengthening or Weakening of Overlapping Memories**

J.P. Oyarzún, J. Morís, D. Luque, R. de Diego-Balaguer, L. Fuentemilla  
*University of Barcelona*

System memory consolidation is conceptualized as an active process whereby newly encoded memory representations are strengthened through selective memory reactivation during sleep. However, our learning experience is highly overlapping in content (i.e., shares common elements), and memories of these events are organized in an intricate network of overlapping associated events. It remains to be explored whether and how selective memory reactivation during sleep has an impact on these overlapping memories acquired during awake time. Here, we test in a group of adult women and men the prediction that selective memory reactivation during sleep entails the reactivation of associated events and that this may lead the brain to adaptively regulate whether these associated memories are strengthened or pruned from memory networks on the basis of their relative associative strength with the shared element. Our findings demonstrate the existence of efficient regulatory neural mechanisms governing how complex memory networks are shaped during sleep as a function of their associative memory strength.

### **Visual imagery strengths mnemonic control**

G. Lerma-Usabiaga & P.M. Paz-Alonso  
*Basque Center on Cognition, Brain and Language, San Sebastian*

A component of goal directed behavior is the ability to focus on memories that are relevant to our current goals. Mnemonic control refers to a set of control processes that, central to higher cognition, determine how relevant information is encoded and retrieved from memory. Here, I will present evidence from a series of behavioral and MRI studies aimed at investigating the impact of using visual imagery as a retrieval and retrieval suppression strategy, and its functional and structural correlates. Results revealed that, compared to standard direct suppression, visual imagery enhanced mnemonic control effects on memory suppression. Reduced anterior, but not posterior, hippocampal volume was associated with memory suppression, supporting prior evidence of a long-axis specialization in the hippocampus and qualifying prior findings. Furthermore, probabilistic tractography results showed that white matter microstructure properties of the cingulum bundle and the uncinate fasciculus were differently associated with memory suppression. These findings constitute the strongest behavioral and neural

evidence so far of the role of visual imagery in mnemonic control.

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### SYMPOSIUM 8

**12:30 -14:00, Salón De Actos Psychology**

#### **THE IMPACT OF ATTENTION AT DIFFERENT STAGES OF MEMORY PROCESSING: FROM ICONIC TO LONG-TERM MEMORY REPRESENTATION**

*Organizers: Valerio Santangelo (University of Perugia) & Fabiano Botta (University of Granada)*

The last decades have seen a growing body of studies assessing the interplay between attention and memory, which have been traditionally studied in isolation. Despite a general agreement that attention can efficiently enhance the chance of later remembering, several issues remains highly debated in the current literature. For instance, are attention effective in biasing early stages of memory processing, such as iconic and “fragile” memory? Is the attentional bias on memory performance durable until retrieval from long-term, episodic, memory? What are stimulus-related features that triggers most efficiently attentional bias on memory in complex, ecologically-valid, scenarios? This symposium aims at providing new insights to these issues by integrating new empirical evidence derived from different experimental paradigms and techniques (i.e., psychophysics, TMS, fMRI). Dr. Fabiano Botta (University of Granada) will show that attention can affect memory as early as at the iconic stage of visual processing. Dr. Giulia Bechi Gabrielli (Sapienza University of Rome) will present recent evidence related to the attentional boost effect on working memory performance. Prof. Valerio Santangelo (University of Perugia) will highlight the role that perceptual- and semantics-related salience exert on working memory performance at the behavioral and neural level. Dr. Javier Ortiz-Tudela (University of Granada) will present evidence indicating an abolishment of the attentional bias when episodic memory retrieval is tested and relate these findings to activity in parietal regions.

**Does selective attention modulate sensory memories?**

F. Fabiano Botta<sup>1</sup>, J. Lupiáñez<sup>2</sup>, P. Bartolomeo<sup>3</sup>

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According to some theoretical models the information contained in visual short-term memory (VSTM), consists of three different memory stages/storages: iconic memory, fragile memory and working memory. Previous studies have consistently shown a strong relationship between attention and visual working memory. Less clear is whether attention during encoding and/or maintenance phases is necessary for the construction and maintenance of visual representations within the two sensory memory systems (iconic and fragile memory). More specifically, both research studies claiming that attention is not necessary for the build-up of the sensory memories and research studies claiming the opposite have appeared. In the present series of experiments, we manipulated selective spatial attention in different ways to investigate how and whether it differentially affects the evolution of the visual representations within VSTM. Overall, our findings show that iconic and fragile memory, as well as visual working memory, are reliably affected by the distribution of attentional resources, suggesting that attention biases the VSTM content starting from very early stages of memory processing.

#### **The Attentional Boost Effect in older adults: When target detection fails to enhance explicit memory**

G. B. Gabrielli<sup>1</sup>, P. Spataro<sup>1</sup>, L. Pezzuti<sup>2</sup>, C. Rossi-Arnaud<sup>1</sup>

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The Attentional Boost Effect (ABE) is a surprising phenomenon in which stimuli presented at the same time as to-be- responded targets are later remembered more accurately than stimuli presented at the same time as to-be- ignored distractors. To date, several studies have demonstrated that the ABE is robust in young adults. We investigated for the first time whether this memory facilitation is also maintained in older adults. We performed four experiments varying the nature of the background stimuli (images vs. words), the length of the encoding trials (500 vs. 1000 ms) and the type of instructions given to participants (incidental vs. intentional). In all cases, the ABE was significant in younger adults, whereas it was completely abolished in older adults. These data support the view that the effect

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reflects a trade-off between attentional competition and attentional facilitation (Swallow & Jiang, 2010): more specifically, we suggest that the age-related increase in the attentional demands of the detection task subtracted attentional resources from the encoding of target-associated stimuli, thus eliminating the ABE in the older group.

### **The role of perceptual- and semantics-related salience on working memory performance: behavioral and fMRI studies**

V. Santangelo<sup>1,2</sup>

<sup>1</sup>*Department of Philosophy, Social Sciences & Education, University of Perugia*

<sup>2</sup>*Neuroimaging Laboratory, IRCCS Santa Lucia Foundation, Rome*

One of the most intriguing issues in the study of cognition is to understand which are the factors determining internal representation of the external world. Previous literature highlighted a key role played by attention selection mechanisms in biasing the access to memory representation. This is particularly true for common life situations, wherein scene complexity is such that only a sub-sample of stimuli can be processed efficiently. Here I will present a series of behavioral and neuroimaging (fMRI) studies based on visual search and delayed match-to-sample (i.e., working memory) tasks. In these tasks the to-be-searched and to-be-remembered targets were indexed by both low-level sensory salience and high-level semantics (e.g., the conceptual mismatch between the target and the context of the scene, or its emotional valence). Overall, the findings showed that both low- and high-level factors jointly contribute to guide attention selection and to enhance the probability of successful working memory encoding, through the selective involvement of the posterior parietal cortex.

### **Attentional preference at encoding and impaired memory performance at test? The role of parietal activity on the interactions between attentional allocation and recognition memory**

J. Ortiz-Tudela<sup>1</sup>, J. Lupiáñez<sup>2</sup>, and E. Martín-Arvalho<sup>3</sup>

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<sup>3</sup>*Universidad de Granada*

The relationship between activity in the posterior parietal regions of the brain and attentional tasks is widely known as it is the relationship between

attentional performance and many cognitive processes such as detection, identification or memory. Nevertheless, the close interaction between these processes hinders the establishment of behavioral dissociations that permits ascertaining the precise involvement of the parietal cortex in each of them. In a recent study, we put forward a change detection paradigm with congruent vs. incongruent semantic information as a key modulating variable, which allows for the study of these three processes within the same procedural task. In this talk we will present the results of combining this paradigm with Transcranial Magnetic Stimulation (TMS) over two regions of the posterior parietal cortex (superior parietal lobe and temporoparietal junction) to explore the interactions between parietal activity, proper attentional performance and memory formation.

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## SYMPOSIUM 9

**16.00 - 17:30, Salón Actos Psychology**

### **NEURO-EMPOWERMENT APPROACH AND NEW TECHNOLOGIES**

*Organizers: Michela Balconi (Università Cattolica del Sacro Cuore) & Sara Invitto (Università del Salento)*

The contribution of neuropsychology in reference to the empowerment of the cognitive functions is twofold: it concerns the possibility of early detection of prognostic markers of cognitive deficits or phenomena of decay, to contrast them; and the possibility of using specific intervention programs, through the stimulation or enhancement of preserved skills, with the intent to potentiate the “functional” cognitive activity. The idea at the basis of cognitive and neurophysiological empowerment is that, across the lifespan, based on the brain plasticity, the activation or reactivation of the networks which mediate these functions can foster a sort of cognitive “empowerment.” To support this functional process, one of the main challenges concerns the ability to adopt proficient strategies, both self- and hetero-induced. The former are based on a virtuous self-managed “learning approach” that should become the objects of further externally induced “reinforcement.” The strategies of the second type provide for the intervention of external aids, such as specific cognitive training. Unlike traditional methods, the latest techniques combine the execution of tasks with the pre-potentialiation of specific neuronal circuits. Experiential



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learning is thus facilitated by the availability of a more receptive brain, as well as a “selectively stimulated brain.” The pre-enhancement of neuronal circuits is achieved thanks to new tools which act directly on the brain, by using magnetic and electrical stimulation, showing a positive impact not only on the fully preserved skills, but also on the residual abilities (cognitive resilience effect). Both of these strategies can engage in contextual supports, which facilitate the reinforcement of cognitive wellbeing and empowerment programs, in particular based on some appropriate environmental stimuli (social networks and caregiver support), as well as the best practices of life (consumption habits, physical activity and so on).

### **Supporting mental training with wearable neurotechnologies to improve performance in sport**

M. Balconi & D. Crivelli

*Università Cattolica del Sacro Cuore*

In order to limit the negative impact of pre-competition anxiety and foster mental strength, athletes often undergo mental training via focusing and awareness techniques. Recently it was proposed that the outcome of those techniques might be improved by supporting mental practice with brain-sensing devices. The present study aimed at investigating the potential of such technology-supported approach for enhancing cognitive control abilities in athletes. A group of semi-professional soccer players (N = 10) completed an intensive 14-day mental training protocol with the support of dedicated wearable brain-sensing devices. While the athletes practiced focused attention meditation, devices provided them with real-time feedback on their focused vs. distracted mindset. The comparison of pre- and post-training performance at neuropsychological tests, together with the analyses of electrophysiological and autonomic responses, highlighted: improved scores at tests tapping on attention and cognitive control; heightened electrophysiological markers of attention orientation; decreased arousal during a cognitive stressor task. First findings hint at the potential of intensive technology-supported mental training for fostering adaptive improvements of cognitive performance efficiency in athletes

### **Effect of Non-invasive Brain Stimulation (NIBS) on neural activity and connectivity examined by magnetoencephalography**

G. Arcara & F. Piccione

*University of Padova*

A considerable number of studies investigated the effects of Transcranial Direct Current Stimulation (tDCS) on cognition and behaviour, providing contrasting results (Horvath et al., 2015). However, only few studies addressed the effects of tDCS at the brain level. To fill this gap we conducted two experiments investigating how offline tDCS shapes brain activity and connectivity, as measured with Magnetoencephalography (MEG). Using a bipolar montage with anode on the left motor cortex and cathode on the right motor cortex cathode, our results show that tDCS increases resting state connectivity in several frequency bands both in the area beneath the anode and in the area beneath the cathode. In a second study, we found that tDCS can modulate auditory processing and decrease the brain entrainment that is observed with 40 Hz frequency-acoustic stimuli. Taken together these results point to widespread effects of tDCS on the brain, and suggest caution in using tDCS without knowing the brain changes that may occur. Further studies are needed to better elucidate the tDCS effects on brain activity and brain networks.

### **Olfactory assessment and new technologies: a neuro-developmental approach with implication for metabolic health.**

S. Invitto, G. Trianni, P. Paladini, D.M. Toraldo, & E. Scoditti

*Università del Salento*

The olfactory system is extremely connected to the gustatory system, and at an evolutionary level, the appetite stimulation is elicited by drivers connected to cross-modal and multisensory trigger. The most recent technological tools now allow both to reconstruct in the laboratory sophisticated odors, and to administer the same smells through olfactometers interfaced with neuroimaging instruments. The purpose of this presentation will be to illustrate, through a neurodevelopmental approach, several studies carried out to evaluate both Olfactory Event Related Potentials and gamma variation to olfactory responses, presenting odorous stimuli with edible and non-edible characteristics and associating these parameters with metabolic (i.e, Body Mass Index and neuroendocrine regulators) and dietary characteristics of the subjects, to evaluate how the olfactory guided behaviour can exist. Data will be presented regarding studies conducted with a new patented olfactory device, the US2017127971 (A1), on Obstructive Sleep Apnea Subjects, Mild Cognitive Impairment, healthy adults and newborns and

newborns the 3 M syndrome (a rare disease).

### **Transcranial electrical stimulation during an auditory verbal task**

A. Brancucci, A. D'Anselmo, G. Prete, & L. Tommasi  
*University of Chieti-Pescara*

Many published results are in contrast between them and as much have reported results that could not be replicated. We present here just an example of such a complex research field. The study was aimed at modulating the classical right ear advantage (REA) for speech sounds by means different tES techniques starting with hf-tRNS. Stimulation was applied over the auditory cortex either unilaterally (experiment 1, N=50) or bilaterally (experiment 2, N=24). A significant enhancement of the REA was found during bilateral hf-tRNS with respect to sham. No modulation was found when stimulation was applied over the left or right auditory cortex with the reference electrode on the contralateral shoulder. In two further experiments (3 and 4, N=60), tDCS with different montages failed to modulate the REA. These findings invoke the use of very carefully controlled experimental designs in which the topic is faced with different techniques and under different points of view.

the external environment to study the mind. In fact, recently, a huge amount of behavioural, electrophysiological and imaging studies have been conducted that provide scientific evidence of this link between the mind, the body and the world. Though, new technologies offer other interesting opportunities that allow scientists to bypass the limitations of the body and the constraints of the environment. Virtual Reality (VR) is a combination of technological devices that allows users to create, explore, and interact with 3-D computer-generated environments. Typically, individuals entering a virtual environment feel part of this world, and they have the opportunity to interact with it almost as they would in the real world. The similarity of the virtual experience to the real world relies mostly on three features: sight, hearing, and interactions involving motor and haptic feedback. The use of a Head-Mounted Display (HMD) and stereo rendered sounds can help users to enhance the sense of presence within the environment, by creating an immersive experience. Therefore, using VR, an individual can be “embodied” in someone else (his/her virtual character) and located elsewhere (the virtual environment, designed according to the specific purposes of the investigation). These capabilities make VR the ideal tool to study different aspects of cognitive and emotional processes from an embodied perspective. Within this Symposium we want to present the most recent advances in the use of VR as an embodied tool in Cognitive Science and Neuroscience.

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**Friday, 6<sup>th</sup> July 2018**

### **SYMPOSIUM 10**

**10:00 - 11:30, Salón Actos Psychology**

### **THE EMBODIED NATURE OF VIRTUAL REALITY**

*Organizers: Claudia Repetto & Silvia Serino  
(Catholic University of Milan, Italy)*

In the last decades a new paradigm took root in the scientific community, that is affecting both the fields of Neuroscience and Cognitive Science: the Embodied Cognition approach. Although within this approach there is a diversity of opinions about the nature of embodiment, the core point is that cognitive processes are tightly linked to and dependent from the sensory-motor systems. In this view, the body morphology, body states, perceptions and actions shape the way we construct knowledge and hereafter we use this knowledge for a wide variety of mental activities. Thus, we can not anymore neglect the bodily interactions with

### **The two-way balance between multisensory processing and embodiment in virtual reality**

A. Maselli

*IRCCS Fondazione Santa Lucia Rome, Italy*

Immersive Virtual Reality (IVR) proved to be a powerful tool to explore the multisensory processing underlying the perceptual experience of our own body. Extensive research established the tight link between the multisensory mechanisms guaranteeing the stable and unitary experience of our own body, and those enabling (i) the feeling of a virtual body as one's own, and (ii) the experience of being in control of it. Beside the great interest of this line of research, IVR paved the way to complementary research on the impact of virtual embodiment on perception, behavior and cognition. Indeed, IVR offers the unique opportunity to overcome the intrinsic limitations of the physical body, and therefore to study under controlled experimental protocols, how the brain processes and integrate “impossible” stimuli (e.g. multisensory bodily stimuli

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with anomalous spatiotemporal correlation, or owning a body of a different age, sex or race). In this contribution, I will present first an overview on the multisensory mechanisms enabling embodiment of virtual bodies. Next, I will focus on the impact that embodiment in VR can have on the processing and integration of multisensory stimuli. More specifically, I will discuss how the feeling of being embodied in a virtual body can be described as the result of an inference process in which all incoming bodily signals, from both the real and the virtual body, are attributed to the same one cause, the own-body. Next, as examples of the impact of virtual embodiment on perception and cognition, I will discuss how embodiment in VR could relax the ordinary spatiotemporal constraints for multisensory integration and affect the perception of painful stimuli.

### **Virtual reality bodily illusions and body plasticity. insights from experimental studies**

S. Serino

*Catholic University of Milan, Italy*

There is a growing interest in literature on the use of Virtual Reality (VR) bodily illusions, not only for the chance to improve our understanding about the nature of bodily self, but also for investigating the body plasticity. In particular, an interesting trend has exploited the advances in VR technology to induce embodiment over a virtual body that substitutes the own body thanks to a synchronized multisensory stimulation revealing that this illusion can lead to altered perceptions of own actual body (i.e., participants perceived themselves significantly fatter or thinner than they really are). In the current contribution, I will present evidence from different experimental studies in support of the use of VR bodily illusions to congruently alter the bodily experience in both healthy and clinical population. In the first study, female participants were invited to embody a virtual body with a skinny abdomen. Congruently, they reported significant changes in their body representation towards slimmer body size. In another work, an effect of age in modulating the multisensory bodily experience was found: 26-to-55 years old participants were more resistant to changes induced by the bodily illusion, while 19-to-25 years old participants underestimated their bodies after both conditions. Then, I will discuss findings obtained from a study aimed at dramatically altering participants' body representation using VR-based full body illusion enhanced with a visuo-motor synchrony in which subjects experienced the ownership over an avatar with extreme body size. Eventually, I will present a case report of an obese patient showing how

the use of a VR body-swapping illusion protocol seems to be a promising technique for improving the bodily experience in this population.

### **Wearing my virtual body: behavioral, physiological and neural reactivities elicited by an embodied virtual avatar**

G. Tieri

*Unitelma Sapienza of Rome*

*IRCCS Santa Lucia Foundation, Rome*

The feeling that our body belongs to us (Ownership) and that we are responsible for its actions (Agency) represent the two basic aspects of the Embodiment and are fundamental for bodily self-consciousness and for interacting optimally with objects and other individuals. Over the last two decades neurological and psychological studies have shown that the Embodiment is a plastic construct that relies on brain regions involved in multisensory integration. In this talk, I will present a series of studies where Embodiment and its changes are explored by means of Immersive Virtual Reality. We recorded behavioral, physiological and neural responses underlying changes of embodiment obtained through a mere passive observation of a virtual body in a first-person perspective. I will show how using either Head Mounted Display or CAVE automatic virtual environment system, it is possible to induce a clear illusory feeling of Embodiment over a virtual body and to modify the inducing feeling by manipulating the visual appearance of the virtual body itself and the appropriateness of its actions. Moreover, I will provide evidences that perceptual and motor properties of the virtual body, modulate behavioral, autonomic (skin conductance and skin temperature) and neural (EEG) responses of the people who embody it.

### **Processing language in a virtual environment: the role of the virtual action and navigation**

C. Repetto

*Catholic University of Milan, Italy*

According to the Embodied Cognition approach language is not defined by a set of abstract symbols combined together following predefined formal rules. Instead, as all the other cognitive processes, language is grounded in our sensory-motor systems. Therefore, embodied theories predict that the neural structures involved in processing sensory information are also active when processing words whose meaning embeds prominent sensory features; furthermore, it assumes that

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neural structures required to perform an action are also involved in processing words describing the same action. If language itself triggers motor and sensory-like responses within the sensory-motor areas, the opposite way to understand the relationships between language and action is to investigate if and to what extent motor inputs affect language representation and acquisition. Virtual Reality turns out to be a promising tool to study the relationships between language and the motor system, but also to set up possible empowerment interventions targeting language comprehension and learning. The present contribution will describe studies that employed virtual reality for these purposes. The first two studies investigated the effect of performing a virtual action on the comprehension and learning of action words, respectively. Furthermore, I will present results from an experimental protocol that prompted participants to learn concrete words in a second language within a virtual environment. Finally, the use of a special kind of virtual reality, the 360° videos for second language learning will be discussed.

# **TALK SESSIONS**

## TALK SESSIONS

Wednesday, 4<sup>th</sup> July 2018

### TALK SESSION 1

11:00 - 12:30, Salón Actos Education

#### ATTENTION

##### **Inhibitory tagging in inhibition of return affects ongoing processing of emotion laden stimuli**

L.J. Fuentes<sup>1</sup>, A. Castillo<sup>1</sup>, N. Sánchez-Pérez<sup>2</sup>, & A.B. Vivas<sup>3,4</sup>

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Inhibition of return (IOR) refers to the observation of slower responses to stimuli that are presented at cued compared to uncued locations. When a IOR procedure is combined with other experimental procedures that are assumed to tap either semantic processing or conflict resolution, priming or congruency effects are either inverted or significantly reduced in comparison to the standard effects observed at uncued locations. We claimed that IOR generates an inhibitory tagging (IT) of stimuli presented at the cued location. IT has been assumed to temporarily inhibit the access of activated representations of stimuli at cued locations to the response system. Here we aimed to generalize the IT effect when the procedure involves emotional processing. Our results showed that the affective priming effect at cued locations was intact at very short and long SOAs, but it was reduced at 200-250 ms SOAs, replicating our previous findings with cognitive tasks. The findings suggest that IT is a rather general attention-based inhibitory mechanism that temporarily disrupts the access of stimuli at IOR-affected locations irrespective of their cognitive/emotional properties.

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##### **Attentional instructions modulate context-switch effects after short and long training**

C.P. Cubillas<sup>1</sup>, J.E. Callejas-Aguilera<sup>2</sup>, & J. M. Rosas<sup>2</sup>

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Four experiments in human predictive learning assessed the modulating role of instructions on context-switch effects of acquisition after different levels of training. In

all the experiments a cue X (food name) was paired with an outcome (gastric malaise) in context A (a specific restaurant) while another cue, Y, was presented in the absence of outcome in context B. The series manipulated, the testing context (same or different from the acquisition context), the length of training (short vs. long), and the instructions participants received before testing (attentional or neutral). Attentional instructions intended to either focus participants' attention to the context or to take attention away from the context. In agreement with the predictions of the Attentional Theory of Context Processing, instructions that focused participants' attention on the context led to the presence of context switch effects after long training, that did not appear in the absence of attentional instructions. Conversely, instructions that took away participants' attention from the contexts by focusing it on the cues, led context-switch effects that usually appear after short training to disappear.

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##### **Attentional influences in the implementation of novel task sets**

C. González-García, S. Formica, B. Liefooghe, & M. Brass

*Ghent University*

Unlike other species, humans share the outstanding ability to create new behaviors from instructions. Recent research has revealed that this ability rests partially in a rapid transformation of the declarative content of the instruction into a reflexive-like, procedural format. However, the neurocognitive mechanisms underlying this transformation are still unknown. In a series of experiments, we tested the hypothesis that internal attention selectively prioritizes relevant declarative content, converting it into an action-oriented representation. To do so, we devised a paradigm in which participants had to encode 4 stimulus-response mappings at the beginning of each trial. Immediately after, a retrocue would reveal which 2 of the 4 mappings were relevant. Based on previous studies, we expected this retrocue to elicit internal attention, which, in turn, would proceduralize the selected mappings. Preliminary results support this hypothesis and suggest that an interplay of memory and attentional mechanisms underlies the rapid implementation of novel task sets.

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##### **Distractor expectation modulates proactive control mechanisms in visual search**

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M.A. Petilli, F. Marini, & R. Daini  
*University of Milano-Bicocca*

Literature has long investigated the role of top-down processes in visual search. However, whether proactive control processes are involved in single feature search (pop-out phenomenon) has not been clearly established. We combined visual search and Distraction Context Manipulation (DCM) paradigm, a method for studying proactive processes of distraction filtering. Accordingly, blocks of visual search trials were of three types: Pure (100% distractor-absent trials), Mixed Feature, and Mixed Conjunction (33% distractor-absent and 66% distractor-present trials each) block. The comparison of distractor-absent trials of Mixed versus Pure blocks helped detecting proactive control processes: increases of detection sensitivity and slowing-down of RTs were observed when distractors were expected, yet not presented. Moreover, the RT slowing-down was larger in Conjunction versus Feature Search Mixed blocks. Thus, we concluded that distractor expectation recruits proactive control processes that improve detection sensitivity and entail an RT-cost both in feature and conjunction search, although its magnitude is modulated by the type of search.

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### **Eye movements affirm: The self can hold attention**

M. Dalmaso, L. Castelli, & G. Galfano  
*University of Padova*

Individuals are sensitive to self-related stimuli. Here, two oculomotor experiments were carried out to assess whether two schematic stimuli associated with either the self or a stranger can shape attention holding. First, participants completed a manual matching task in which they were asked to associate the self and a stranger with two shapes (triangle vs. square). Subsequently, in an oculomotor task, participants were asked to perform a saccade from the centre of the screen towards a peripheral target while either the triangle or the square were presented at the centre of the screen. In Experiment 1, saccades had to be performed on each trial - irrespective of the central shape - while in Experiment 2 saccades had to be performed only when the central shape was associated with either the self or the stranger, according to block instruction. Participants were slower to initiate a saccade away from the central shape when this was associated with the self rather than with the stranger, but only when self-related information was task-relevant. These data suggest that stimuli associated

with the self through episodic learning can hold attention in human observers.

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## TALK SESSION 2

### **11:00 - 12:30, Salón Grados Education CONDITIONING AND LEARNING**

#### **Haloperidol-induced conditioned activity**

L. Charcel, L.G. de la Casa, F. Hermoso, A. Mena, F.J. Pérez-Díaz, J.C. Ruiz-Salas, & L. Vicente  
*University of Seville, Spain*

When the effects of a drug are repeatedly associated with a neutral stimulus a Conditioned Response (CR) emerges that can be similar or opposed to the unconditional reaction induced by the drug. In previous experiments it has been demonstrated that administration of a dopamine agonist in the presence of a specific context results in a conditioned increase of activity. However, the evidence of conditioning using dopamine antagonist is scarce and less consistent. In two experiments with rats we injected two haloperidol doses before exposing the animals to an experimental context for 60 min during four consecutive days. Control groups received the drug after context exposure. A free-drug test was conducted to register the CR to the context. The results revealed that the lower dose of haloperidol induced conditioned activity in presence of the context (Experiment 1), and that a treatment of extinction was effective to reduce such CR (Experiment 2). We interpreted these results considering that the lower haloperidol dose blocked presynaptic D2 receptors, resulting in a dopamine increase that supported conditioning.

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#### **Sex differences in a conditioned taste aversion preparation: might the overshadowing and blocking effects be specific for males?**

R. Angulo, B. Bórquez, V. Ramírez, & V. Estades  
*Universidad Autónoma de Chile*

Two experiments were conducted with the general aim to test whether males and females might differ or not in general effects of classical conditioning such as overshadowing (Experiment 1) and blocking

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(Experiment 2). In both experiments a standard conditioning taste aversion preparation was used with adult Sprague Dawley rats as subjects. Experiment 1 found the typical overshadowing effect for males but not for females. Similarly, Experiment 2 found a blocking effect only for males. These findings would be suggesting that males and females might differ in basic learning instances such as the classical conditioning. Furthermore, these results would be challenging the generality of some important learning effects usually addressed only in male subjects. The study emphasizes the importance of investigating a potential sexual dimorphism for the main instances of learning to increase our understanding about this cognitive process.

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### **Schedule-Induced behaviours turn animals more tolerant to delays in a delay-discounting task?**

S. Ramos, E.A. Sjöberg, G.E. Lopez-Tolsa, R. Pellón, & E.B. Johansen  
*Universidad de Sevilla*

Delay discounting is the loss of the subjective value of an outcome as the time to its delivery increases. It has been suggested that the development of schedule-induced behaviour (SIB) can help organisms to be more tolerant to the delays. SIBs develop at an excessive rate during inter-reinforcement times of intermittent reinforcement schedules without explicit arranged contingency with the reinforcer. The main purpose of this experiment was to study how the possibility of developing SIB affects the discount of the subject in a delay-discounting task comparing SHR and Wistar-Kyoto strains of rats. Rats were exposed to an A-B-A design that consisted on presenting the subject with two levers: one that gave a small immediate reinforcer and the other that gave a large delayed reinforcer. During phase A only the levers were presented, and during phase B a water bottle and a running wheel were also available. Results show that the subjects discounted earlier as the phases progressed, and that differences between strains that were observed in Phases A disappeared during Phase B.

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### **The role of hippocampal parasubiculum asymmetry in the learning flexibility of Alzheimer's disease**

M.G. Vaccaro<sup>1</sup>, A. Sarica<sup>1</sup>, R. Vasta<sup>1</sup>, F. Novellino<sup>2</sup>, & A. Quattrone<sup>1</sup>

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<sup>2</sup>*Institute of Bioimaging and Molecular Physiology, CNR, Catanzaro, Italy*

Human brain morphological asymmetries were traditionally correlated to optimal information processing, language function, visuospatial task, attention and many aspects of emotion. Among all regions characterized by lateralization, hippocampus plays a particular role as precursor to broader asymmetrical development and represents an essential hub of network of learning and memory, especially in Alzheimer's disease (AD). Our aim was to investigate for the first time the relationship between hippocampal substructures asymmetry and verbal memory, assessed by Rey's auditory verbal learning test (RAVLT) in healthy controls (HC) and AD. We calculated the asymmetry index (AI) of MRI volumes of 12 hippocampal subfields and their association with RAVLT immediate, learning, forgetting and percent forgetting. Surprisingly, we found in AD that the severity of learning scores (HC:5.75±2.39; AD:1.70±1.62) was negatively correlated with the AI pathological high degree in parasubiculum of AD (HC:8.77±6.12; AD:12.70±9.59). This finding leads us to hypothesize that asymmetrical but not lateralized parasubiculum could play a specific role in learning flexibility of verbal memory and encourage future works about relationship between parasubiculum and learning process, as assessed by other specific cognitive batteries.

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### **The use of Spanish Sign Language as a tool for foreign language learning**

S. Rodríguez-Cuadrado<sup>1</sup>, F. Ojedo<sup>2</sup>, M. A. Sampedro<sup>2,3</sup>, & J. Santiago<sup>2</sup>

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<sup>2</sup>*Universidad de Granada*

<sup>3</sup>*Basque Center on Cognition, Brain and Language (BCBL)*

Foreign words are better learned with gestures, known as the "enactment effect" (Kelly, 2009; Macedonia & Knösche, 2011). Does this effect occur also with abstract words? It is also known that gesture iconicity improves acquisition (Perniss & Vigliocco, 2014), but so far finding iconic gestures for abstract words has escaped any principled approach. Here we used signs from Spanish Sign Language, which has iconic and non-iconic signs for both concrete and abstract words. Forty-



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two participants were presented with nouns in "Vimmi", randomly matched with an abstract or concrete Spanish noun and a video of an iconic or non-iconic sign, or a static picture. Participants were exposed to the Spanish-Vimmi associations and completed free and cued recall tests. They were tested again one week later. Words were better learned when concrete and when matched with an iconic sign. Abstract words matched to a non-iconic sign did not show any enactment effect.

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### TALK SESSION 3 12:30 - 14:00, Salón Actos Education ATTENTION NEUROSCIENCE

#### **Mapping the neuropsychological profile of Alzheimer's Disease using graph theory**

A. Nevado<sup>1,2</sup>, D. del Rio<sup>1,2</sup>, J. Garcia-Pacios<sup>2,3</sup>, & F. Maestú<sup>1,2</sup>

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Graph theory was used to characterize neuropsychological data from healthy, mild cognitive impairment (MCI) and dementia (DM) groups, defined according to the Clinical Dementia Rating. The neuropsychological battery from the National Alzheimers Disease Coordinating Center (NACC) was employed. A simple interactions model provided a good fit of the results from a correlation analysis. The DM group showed the most compact interaction graph, while the healthy ageing group displayed the most linear organization. Intergroup comparison showed increased interactions between test scores for the MCI as and especially for the DM group as compared to the healthy group. Furthermore, a community analysis revealed that neuropsychological scores were organized along the axis Attention - Executive Function - Language - Memory for all three groups. Nevertheless, functional communities were most stable for the healthy group. The present analysis provides new insight into the organization and interrelations of the distinct aspects of cognitive functioning for groups with different cognitive status.

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#### **Making simple auditory perceptual decisions is modulated by subcortical sound processing**

N. Gorina-Careta & C. Escera

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Simple auditory perceptual decisions are thought to be mediated by neural computations occurring in the ventral auditory pathway. Indeed, throughout the structures that conform this pathway, auditory information is organized and processed in a hierarchical manner, with complex feature processing taking place in higher areas of the auditory hierarchy. However, recent studies have demonstrated that sound processing is not carried out exclusively in cortical regions so that the subcortical auditory pathway also has an active role in the perception and processing of the incoming sounds, consistent with the hypothesis of a distributed network for perceptual organization. To assess how auditory simple cortical perceptual processing relies on preceding subcortical processing, here we recorded the Frequency-Following Response (FFRs) to a set of pure tones of 20 different frequencies, as well as the behavioral response times to these same sounds before and after the FFR recording. Together, our findings support that subcortical sound processing has an important role in making of simple perceptual decisions, thus providing support that the evidence accumulation models are not only limited to cortical activity as they should also take into consideration the subcortical contribution.

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#### **Implicación simpática en la modulación atencional de la respuesta cardíaca de defensa**

A. Garrido, J. Otero, J.L. Mata, E. Volchan, & J. Vila

*Universidad de Granada*

La respuesta cardíaca de defensa (RCD), provocada por un estímulo auditivo intenso, se ve incrementada cuando simultáneamente se realiza una tarea atencional de búsqueda visual. Sin embargo, se desconoce el mecanismo fisiológico (simpático-parasimpático) que media dicha modulación. En el estudio participaron 45 estudiantes divididos aleatoriamente en tres grupos. Todos recibieron dos presentaciones de un ruido blanco para provocar la RCD con un intervalo entre los estímulos de 12,5 minutos. El grupo 1 y el grupo 2 inmediatamente después del ruido iniciaron una tarea de búsqueda visual que duraba 80 segundos, el grupo 1 con imágenes visuales emocionalmente neutras y el grupo 2 con letras. El grupo 3 no realizaba ninguna tarea. Se registro el electrocardiograma y la cardiografía de

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impedancia para obtener el período cardíaco (índice de la RCD) y el período de pre-eyección (índice de la mediación simpática) latido-a-latido durante el tiempo de la tarea. Los tres grupos mostraron una inhibición seguida de una activación simpática. Sin embargo, la inhibición fue más prolongada en los grupos 1 y 2 que mostraron la RCD incrementada.

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### **Atención endógena a estímulos amenazantes en movimiento**

U. Fernández-Folgueiras, C. Méndez-Bartolo, M. Hernández-Lorca, C. Bodalo, T. Giménez-Fernández, & L. Carretié

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Numerosos estudios han mostrado que los estímulos negativos modulan la atención endógena. Algunos datos indican que los atributos visuales procesados preferentemente por la vía magnocelular juegan un papel crucial en este sesgo. En este estudio manipulamos el movimiento, también procesado por la vía magnocelular, para explorar esta cuestión. Los participantes (N=63) realizaron una tarea en la que debían dirigir su atención endógena a estímulos estáticos o aproximándose “gracias al uso de gafas 3D de obturación de litio- que consistían en animales positivos, negativos y neutros (previamente evaluados afectivamente por una muestra independiente de N=70). Los resultados muestran que los participantes presentaron amplitudes máximas en el componente LPP centro-parietal, consistentemente asociado con la atención endógena, ante estímulos amenazantes (negativos) que se aproximan. Estos resultados indican que el movimiento modula la atención endógena incrementando su intensidad especialmente en estímulos amenazantes, lo que sustenta la importancia de la vía magnocelular en este proceso.

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### **Is there such a thing as exogenous feature based attention?**

A. Carboni<sup>1</sup>, L. Gómez<sup>1</sup>, D. Kessel<sup>2</sup>, & M. Carrasco<sup>3</sup>

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Feature-based attention (FBA) optimizes our visual system enhancing the representation of specific aspects (e.g., color, orientation, or motion direction) throughout the visual field. This process is specially useful when searching for a particular stimulus feature. Most previous evidence has proposed that FBA is endogenously controlled, however exogenous FBA mechanisms are still scarcely explored.

The aim of the present study was to investigate whether exogenous FBA can benefit signal discriminability. To this end, participants were asked to detect changes in saturation after a non-informative color cue. In this experiment, the cue feature (color) was not relevant for the task (detection of saturation changes). Results did not provide evidence confirming the existence of an exogenous FBA effect on target discriminability. However, in a second task, where participants were asked to detect the color of a target after a non-informative color cue (i.e., the feature of the cue was relevant for the task), facilitation and interference effects of the exogenous cues were present. This indicates that these mechanisms of FBA might not operate completely exogenously.

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## TALK SESSION 4

**15:00 - 16:00, Salón Actos Psychology**

### **METHODOLOGY**

#### **Data-driven observation: The application of adaptive assessments during standard observations**

U. Granziol, A. Spoto, & G. Vidotto

*University of Padua*

The computerized adaptive assessments are increasingly used in psychodiagnostics. Their use, nonetheless, is limited to self-report measures. Assessments such as observations are still linked to methods that are both time-consuming and prone to inferential errors. The present study aims at introducing the so-called data-driven observation, intended as the application of computerized adaptive assessment to standard observations. A data-driven observation suggests online which behavior should be observed, based on the ones previously observed. Two expert clinicians were asked to perform, independently and blindly, psychological assessments on 30 patients with different diagnosis, using both standard and data-driven observations on each patient. The assessments were performed into two

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sessions, distant one week each other, in which the observation procedure for each patient was randomly assigned, in order to reduce the order effect or any kind of learning. Results showed that, for each patient, the data-driven observation completed the whole assessment asking 40% less behaviors, giving a diagnosis that converged with the one obtained using the standard observation. Results suggest that data-driven observation could be effectively applied in psychodiagnostics.

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### **The effect of missing data on the goodness-of-fit of a model in the knowledge space theory framework**

D. de Chiusole, P. Anselmi, L. Stefanutti, & E.

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With complete data, the likelihood ratio (LR) test can be regarded an absolute fit index that uses the saturated model as the most complex one. When some responses in the data are missing, the likelihood of the saturated model cannot be computed anymore and thus, the LR test cannot be obtained. A procedure for getting around the problem is provided, that is adequate for some of the probabilistic models developed in the framework of knowledge space theory. Although the algorithms for estimating the parameters of these models proved to be adequate, the effect of missing data on their goodness-of-fit was never explored. Simulation results show that the probability of not rejecting a false model increases as the proportion of missing data increases and as sample size decreases. Moreover, the power of the test is affected more by the proportion of missing data than by the sample size. The generalization of these results to different theoretical frameworks (e.g., structural equation modeling) is discussed.

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### **I do (not) agree. It depends**

A. Spoto<sup>1</sup>, M. Nucci<sup>1</sup>, G. Altoè<sup>2</sup>, & M. Pastore<sup>2</sup>

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We introduce a methodology to accurately estimate inter-rater agreement going beyond the observed (Simple Percentage Agreement) or corrected (Cohen's kappa) count of agreements in a classification task. This

is done by defining the concepts of raters' theoretical beliefs (belonging degree of an object to a category) and threshold (minimum belonging degree to classify an object into a category), both involved in the classification task. Two Bayesian models were tested through a Monte Carlo simulation study for evaluating the accuracy of this methodology in estimating both raters' threshold and the "actual" degree of agreement between two independent raters. Results show that the introduction of raters' threshold in the evaluation of inter-rater agreement represents an evident improvement in the estimate of this construct. More specifically, traditional estimates are accurate when raters' thresholds are sufficiently close to one another, but they are rather unreliable when differences between thresholds increase. The proposed methodology improves the reliability of the estimates in both cases. Finally, it is discussed how the methodology can be extended to more than two raters case.

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### **Enhancing computerized adaptive testing with batteries of unidimensional tests**

P. Anselmi, E. Robusto, & F. Cristante

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Test batteries are usually designed to measure a set of distinct but related traits. Since the correlations between traits may be substantial, it would be a waste to ignore the information provided by them in the process of computerized adaptive testing (CAT). The article presents a CAT procedure for use with batteries of unidimensional tests. At each step of the assessment, the estimate of a certain trait is updated on the basis of the response to the administered item and of the estimates of the other traits obtained up to that step. A simulation study was carried out, in which the number of tests in the battery (from 3 to 5) and the size of correlation between the traits (from .1 to .9) were manipulated. The proposed procedure is found to outperform existing CAT procedures with respect to efficiency (number of administered items) and accuracy (bias of trait estimates). The gains in efficiency and accuracy increase with the number of tests in the battery and with the correlation between the traits.

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## TALK SESSION 5

## TALK SESSIONS

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### 15:00 - 16:00, Salón Grados Education REASONING/CONTROL

#### **Relational alignment: A benefit of icons for Bayesian reasoning**

E. Tubau, J. Rodríguez-Ferreiro, I. Barbería, & A. Colom

*Universitat de Barcelona*

Previous studies on Bayesian problem solving have shown that iconic representations help infer frequencies in represented arrays. Nevertheless, the mechanisms by which icons enhance performance remain unclear. Here, we tested the hypothesis that the benefit offered by icons lies in a better relational alignment, which should facilitate the comprehension of numerical ratios, beyond the represented frequencies. To this end, we analyzed individual risk estimates based on data presented either in standard verbal presentations (percentages and natural frequency formats) or as icon arrays. Compared to the other formats, icons led to estimates that were more accurate and, importantly, promoted the use of equivalent expressions for the requested probability. Furthermore, whereas the accuracy of the estimates based on verbal formats depended on their alignment with the text, all the estimates based on icons were equally accurate. Therefore, these results support the proposal that icons enhance the comprehension of the ratio and its mapping onto the requested probability, and point to relational misalignment as potential interference of standard verbal presentation for Bayesian reasoning.

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#### **Causal judgments are affected by outcome base-rate expectations**

F. Blanco & H. Matute

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As shown previously, people tend to exhibit causal illusions under some circumstances. Particularly, they produce high judgments of causality despite the absence of actual causality, when the outcome is presented with high probability. In two experiments, we showed that this causal illusion is sensitive to prior expectations about the frequency with which the outcome would occur. Specifically, we pre-trained participants to expect either a high outcome base-rate (Experiment 1) or a low outcome base-rate (Experiment 2). This pre-training was followed by a standard learning task in which the cause and the outcome were not causally related. Subsequent

causal judgments were affected by the pre-training: when the outcome base-rate was expected to be high, the causal illusion was reduced, and the opposite pattern was observed when the outcome-base rate was expected to be low. We discuss several theoretical accounts for these results.

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#### **Evidence of non-normative strategies when combining causes**

N. Ortega-Castro<sup>1</sup>, I. Barbería<sup>2</sup>, M.A. Vadillo<sup>3</sup>, M. & A.G. Baker<sup>4</sup>

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Causal learning models make different assumptions about how people should combine the influence of different potential causes when presented in compound. While some models propose that the causal impact of a compound should equal the linear sum of each of the causes presented in isolation, other models suggest that the sum of the causes should be corrected by subtracting the overlap between them (i.e., people should use the noisy-or integration rule). The present series of experiments was designed to test which integration rule people use. The experiments used different cover stories (to ensure that participants assumed that the candidate causes were independent), different sets of probabilities and several presentation formats (described vs. experienced).

The results of the experiments consistently differ from the predictions of the noisy-or integration rule. People do not seem to use this rule spontaneously. We discuss the implications of our results and alternative explanations for our pattern of data.

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#### **Do proactive and reactive mechanisms of control modulate the relationship between executive control and conscious perception?**

I. Colás & A.B. Chica

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Attentional processes are important for the selection of information that reaches consciousness (Chica et al., 2012; Petersen et al., 2017). Executive control is one of

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the attentional systems that modulate conscious perception of visual stimuli (Colás et al., 2017; Colás et al., 2018). In this study, we tested whether the implementation of two types of executive control, reactive and proactive control (Braver, 2012) could modulate conscious perception. We designed a Stroop task where we manipulated stimulus' proportion congruence in two contexts, so that each context would trigger either reactive or proactive control. In addition to responding to the Stroop task, participants had to detect a near-threshold stimulus that was presented concurrently to the Stroop stimulus. Finally, we included an Operation Span task in order to assess participants' working memory capacity (WMC), as high WMC individuals tend to use proactive strategies of control (Richmond et al., 2015). The results of this experiment will shed light on the influence of adopting different control mechanisms over conscious perception, by exploring the impact of task contingencies and individual differences.

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### TALK SESSION 6

#### 16:00 - 17:30, Saló Actos Education LANGUAGE

##### **How are ambiguous words processed? Behavioral and EEG evidence of the role of number of meanings, relatedness of meanings and stimuli selection criteria**

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Ambiguous words are usually recognized faster than unambiguous words in LDT. The reason seems to be that the multiple meanings of ambiguous words engage a lot of semantic activation during word processing. However, it is not clear how this enhanced semantic activation would facilitate recognition. In addition, several studies suggest that the ambiguity advantage is not due to number of meanings (NOM), but to relatedness of meanings (ROM). In this work we conducted a series of seven experiments to address some issues on ambiguous word processing. We recorded behavioral and EEG data (i. e., ERPs) during LDT to assess the role of NOM and ROM. We also examined whether the criteria used to select ambiguous words influences LDT results. Finally, we looked for the cause

of the ambiguity advantage by using a 2AFC task. The results suggest that NOM facilitates recognition by triggering a large semantic-orthographic feedback. However, this facilitation only arises when NOM is obtained from participants' ratings (but not from the dictionary). Moreover, ROM seems to have no effect on word recognition.

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##### **Differentiating unimodal and bimodal bilinguals: A tractography study**

C. Quartarone, S. Budisavjevic, E. Navarrete, U. Castiello, & F. Peressotti  
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The last few years have seen a strong increase of interest on the study of the bilingual brain and its neural connectivity. Despite this, little attention has been devoted to the study of the structural modifications occurring in the bimodal bilingual brain and, especially, on the effect of the neuroanatomical organization due to the different language modality (verbal-signed). In the current study, Diffusion Tensor Imaging (DTI) has been used in 24 bimodal bilinguals and in 25 unimodal bilinguals in order to investigate the white matter tracts. Tractography was applied to isolate the three ventral fasciculi of the language network. Participants also performed behavioral tests in both the first (Italian) and the second language (English-Italian Sign Language). Diverse measures of (a) production (fluency and picture naming), (b) comprehension (identification of different violations in sentences) and (c) fine motor skills have been collected. Morphological data were correlated with behavioral measures in order to better describe the architecture of the language-processing system. The results will be discussed taking into account the current theories of language processing.

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##### **Language rule learning is associated with flexible mechanisms of temporal attention: Evidence from adults, typically developing children and children with language impairment**

A. Martínez-Alvarez<sup>1</sup>, P. Ripollés<sup>2</sup>, M. Sanz-Torrent<sup>1</sup>, F. Pons<sup>1</sup>, & R. de Diego-Balaguer<sup>1</sup>

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Language has commonly been associated to the uniquely human ability to comprehend and produce syntactic structures, which entails non-adjacent

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dependencies such as in "The book [that they are reading] is very well written". Given the temporal nature of speech, recent proposals postulate that temporal attention may scaffold language acquisition (de Diego-Balaguer, Martinez-Alvarez, & Pons, 2016). We tested the hypothesis that successful learning of non-adjacent dependencies requires the correct orienting of attention in time. To do so, three experiments assessed temporal attention and rule extraction in adults ( $n = 22$ ), typically developing children ( $n = 68$ ), and children with Specific Language Impairment (SLI;  $n = 23$ ). Overall, the results confirmed that participants succeeding and failing in the language task differed in their temporal orienting abilities. More specifically, learners demonstrated better temporal abilities in the invalid condition, suggesting a more flexible attention mechanism. In the SLI group, this pattern of results was restricted to the long temporal condition, suggesting difficulties in the hazard function. Interestingly, in both TD and SLI children, the evaluation of natural language tasks provided further evidence on the relationship between temporal attention and syntactic structure -but not vocabulary-comprehension.

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### **Processing gender agreement errors in negative words: An ERP study**

I. Padrón<sup>1</sup>, J.A. Hinojosa<sup>1</sup>, & I. Fraga<sup>2</sup>

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The purpose of this work was to examine whether the processing of gender agreement errors is affected by the presence of unpleasant words, since previous event-related potential (ERP) studies in this domain have found inconsistent results in the LAN/N400 time window (e.g., Hinojosa et al., 2014; Fraga et al., 2017). In this ERP study we used noun-phrases (Det + Noun + Adjective) in which the adjective could be neutral or unpleasant and could agree or not in gender with the preceding noun. Results showed early effects of emotionality (N100), the classical effects of grammaticality (LAN/N400 and P600), as well as an interaction between grammaticality and emotionality in the LAN/N400 time window. However, in contrast to Hinojosa et al.'s results (2014), we found an augmented LAN for unpleasant adjectives. These results are interpreted in terms of additive effects elicited by the presence of both the morpho-syntactic error and the negative word. Likewise, individual differences in this

component will be analyzed to shed light on results obtained across studies.

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### **ERP correlates of semantic and syntactic processing in pre-verbal cochlear implant users**

L. Artesini<sup>1</sup>, V. C. D'Avanzo<sup>2</sup>, E. Ragusa<sup>1</sup>, D. Musola<sup>1</sup>, A. Chini<sup>3</sup>, F. Bonfioli<sup>3</sup>, G. N. Frau<sup>3</sup>, F. Vespignani<sup>1</sup>, & F. Pavani<sup>1,4</sup>

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Profound deafness can limit language acquisition, impacting on oral and written language processing. Research on written language processing in deaf children revealed specific difficulties in syntactic and grammatical abilities, even in individuals who partially recovered hearing through cochlear implants (CI). In agreement with these behavioral results, EEG studies in congenitally deaf adults without CI showed typical N400 responses triggered by semantic incongruities, but no P600 effects in response to syntactic agreement violations. Here we tested 15 early deaf CI users and 48 normal-hearing controls, using EEG and behavioral measures, to evaluate the impact of CI on written sentence processing. In CI users and normal-hearing controls alike, we documented N400 and P600 responses to semantic and syntactic violations, respectively. These results emerged at both group and single-subject level. In the syntactic condition, we also measured larger P2 responses in CI users compared normal-hearing controls, at left-frontal sites. Taken together these results suggest that CI use can promote hearing-like brain responses to syntactic violations (intact P600), with possibly greater reliance on orthographic than phonological processing (enhanced P2).

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## TALK SESSION 7

**16:00 - 17:30, Salón Grados Education PERCEPTION**

**Preference for curvature in real paintings**

## TALK SESSIONS

E. Munar<sup>1</sup>, R. Pepperell<sup>2</sup>, J. Vañó<sup>1</sup>, & N. Ruta<sup>2</sup>

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Preference for curvature is a well-known cognitive effect. It has been proved with many different types of stimuli. However, as far as we know, there are no experimental results with real paintings. With this aim, Robert Pepperell painted a collection of 48 paintings distributed in three subsets according to the type of contour: curved, sharp-angled and mixed. To wit, there were three versions of the "same" painting. We carried out an experiment with two tasks using the digital versions of those paintings. The two tasks were intended to test preference for curvature in the liking and wanting processes, with explicit and implicit measures. Results showed clear preference for curvature in the liking task. However, in the wanting task, preference for curvature was only significant as the task advanced.

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### **Testing the usability of sensory substitution devices through the perception of affordances**

C. de Paz<sup>1</sup>, D. Travieso<sup>1</sup>, L. Lobo<sup>2</sup>, J. Ibáñez<sup>1</sup>, & D.M. Jacobs<sup>1</sup>

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<sup>2</sup>*Universidad Isabel I de Burgos*

This presentation reports results on two experiments in which sensory substitution devices (SSDs) are used to perceive the climbability of steps and the passability of vertical apertures. Both the design of the SSDs and the experimental tests make use of the concept of affordances.

The first experiment tests if blindfolded participants can use a vibrotactile SSD to estimate if they can climb steps of different heights. Results show that participants scale the step to be climbed as a function of their own leg length. Moreover, they produce similar estimations to that of sighted participants.

The second experiment tests if blindfolded participants can use a different vibrotactile SSD to estimate if they can pass through vertical apertures of different widths. Again, results show that participants scale their estimation, in this case to their shoulders width. In this experiment, we also compare a crossmodal visual training with a haptic training, without finding significant differences in performance. Finally, we analyse the movements performed by participants with a motion tracking system, showing their relevance on performance.

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### **Do animals perceive the Delboeuf illusion? A large-scale study in mammals, reptiles and fishes**

M. Santaca<sup>1</sup>, B. Regaiolli<sup>2</sup>, T. Lucon-Xiccato<sup>3</sup>, M. Dadda<sup>1</sup>, M.E. Miletto Petrazzini<sup>1</sup>, C. Spiezio<sup>2</sup>, A. Wilkinson<sup>4</sup>, & C. Agrillo<sup>1</sup>

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<sup>2</sup>*Parco Natura Viva - Garda Zoological Park*

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<sup>4</sup>*University of Lincoln*

Visual illusions are commonly used in animal cognition studies to compare visual perception among vertebrates. Few studies have investigated sensitivity to visual illusions in fishes and none in reptiles and prosimians. We investigated whether fishes (*Poecilia reticulata*, *Danio rerio*, *Pterophyllum scalare*), reptiles (*Pogona vitticeps*, *Geochelone carbonaria*) and lemurs (*Lemur catta*), perceive the Delboeuf illusion, a distortion illusion (according to Gregory's classification) consisting in the misperception of the size of an object due to the surrounding context. We adopted the same spontaneous paradigm in all species; in particular all subjects were observed in their natural tendency to select the larger amount of food. In control trials, we presented two different food portions in two identical plates. In test trials, we presented equal food portions in two plates differing in size: if subjects were sensitive to the illusion, they were expected to select the food portion presented in the smaller plates. The different species showed distinct performances with the illusory pattern, suggesting the intriguing possibility that the perceptual biases affecting size discrimination might be different among vertebrates.

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### **Interactions between grouping principles in touch: Evidence from phenomenological and psychophysical tasks**

A. Prieto, J. Mayas, & S. Ballesteros

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We conducted 4 experiments to investigate the interactions between the grouping principles of spatial-proximity and texture-similarity in touch by adapting three different paradigms previously used in vision. In Experiment 1, participants rate the strength of grouping in acting-alone and conjoined (cooperative and competitive) conditions, using phenomenological judgments. In Experiment 2, we used a psychophysical directed attention task, in which objective responses were defined by selectively attending to a specific

grouping cue in different blocks of trials. Finally, Experiments 3 and 4 employed two variations of the repetition discrimination task (proximity and similarity grouping, respectively), a psychophysical task that do not requires explicit attention to the grouping process while providing objective correct responses and preventing possible strategic effects derived from the directed attention tasks. Our results suggest that spatial proximity dominated the haptic perceptual scene when both grouping principles compete within the same stimulus. These results are compatible with an additive model of grouping effects, as indicated by the relative grouping strengths of acting-alone and conjoined conditions.

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**ERP correlates of perceptual competition between Gestalt grouping cues**

C. Villalba García<sup>1</sup>, M. Jiménez<sup>2</sup>, P.R. Montoro Martínez<sup>2</sup>, & J. A. Hinojosa<sup>1</sup>

<sup>1</sup>*Facultad de Psicología, Universidad Complutense de Madrid, Spain; Instituto Pluridisciplinar, Universidad Complutense de Madrid, Spain*

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From the pioneering proposal of Gestalt psychologists, a century ago, perceptual grouping laws were proposed in order to explain how our system organize our visual scene. However, previous research has focused principally on the study of isolated grouping laws. To step forward, in an event-related potentials (ERPs) study, we examined the dynamics of the competition between two classical grouping principles: proximity and shape similarity. Firstly, our analyses revealed a N200 component modulated by the interaction between both grouping cues, which appears to reflect the visual salience and/or the processing fluency of the shape similarity grouping cue. Particularly, it could be considered an indirect brain signature of the competitive interaction between grouping cues. Secondly, we observed larger P300 amplitudes elicited by single compared with competing trials, as well as by proximity relative to shape similarity cues. This component could reflect higher perceived confidence in decisions during the processes joining perception to action. Similarly, our behavioural data revealed a larger interference effects of shape similarity on proximity cues when both cues compete.

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Thursday, 5<sup>th</sup> July 2018

**TALK SESSION 8**

**9:00 - 10:30, Salón Actos Education EMOTION**

**The cognitive costs of emotion regulation: A study on the effects of WM Shifting and Updating on rumination of emotional experiences**

A. Curci, F. Battista, & T. Lanciano

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The focus of the present work is to investigate the consequence of resource competition between post-emotional processing and concurrent Working Memory (WM) tasks. Previous studies have shown that such a resource competition engenders both short-term (e.g., defeats in the execution of the WM task) and long-term effects (e.g., procrastination of rumination following an emotional experience). We thus expected that these effects vary as a function of the different WM component involved (mental set shifting SH, Study 1; information updating UP, Study 2). Participants of low vs. high WM were administered one out of two variants of a visuospatial task (SH or UP) adopted by Curci and coll.'s (2015) before and after a negative vs. neutral manipulation. Rumination was assessed immediately and after the second task performance. Results showed that emotional experience impaired cognitive performance and influenced the persistence of rumination, as a function of the cognitive resources triggered by each of the two WM components.

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**Contextual influences in the interpretation of facial expressions: a high-density EEG investigation on the Kuleshov effect**

M. Calbi<sup>1</sup>, F. Siri<sup>1</sup>, K. Heimann<sup>2</sup>, D. Barratt<sup>3</sup>, V. Gallese<sup>1,4</sup>, & M.A. Umiltà<sup>1</sup>

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So far, little has been done to explore contextual modulations on facial expressions processing at a physiological level. This study fits in this gap by employing an original paradigm based on the cinematographic "Kuleshov effect". High-density EEG was recorded while participants watched film sequences consisting in three shots: the close-up of a target person's



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neutral face (Face1), a view of an emotional (happy, fearful or neutral) context and a close-up of the same target person's neutral face (Face2). The task was to rate both valence and arousal, and subsequently to explicitly categorize, the target person's emotion. We focused on Late Positive Potential (LPP) evoked by Face2. Results showed higher LPP amplitude in response to neutral faces in emotional contexts than to neutral faces in neutral contexts. This modulation involved brain regions related to emotional faces processing. Coherently, behavioural results showed a significant effect in terms of valence, arousal and categorization. Our results shed new light on the comprehension of neural and temporal correlates underpinning the context-sensitivity of facial expression of emotions.

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### **¿Qué impacto tiene exponernos a la luz artificial sobre nuestra fisiología y estado psicológico?**

Á. Correa, B. Rodríguez-Morilla, A. Barba, F. Padilla, & J.A. Madrid

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Desde la revolución industrial se ha intensificado el trabajo nocturno y la exposición a luz artificial. Cuando se cronifica esta falta de sincronía con nuestro ritmo natural circadiano, aparecen trastornos afectivos y del sueño. ¿Qué ocurre a más corto plazo?

Presentaremos los resultados de cinco años investigando los efectos a corto plazo de la exposición a luz artificial sobre la activación fisiológica, el estado afectivo y la capacidad para realizar tareas cognitivas.

Una muestra de 156 adultos jóvenes fue expuesta durante más de 20 minutos a luz blanca enriquecida en azul (activa sistema circadiano y arousal), luz naranja (no altera el ritmo circadiano) y en penumbra.

Medidas: temperatura de la piel como marcador fisiológico circadiano, afecto subjetivo y ejecución en tareas de vigilancia y control inhibitorio (conducción simulada y SART).

Encontramos evidencia sólida de un efecto estimulante de la luz azul sobre la activación fisiológica que es congruente con una potenciación de la alerta, acelerando la ejecución de respuestas automatizadas a costa de interferir la precisión de respuestas que requieren mayor control cognitivo.

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### **Reducing negative emotions through anodal tDCS over the right ventrolateral cortex**

A. Vergallito, P. Riva, A. Pisoni, & L.J. Romero Lauro  
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The incapacity to suppress negative emotions is considered a key factor in the genesis and maintenance of many psychopathological diseases. In the past decades, non-invasive brain stimulation techniques have emerged as adjuvant treatment of psychiatric and mood disorders with promising, even though controversial, results.

Here we explored the possibility of reducing negative emotions in healthy subjects by applying anodal tDCS over the right ventrolateral cortex (rVLPFC), a region which plays a critical role in emotion regulation.

96 Italian students took part in a double-blind, between-subjects, sham-controlled study and watched short video clips eliciting different emotions during anodal or sham tDCS over the rVLPFC. Emotional reactions to each video clip were assessed with self-report scales measuring eight basic emotions. Results showed that, as compared to the sham condition, tDCS over the rVLPFC reduced the perceived extent of certain negative emotions, namely, fear, anxiety, and sadness, without affecting neutral or positive feelings. Our results support the usefulness of tDCS to modulate negative emotions and the specific role played by rVLPFC in emotion perception and regulation.

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### **Linguistic predictors of online grooming typologies: Examining levels of deception in online grooming chats**

L.J. Broome & C. Izura  
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Online grooming (OG) is a communicative process of entrapment. Using normal, everyday chat, groomers persuade and manipulate minors into sexual behaviour using technology. Deceptive Trust Development is a core grooming process, in which their intention of sexual abuse is hidden behind a false, intimate relationship. Yet our previous findings show that groomers can be honest about their intentions for a relationship. The present study will examine levels of deception depending on the objective of the groomer (intimacy vs. sex). Sixty-seven chat logs from convicted OG's will be categorised into the three grooming types presented by the European Online Grooming Project; intimacy seeking, adaptable and hypersexual groomers. Using empirical markers of deception (emotional expression, pronoun use and cognitive complexity),

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predictive markers of behaviour will be explored and discussed against a new model of OG communication. If we can understand the underlying mechanisms involved in the entrapment of victims, we can be better equipped to safeguard young people. Furthermore, language predictors are needed to effectively guide machine learning systems in the detection and prevention of online predation.

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### TALK SESSION 9 12:30 - 14:00, Salón Actos Education AGING

#### Physical training vs motor training as cognition enhancers of different driving mechanisms

Y. Netz

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The presentation will focus on the mode of exercise as a moderator of exercise-cognition relationship in healthy older adults. Modes of exercise include: aerobic activity, strength training, flexibility, balance, and coordination. These components will be further categorized into physical training (aerobics, strength, flexibility) and motor training (balance and coordination).

Chronologically, physical training, mainly aerobic and strength, were explored first as enhancers of cognition. In this respect, studies examining the chronic and acute effect of exercise will be described, as well as studies comparing aerobic to strength exercise. Motor training studies, examining the effect of balance and coordination on cognition as compared to physical training will then be explored, followed by the latest studies comparing traditional motor or physical training modes to more sophisticated methods using modern technology (e.g. exergames), which integrate cognitive stimulations into the physical/motor training.

A model proposing the driving mechanism behind cognition enhancing of each of the two types of training will be presented.

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#### Does computerized cognitive training maintain older brain functionality?

S. Ballesteros<sup>1</sup>, J.M. Reales<sup>1</sup>, A. Prieto<sup>1</sup>, J. Mayas<sup>1</sup>, E. Ruíz-Márquez<sup>1</sup>, P. Toril<sup>1</sup>, M. P. Jiménez<sup>1</sup>, & M.L. de Ceballos<sup>2</sup>

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Motivated by brain plasticity, this randomized controlled trial (RCT; Clinicaltrials.gov ID: NCT02796508) investigated behavioral and brain effects of training elders with non-action adaptive games (Lumosity; <http://www.lumosity.com/>) on measures of WM and attention. In the study participated an active-control group trained with simulation non-adaptive strategy games (The Sims; SimsCity). Participants were assessed at pre-test, post-test and at 3-month follow-up. The results showed: 1) both groups improved in WM (n-back and Corsi tasks) with improvements maintained at follow-up; 2) in the attentional tasks, the active-controls were less distracted (oddball task) while inhibition did not change (Stroop and NP task); 3) C-reactive protein levels (a measure of inflammation) were similar in both groups across assessment points. The results concerned the modulations of N2 and N450 component as markers of interference resolution (Stroop task), along with changes in the P3b component as an indicator of distraction/alertness allowed to conclude that non-action games produce similar benefits than strategic games. A new RCT investigates whether multi-domain training increases transfer benefits to executive control in older adults compared to unidomain training.

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#### tDCS polarity-dependent changes in physiological and pathological brain aging: a TMS-EEG study

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Physiological aging and Alzheimer's Disease (AD) are characterized by synaptic dysfunctions with consequent excitability alterations. We aimed to investigate age- and AD-dependent excitability changes in the prefrontal cortex (DLPFC), by applying transcranial direct current stimulation (tDCS). TMS-EEG recordings were performed to monitor the tDCS-induced effects on

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cortical excitability. 14 healthy young, 14 healthy elderly subjects and 10 AD patients received separately anodal, cathodal and sham tDCS. Before and after the tDCS, performance in a working memory task was assessed, while 32-channel EEG was recorded in order to evaluate ERPs. As our main result, we found a cortical excitability increase after cathodal and a decrease after anodal tDCS in young subjects. Opposite cortical patterns were found in elderly subjects. AD patients showed a reduced cortical excitability after both anodal and cathodal tDCS. Our results show that tDCS-induced effects in physiological and pathological aging are non-linear, probably due to specific plasticity alterations. Measuring cortical excitability modulation induced by tDCS may provide neurophysiological markers of cognitive decline and might represent the starting point for development of neuro-rehabilitation strategies.

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### **Age differences on implementing of remember vs. forget instructions on intentional forgetting: an ERP study**

P. Alfonso & J. Menor  
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The effect of aging on processing of Remember (R) and Forget (F) instructions on intentional forgetting was investigated. ERPs were recorded while 23 younger and 23 older adults completed a directed forgetting task (item-method) for negative and neutral words. A visual detection task after memory instruction to measure the cognitive demand of instantiate an R vs. F cue was used. P3 amplitude was greater for R than F cues over posterior sites in both groups but this effect was higher for younger than older adults. N2 amplitude was larger for F than R instructions at anterior sites only in the younger group. Longer Post-F probe RTs compared to Post-R probe RTs were found in younger adults while no differences were found in the older group. Overall, the electrophysiological differences in processing of R vs F instructions on N2 amplitude and performance in visual detection task suggest that younger adults are implementing inhibitory mechanisms, whilst older adults are not executing these mechanisms probably due to an inhibitory processes deficit.

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### **Age-related changes in familiarity and recollection for short-term recognition**

R. Linares, M.T. Lechuga, & S. Pelegrina

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We investigated the contribution made by familiarity and recollection to age-related differences in short-term recognition. Four age groups (8-, 11-, 14-, and 21-year olds) were administered two recognition tasks. Six-item lists associated with three semantic categories were presented consecutively. In a working memory updating (WMU) recognition task, children had to determine whether a probe had been the last item for its category, whereas in a short-term memory (STM) recognition task they had to judge whether a probe had been presented in the list. In the WMU task, correct responses require recollection because familiarity is not diagnostic of the probe status. In the STM task, correct responses may be based on familiarity and recollection. Results showed that recognition performance in WMU and STM tasks increased with age. Age differences were observed in recollection but not in familiarity estimates. Improvements in short-term recognition throughout childhood and adolescence seem to be associated with age-related changes in recollection-based processes.

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## TALK SESSION 10

### **12:30 - 14:00, Salón Grados Education SOCIAL COGNITION**

#### **Behavioural and neural correlates of the semantic of physical and social pain**

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Pain perception is modulated by cognitive variables and its neural counterpart may be activated by innocuous stimuli when associated with pain. Moreover, experiences such as social loss/rejection/exclusion are often described as "painful", leading researchers to investigate if they may activate pain-related neural networks. Although pain is ultimately defined by verbal reports, only few studies investigated the effects of pain-related words on pain perception. We used words

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associated with physical and social pain to assess whether they modulate the aversive response in an affective compatibility paradigm differently from negative, pain-unrelated words, and to what extent their reading triggers pain-related areas once the negative valence is taken into account. Our results suggest that especially social pain-related words specifically modulate the affective compatibility effect. In addition, a fMRI study showed that pain word comprehension activates areas involved in pain-related emotional processing.

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### **Social-cognition biases and counterfactual thinking**

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It has been proposed that epistemic egocentric biases such as hindsight bias (HB) and the illusory transparency effect share a common mechanism: the anchoring and adjustment heuristic (Epley et al. 2004). Later research has demonstrated the influence of counterfactual thinking on HB. Specifically, the HB was increased when participants were engaged in counterfactual reasoning before undertaking a HB task. If the effect is produced in the shared mechanism, we would expect similar effects on other biases. We present a research study with forty-five adult participants who carry out an illusory transparency task. The elicitation of counterfactual possibilities was manipulated using twelve different stories. Results showed that the magnitude of illusory transparency changes when there is a prior activation of the counterfactual mind-set. These results are relevant to discover the similarities and differences between the different egocentric biases and also to know more about the processes implicated in the illusory transparency phenomenon.

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### **The smell of prejudice: individual differences in body odor disgust sensitivity predict prejudice towards a fictive unfamiliar group**

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The Behavioral Immune System (BIS), is a psychological mechanism adapted to detect and avoid pathogen threats. According the BIS framework, prejudice towards unfamiliar groups might be partially driven by concerns on their dissimilarity in terms of hygiene and food preparation. Disgust is a core and universal emotion supposedly evolved to avoid disease (pathogen threats) and olfaction plays a pivotal role in evoking this emotion. We investigated whether individual differences in Body Odor Disgust Sensitivity Scale (BODS) correlate with unfavorable attitudes towards a fictive unfamiliar group, the Dhrashnee refugees. We ran a pre-registered online questionnaire study on a sample of N = 800 participants from an M-Turk pool. Participants rated their attitudes towards the Dhrashnee, perceptions of similarity with the Dhrashnee and general attitudes towards immigration. Results fully supported our pre-registered hypotheses: higher levels of BODS are associated with higher levels of prejudice and this association is mediated by perceived dissimilarity in hygiene and food preparation practices, a result that is consistent with the theoretical framework provided by the BIS.

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### **Beaming into a robot increases its acceptability**

F. Pavani<sup>1</sup>, G. Gibert<sup>2</sup>, M. Bosse-Platiere<sup>2</sup>, A. Farna<sup>2</sup>, P. Dominey<sup>2</sup>, & J. Ventre-Dominey<sup>2</sup>

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In two experiments, we adopted a simple procedure for beaming a human subject into a robot, and tested if embodiment can increase acceptability, sympathy and social closeness for that robot. Participants wore a Head Mounted Display tracking their head movements and displaying the 3D visual scene taken from the eyes of either the iCub or Reeti robot, which were positioned in front of a mirror. As a result, participants saw themselves as robots. When the participants' and robots' head-movements were synchronous, participants felt that they were beamed into the robot, with a significant sense of agency. Critically, the robot they embodied was judged more sympathetic and socially closer. Control conditions whereby participants' head movements did not induce any movement in the robot's head (static), or produced unmatched movements (uncorrelated), reduced embodiment sensations and social attraction to the robot. These findings reveal the ease of body-swapping into robots via visual-motor synchrony, even when robots do not share any clear human resemblance.

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Furthermore, they pave a new way to make our future robotic helpers socially acceptable.

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### **Social cognition in human-robot interaction: The case of sense of agency**

F. Ciardo<sup>1</sup>, F. Beyer<sup>2</sup>, D. De Tommaso<sup>1</sup>, & A. Wykowska<sup>1</sup>

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The present study examined Sense of Agency (SoA) in Human-Robot Interaction (HRI). Participants interacted with the Cozmo robot (AnkiTM). They were asked to perform costly actions (i.e. losing various amounts of points) to stop an inflating balloon from exploding. In 50% of trials, only the participant could stop the inflation of the balloon ("individual condition"). In the remaining trials, both Cozmo and the participant were in charge of preventing the balloon from exploding ("joint condition"). The longer the players waited before pressing the "stop" key, the fewer points were subtracted. In case the balloon exploded, participants would lose the highest amount of points. In the joint condition, no points were lost if Cozmo stopped the balloon. Participants rated how much control they perceived over the outcome of the trial. Results showed that participants attempted to minimize losses in Joint trials. Moreover, when they successfully stopped the balloon, SoA ratings were lower in the joint than in the individual condition, independent of the amount of lost points. This result suggests that interacting with robots reduces SoA.

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## TALK SESSION 11

**15:00 - 16:00, Salón Actos Psychology**

### **LANGUAGE II**

#### **Representational organization during the encoding of novel verbal instructions: effects of control-related variables and motivation**

A.F. Palenciano<sup>1</sup>, C. González-García<sup>2</sup>, J. E. Arco<sup>1</sup>, S. Padmala<sup>3</sup>, L. Pessoa<sup>3</sup>, & María Ruz<sup>1</sup>

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Human success in novel task environments is anchored in our ability to follow verbal instructions. However, how the brain encodes the relevant information in the instructions and the role of motivation in this process is not known. To study these issues, we conducted an fMRI study where participants followed instructions under economic incentives. Using Representational Similarity Analysis (RSA; Kriegeskorte et al., 2008), we tested which brain regions presented activity patterns best explained by three variables: across-dimension integration, response-set complexity and stimulus category. Whereas the former explained the encoding only in the inferior frontal gyrus, the response-set complexity captured the representational structure of the anterior and posterior intraparietal sulcus and premotor cortex, and the target stimulus category of the instructions was significant in the fusiform gyrus and precuneus. In all these areas, motivation exerted a general effect on the representational spaces, diminishing the distances between different instructions. Importantly, this reduction correlated with reward-related behavioral improvements. Our results suggest that the preparation to implement verbal instructions relies on structured activity in content-related brain regions.

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#### **Foreign language does not hinder learning emotional concepts**

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We are constantly learning new concepts and words, and we remember better those that have an emotional impact. Furthermore, we learn many of these in a foreign language, arguably less emotional than our native one. So, is learning hindered in a foreign language context? To address this question, we taught participants novel objects, half with positive emotional content and half with only neutral content. We found that the names of positive items were remembered better and more quickly. On the other hand, we only saw an effect of language when participants had to associate the object with its name. Nevertheless, we did not find any interactions between language and emotionality, providing no evidence that using a foreign language hinders our learning for emotional content.

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### **Motor interference effects on construal level in language comprehension**

O. Escámez<sup>1</sup>, D. Casasanto<sup>2</sup>, G. Vigliocco<sup>3</sup>, & J. Santiago<sup>1</sup>

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Embodied theories propose that an essential ingredient of language understanding is the detailed mental simulation of the meaning of words and sentences. Action concepts (e.g., “to stomp grapes”), as any other concept, can be construed at different levels, from a low level (“to crush grapes with the feet”), which specifies the perceptual and motor details of the action, to a high level, which focuses on the distant goals of the action (“to make wine”). Participants were presented with descriptions of hand or foot actions and asked to choose between a low-level and a high-level interpretation while performing a repetitive rhythm tapping task with either their hands or feet. When the delay between sentence and interpretations was long, they tended to construe same-effector actions at a higher level. When the delay was short, they tended to prefer the low-level interpretation. These effects were due to both same-effector and other-effector effects. The results shed light on the temporal dynamics of mental simulation in language comprehension.

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### **Influence of second language learning strategies in a sentence context: Semantic and Lexical methodologies**

A.B. García-Gámez & P. Macizo  
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Learning vocabulary in a second language (L2) is more efficient if the learning method emphasize semantic vs. lexical processing. This advantage of semantic learning has been observed during the processing of isolated words (Comesaña et al., 2009; García-Gámez & Macizo, 2017). The aim of our study was to determine whether the acquisition of L2 vocabulary with semantic vs. lexical trainings improved word processing in rich linguistic contexts (sentences). A group of participants learned L2 words based on a semantic vs. lexical learning. After two days of training, the semantic learning group compared with the lexical learning group showed: (a) a consolidation learning effect on the

second day of training, (b) better word processing out of context (e.g., picture naming tasks), (c) and within sentences (sentence reading task). Overall, the pattern of outcomes indicates the advantage of semantic learning for acquiring and using words in rich linguistic contexts.

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## TALK SESSION 12

### **15:00 - 16:00, Salón Actos Education CLINICAL**

#### **Beyond eye movements: Attention shifts in the depth plane as a novel communication tool for Complete Locked-In State (CLIS) patients**

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Non-invasive, gaze-independent brain-computer interfaces to decode voluntary responses in completely paralyzed patients are intensely investigated, but still scarcely effective.

Here we exploited 3 physiological responses: PAR (Pupil Accommodative Response, the pupil constriction that accompanies an attention shift from a far to a near stationary target), POR (Pupil Oscillatory Response, the continuous, oscillatory change of pupil size evoked by a flickering visual stimulus) and SSVEP (Steady-State Visual Evoked Potential, the cortical oscillations evoked by a flickering visual stimulus).

In a first experiment, we found PAR to be fairly robust to changes in environmental luminance, monocular/binocular viewing and target texture. With healthy young volunteers, PAR achieved a yes/no response rate of 10 events/min and 100% accuracy, in a condition mimicking lack of eye movements. In 3 patients (advanced ALS, with null or limited use of

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communication aids), a verbal command could often, though not always, elicit reliable PARs.

In a second experiment, we integrated POR and SSVEP signals into a single combined response contingent to an attention shift from a far to a near target, flickering at different frequencies. Despite the lower reliability at the single trial level, as compared to PAR, the combined response could be integrated with PAR to boost communication efficacy in patients, where PAR may be noisy.

These preliminary results show the potential of exploiting natural attention shifts in depth, cortical responsivity and “voluntary” autonomic pupil control, in order to realize a simple communication tool – both yes/no protocols and spellers – for CLIS patients, even when eye movements are not any longer an option.

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### **Exploring the relationship between impulsivity toward food-reward and bariatric surgery in severe obese individuals**

S. Schiff<sup>1</sup>, G. Testa<sup>2</sup>, F. Buongiorno<sup>1</sup>, M. Foletto<sup>3</sup>, & P. Amodio<sup>1</sup>

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In severe obese individuals a tendency to prefer immediate but smaller reward instead attending to receive a greater one delayed in time was frequently observed. This effect seems to be greater when decision involves food-related rewards. Laparoscopic sleeve gastrectomy (LSG) is a bariatric surgical procedure consisting in the reduction of the volume of the stomach, which is able to limit food consumption and to produce changes in hormones that regulate hunger and appetite. Beyond physiological changes induced by LSG, improvement in cognitive functions after surgery has been recently showed. The present study aims to evaluate if LSG modulates inter-temporal decision-making toward food and non-food rewards. Twenty-four severe obese were studied with three inter-temporal tasks with different types of reward (i.e. Euro, discount vouchers, and food), one-month pre-LSG and one-year post-LSG, after significant weight loss. Obese individuals are more impulsive toward immediate rewards compared to normal-weight individuals. Interestingly, impulsivity toward food-related reward seems to partially improve post-LSG, especially in those individuals that show lower fasting glycaemia levels,

suggesting that gastrointestinal hormones may affect inter-temporal decision-making.

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### **Electrophysiological correlates of performance monitoring across Go/NoGo and Flanker tasks and the triarchic conceptualization of psychopathology**

P. Ribes, R. Poy, & J. Molto

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This study examined, in a sample of 142 undergraduates (101 females), the covariance among multiple ERPs related to performance monitoring across Go/NoGo and Flanker tasks, and its associations with the psychopathy domains of disinhibition, meanness and boldness as assessed by the Triarchic Psychopathy Measure. Multiple regression analyses showed that the relationship between the ERN and the phenotypic domain of disinhibition depends on the experimental paradigm used to assess this ERP component, with decreased amplitudes of the ERN in high disinhibited participants found only after response inhibition errors (NoGo-ERN; beta weight = .20,  $p < .05$ ) but not after action slips due to interference (Flanker-ERN; beta weight = -.07,  $p = .49$ ). This phenotypic domain was also associated with reduced amplitudes of the Pe and the P300 measures studied in both tasks (beta weights from -.18 to -.28,  $ps < .05$ ), which were highly intercorrelated, suggesting that both ERP components represent similar processes linked to the disinhibition characteristics of psychopathy irrespective of the experimental paradigm in which these components are measured.

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## TALK SESSION 13

**15:00 - 16:00, Salón Grados Education**

### **PSYCHOLOGY AND NEUROSCIENCE**

#### **Will Psychology end up being adduced by Cognitive Neuroscience?**

J.E. García-Albea

*Universitat Rovira i Virgili*

The current boom of neurosciences poses a grave threat to psychology, so that we can ask ourselves to what extent the latter will survive as an autonomous discipline or whether it will remain in a provisional status waiting

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for the decisive advances in cognitive neuroscience. Clearly, at the bottom of these questions there it underlies the long-standing issue about the relationship between mind and brain, traditionally termed the mind-body problem. A brief run through the main approaches to this problem in the history of psychology will lead to a critical review of the excesses attributable to cognitive neuroscience. The possibilities of a genuine scientific psychology, as the science of mental life, will be assessed, and at the time of claiming for its autonomy and differentiation, it should keep open to the collaboration with neighboring disciplines. Assuming that we all accept as a fact that the brain is the organ of the mind, it will be unavoidable that the science of mind (Psychology) will interact with the science of the brain (Neuroscience) for their mutual benefit.

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### **Decoding action goal information from the tool network**

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A dedicated cerebral network, comprising temporal and fronto-parietal regions, is recruited when we manipulate or pantomime the use of a tool.

In this fMRI study, we investigated where in this “tool” network, the final goal of an action is represented irrespective of specific task requirements (i.e. adopted hand and instruction modality).

In two different experimental sessions, participants (N=17) pantomimed a “grasp-to-move” or a “grasp-to-use” action, either with a pair of scissors or an axe. In session A the task was performed with the right dominant hand and the instructions were delivered in an auditory modality. In session B, instead, the task was performed with the left hand and the instructions were visual.

Adopting multivariate pattern analysis, we were able to identify the encoding of the final goal of the pantomimed action, irrespective of the adopted effector and of instruction modality, within the posterior nodes of the tool network.

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### **Specific relevance instructions promote selective reading strategies: Evidences from eye tracking and oral summaries**

J.A. León<sup>1</sup>, J. D. Moreno<sup>1</sup>, I. Escudero<sup>2</sup>, R. Olmos<sup>1</sup>, M. Ruiz<sup>2</sup>, R. F. Lorch, Jr<sup>3</sup>

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The present study analyzed how relevance instructions affect eye movement patterns and the performance in a summary task of six expository texts. Forty-one undergraduate students participated in the experiment, half of them were instructed to make an oral summary of the main ideas focusing on the “why” question that appeared at the end of the first paragraph (specific relevance instruction), while the other half were instructed to make an oral summary of the main ideas of the text (general relevance instruction). Eye movement patterns revealed that specific instructions promoted more and longer fixations and more regressions for relevant information than general instructions. A higher percentage of words in the summary task related to relevant information was recalled when readers received specific instructions. These findings suggest that relevance instructions influence how readers enact strategies to meet their reading goals and how these strategies are reflected on memory.

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### **Neural mechanisms underlying current and delayed representation of social dimensions**

P. Díaz-Gutiérrez<sup>1</sup>, S. J. Gilbert<sup>2</sup>, J.E. Arco<sup>1</sup>, A. Sobrado<sup>1</sup>, M. Puertollano<sup>1</sup> & M. Ruz<sup>1</sup>

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<sup>2</sup>*University College London*

Growing evidence suggests that the regions associated with the Default Mode Network (DMN) represent relevant information about stimuli and task sets to be implemented in the near future, complementing the role of lateral fronto-parietal areas. Here, we studied how different task contexts and time delays influence the representation of social information in the DMN and fronto-parietal networks. To examine this, we used a task-switching paradigm adapted to functional Magnetic Resonance Imaging (fMRI) where participants had to categorize social dimensions of facial stimuli (their race, gender or emotion), maintaining relevant task sets in either a current or delayed manner. We employed multi-pattern decoding analysis to examine fine-grained differences in the neural representation of these social dimensions depending on when they were relevant (current vs. delayed). Preliminary data shows that the mPFC (part of the DMN) contained information about social categories that were relevant at both timescales. Although further analysis will clarify the role of fronto-parietal regions in the representation of social



## TALK SESSIONS

dimensions, our results emphasize the role of the mPFC in holding task-relevant information.

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### TALK SESSION 14

#### 16:00 - 17:30, Salón Actos Education SPATIAL COGNITION

##### **The role of the cerebellum in space representation**

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Neuroimaging and brain stimulation evidence has suggested a possible cerebellar role in orienting of spatial attention (in the physical and/or representational space). However, evidence is not consistent and the extent and significance of cerebellar contribution to attentional mechanisms is not clear. Here, we aimed to shed light on this issue by using TMS to interfere with cerebellar activity during the execution of the Landmark task in two orientations (horizontal and vertical). Participants received single-pulse TMS at stimulus onset over the cerebellar vermis, the primary visual cortex and the vertex (control site). Overall, TMS over V1 significantly delayed response times compared to the other two conditions. In the control condition (vertex) participants showed pseudoneglect in both orientations, but TMS over V1 or over vermis did not affect this bias nor it modulated accuracy overall. In sum, our findings suggest that the vermis is not critically implied in spatial attentional mechanisms as measured by the Landmark task. Furthermore, preliminary data investigating the role of cerebellar regions in spatial attention orienting in the representational space are also presented.

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##### **Interactions between egocentric and allocentric spatial coding of sounds revealed by a multisensory learning paradigm**

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<sup>2</sup>Centre de Recherche en Neurosciences de Lyon (CRNL) (France)

Sounds in the environment can be encoded in body-centred (egocentric) or world-centred (allocentric)

spatial coordinates. While there is evidence that these reference frames for spatial hearing can dissociate, their potential interactions remained largely unexplored. Here, we examined whether a training based on allocentric sound-coding can improve subsequent egocentric sound-localisation. Two groups of normal-hearing participants (N=15 each) performed an egocentric sound-localisation task (pointing to a single sound), in monaural listening (the left ear plugged), before and after 4-days of multisensory training on triplets of sounds paired with occasional visual feedback. The experimental group performed an allocentric training procedure (auditory bisection task). The control group performed instead an egocentric training procedure (pointing to one of the sounds in the triplet). A further group (N=15) did not perform any training. Results showed that both training procedures (allocentric and egocentric) improved egocentric sound-localisation abilities in the horizontal plane, specifically in the space ipsilateral to the ear-plug. Transfer of learning between allocentric and egocentric sound processing reveals close interactions between these reference frames, with implications for acoustic space re-learning.

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##### **The SNARC side of weight**

M. Vicovaro & M. Dalmaso

University of Padova

It has been suggested that non-numerical quantities like size, luminance, and time are spatially represented in human mind, with smaller quantities represented on the left and larger quantities represented on the right. Here, we conducted two experiments to test the possible spatial representation of weight. In Experiment 1, target stimuli were written words referring to animals (e.g., cow). Participants were asked to judge, by pressing a left- or right-side button, whether the target animal was heavier or lighter than a reference animal. Results showed that responses to “heavier” targets were faster if provided with the right-side button than with the left-side button. Response times to “lighter” targets were not affected by the side of the response button. The same pattern of results emerged in Experiment 2, in which participants were presented with written words referring to materials (e.g., iron). Overall, the results provide partial support to the hypothesis of a left-to-right spatial representation of weight.

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## TALK SESSIONS

### **Neural bases of spatial cognition: A meta-analysis of neuroimaging studies**

G. Cona & C. Scarpazza

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Spatial information is processed in the service of several different cognitive functions, including visuo-spatial attention, spatial working memory, mental rotation and spatial imagery, spatial long-term memory and navigation. These functions involve distinct neural substrates, but they also share common neural mechanisms since they all operate on spatial material.

This study utilized the Activation Likelihood Estimation method of meta-analysis to reveal both the specific neural activations associated with each of these cognitive functions, and the shared activations among them. A total of 133 neuroimaging (fMRI and PET) studies were included in the meta-analysis according to the inclusion criteria.

The overall analysis showed that the core network of spatial processing comprises brain regions that are symmetrically distributed on both hemispheres and that mainly include dorsal frontal and parietal regions, pre-supplementary motor area, and anterior insula.

The analyses separated for each spatial function revealed the brain regions that are specifically involved in each type of spatial operations, such as the right temporoparietal junction in visuo-spatial attention and the parahippocampal gyrus in navigation.

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### **Metrical patterns in spatial audition: The role of attention and musical training**

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The rhythms of music are based on a periodic beat that is organized in metrical patterns. In live music performances, auditory spatial cues could affect the perception of rhythms. By means of electroencephalography, we explore the neural entrainment to beat and a metrical structure signaled in the spatial domain. We designed two studies to attest whether musical training modulates the brain responses to the spatial grouping of the beat into metrical patterns, and to clarify whether attention to the auditory spatial cues is required to trigger meter induction. The ternary meter (i.e. waltz) was obtained in 30-second-sequences by concurrently alternating a sound at one side followed by two sounds at the contralateral side ( $\pm 30^\circ$ ,  $\pm 60^\circ$  and

$\pm 90^\circ$  on azimuth plane). In the first study we compared musicians and non-musicians listening to the sounds. In the second study participants were distracted with a silent movie. Auditory spatial cues seem to elicit neural entrainment to ternary meter when participants pay attention to the auditory stimuli. Furthermore, musicians showed greater magnitudes of neural entrainment than non-musicians.

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## TALK SESSION 15

### **16:00 - 17:30, Sal3n Grados Education COGNITIVE AND AFFECTIVE NEUROSCIENCE**

#### **Neural correlates in the Iowa Gambling Task in young participants with memory subjective complaints: preliminary results**

R. Garrido-Chaves<sup>1</sup>, T.O. Paiva<sup>2,3</sup>, M. Perez-Alarcon<sup>1</sup>, V. Perez<sup>1</sup>, V. Hidalgo<sup>1,4</sup>, M. Pulpulos<sup>5</sup>, & A. Salvador<sup>1</sup>

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Subjective memory complaints (SMC) have been associated with attentional, memory and executive deficits of the prefrontal cortex (PFC). The present study aimed to investigate the differences of the neural

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correlates between people with and without SMC during decision-making task.

65 healthy young participants, were divided into two groups: with SMC (n = 38) and without SMC (n = 27). They performed the Iowa Gambling Task modified for ERPs recording. Analyzes were carried out in the feedback evaluation stage.

Statistics of the ERPs elicited by the economic outcome (losses vs. wins) showed the frontal negativity N260, obtaining a greater amplitude for the economic losses. Regarding to Feedback Related Negativity (FRN), a greater amplitude was observed in the first trials.

Results show that participants with and without SMC have similar neural correlates. These findings do not imply executive deficits of the PFC during a decision-making task, although both groups are sensitive to economic losses, which decreases as the trials increase, modulated only by the economic losses.

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### **Blunted psychophysiological reactivity as a biomarker of motivational deficits in subclinical depression**

N. Fuentes-Sánchez, M. Escrig, I. Jaen, & M.C. Pastor  
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This study aimed to explore whether emotion regulation might be impaired in stressing real life situations, such as unemployment. Here we examined two defensive reflexes (Cardiac Defense Response – CDR – and Startle Reflex) in unemployed and employed participants under 30 years old (N=71). The cognitive reappraisal task began with a "cue" (2s) with the instruction (Look, Increase, Decrease) to follow during unpleasant or neutral pictures (8s). Acoustic probes were delivered (4s or 7s) after picture onset to prompt defensive startle reflex. Affective ratings were collected after picture offset using SAM. Moreover, participants completed Beck Depression Inventory (BDI), among other questionnaires. CDR pattern was obtained in an independent psychophysiological test prior to the emotion regulation task. Results showed that unemployed participants scored higher in depression, and presented diminished CDR second accelerative component besides absence of blink modification by instructions, compared with employed participants. Our findings suggest that blunted reactivity might be associated with difficulties to regulate negative emotions in subclinical depression. One question is whether this blunted reactivity might be a pathological biomarker of risk for depression.

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### **The role of sleep in memory reactivation during encoding and retrieval**

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Sleep is crucial for memory encoding, consolidation, and reconsolidation. However, it is unknown how the carryover effects of these processes impact acquisition of similar competing memories. We predicted that the weaker the memory representation, the more difficult it would be to encode new similar information. Half of the participants were subjected to a protocol of acute sleep restriction (ASR) in the night prior to memory acquisition that resulted in reduced memory strength. This conclusion derives from a reduction in the EEG spatio-temporal similarity pattern (STPS) estimated across item repetitions during encoding and between items presented during encoding and retrieval. This finding was not paralleled by impaired performance, but it was followed by a difficulty to acquire new similar memories, as revealed by performance on the next day. Only controls showed impaired memory, likely because only they had strong representations of the two competing memories. These results indicate that sleep rescues weak memories from forgetting, but it cannot prevent that the low resolution hampers acquisition of new overlapping memories.

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### **Análisis individualizado de las alteraciones del componente P3 y la alfa-ERD en relación con su discapacidad en pacientes con EM**

M. Vazquez-Marrufo<sup>1</sup>, A. Galvao-Carmona<sup>2</sup>, R. Caballero<sup>1</sup>, M. Borges<sup>3</sup>, M.D. Paramo<sup>3</sup>, J.L. Ruiz-Peña<sup>3</sup>, & G. Izquierdo<sup>3</sup>

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Un gran objetivo en la Esclerosis Múltiple (EM) es comprender la neuroanatomía funcional del deterioro

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cognitivo que provoca y en particular, encontrar parámetros psicofisiológicos que valoren la progresión de la discapacidad cognitiva de manera individualizada. Se registró la señal de EEG en 58 canales en treinta sujetos (10 sujetos sanos, 10 sujetos con una baja EDSS (escala de discapacidad) (1-2.5) y otros 10 con una moderada EDSS (4-6) y se analizaron las respuestas conductuales y parámetros del EEG (P3 y alfa-ERD).

Los resultados mostraron que una puntuación que combinaba el tiempo de reacción, la latencia y amplitud del P3 y la alfa-ERD, así como los valores de correlación de los mapas de P3 y ERD individuales respecto del mapa general “sano”, mostraron la más alta correlación con la EDSS ( $r=0.716$ ,  $p<0.001$ ). La alteración heterogénea de los diferentes parámetros sugiere diversos perfiles en el deterioro cognitivo de los pacientes con EM.

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### **Visually evoked steady State EEG/MEG responses in psychiatry research**

*S. Moratti, T. Giménez Fernández, J. de Echegaray, & G. Rubio*

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The long tradition of psychophysiological research yielded many basic research paradigms that are well established and understood from a theoretical viewpoint. Further, numerous laboratories have replicated many of these results; thus these findings represent stable and reproducible research designs that are ready for being used in the understanding of psychopathology. Here, we will present an example of such a paradigm: the visually evoked cortical steady state response and its modulation by motivated attention or emotion. We will show how this research paradigm and its reproducible results can be applied in psychiatry research to get more insights into the pathological processes underlying affective disorders such as depression and post-traumatic stress disorder (PTSD). Thereby, we will present recent data from our laboratory showing how low emotional arousal in depressed patients is accompanied by reduced arousal modulation in cortical attention systems in the right hemisphere and that in PTSD patients the sensory representation in early visual cortex of acquired fear relevant and irrelevant stimuli is not discriminated properly.

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## TALK SESSION 16

### **10:00 - 11:30, Salón Actos Education CONSCIOUSNESS AND MEMORY**

#### **A new experimental paradigm to investigate prospective and working memory**

*G. Fronda<sup>1</sup>, M. Sozzi<sup>2</sup>, C. Monti<sup>2</sup>, & M. Balconi<sup>1</sup>*

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Prospective memory (PM) concerns the ability to achieve a previously organized future intention in a given time. This mechanism requires the involvement of working memory (WM), which allows to coordinate simultaneous processes. The relation between WM and PM is a debated theme in literature. The present study aims to observe the engagement of WM in PM, investigating how these two mechanisms are correlated or partially independent. Two ongoing activities concurrently with a prospective switching task were administered to a sample of 21 healthy participants. The first task (arithmetic) consists in the development of a low-cognitive WM activity together with a PM task to be conducted after the presentation of a cue (event-based) or at a given moment (time-based). The second experiment (PASAT) demands to perform a high load WM activity and a PM task according to the same modalities of arithmetic task. Results show that WM influences PM performance only in high load WM tasks requiring an active PM self-retrieval (time-pasat). Such findings support the partially independent of WM and PM, consisted of distinct processes.

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#### **Cortical excitability unveils brain mechanisms related to conscious and unconscious face perception**

*G. Mattavelli<sup>1</sup>, A. Pisoni<sup>1</sup>, B. Marino<sup>1</sup>, M. Bonomi<sup>1</sup>, M. Rosanova<sup>2</sup>, L.J Romero Lauro<sup>1</sup>, & C. Papagno<sup>3</sup>*

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Awareness for perceptual stimuli has been related to recurrent activity in distributed cortical networks, although brain mechanisms for unconscious processing and stimuli access to consciousness need to be clarified. We used TMS-EEG over the right occipital face area (rOFA) to explore cortical excitability during a backward masking paradigm with individually defined

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**Friday, 6<sup>th</sup> July 2018**

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stimuli visibility. We found differences in electrophysiological recordings between faces versus houses and between detected versus missed faces, starting 200 ms post target onset. TMS over rOFA triggered a relative positivity starting at 150 ms when faces with high visibility were consciously reported. Moreover, TMS evoked differential responses for high versus low visible faces in conscious and unconscious processing at 290-390 and 180-240 ms, respectively. Results showed a causal link between rOFA excitability and late wide-spread responses related to access to consciousness, suggesting a critical role of recurrent activity, but distinct components, for consciously perceived stimuli and unconscious processing.

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### **On the poor correlation between awareness and performance in implicit learning research**

M.A. Vadillo<sup>1</sup>, S. Malejka<sup>2</sup>, Z. Dienes<sup>3</sup>, & D.R. Shanks<sup>1</sup>

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Several analytical approaches to assessing the unconscious character of learning rely on analyzing the relationship between awareness and performance. For instance, if participants' performance in a learning task does not correlate with their awareness of the stimuli, it is typically assumed that learning must have been unconscious. Similarly, if a regression of performance on awareness returns a positive intercept, this is also taken as evidence of unconscious learning. What these analyses often overlook is that the statistical relationship between measures of learning and awareness is biased by their respective reliabilities. In the present paper, we present evidence that the measures used in a popular implicit learning paradigm, contextual cuing, are remarkably unreliable and that once reliability is taken into account, the correlation between performance and awareness is relatively large. Furthermore, a simulation study shows that regression analyses tend to overestimate the evidence of unconscious learning, even when specific measures are taken to correct for reliability artefacts. Taken collectively, these results suggest that correlational analyses should be restricted to highly reliable measures of learning and awareness.

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### **Working memory: Preliminary data from a behavioural, resting state and EEG study**

L. Zarantonello, S. Schiff, P. Amodio, & P.S. Bisiacchi

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Working memory (WM) represents the brain's ability to store, manipulate and process information. This study was carried out to investigate neurophysiological mechanisms related to WM.

Thirty-five healthy young adults performed a visuo-spatial n-back task, formed by control condition (0-back), low (1-back) and high (2-back) WM load conditions. Behavioural data, EEG resting state and event-related potentials were collected.

Results showed slower reaction times (RTs) in the 2-back compared to both 1-back and 0-back ( $p < .0001$ ). Target P3a amplitude and non-targets P3b latency increased as WM load increased ( $p < .0001$ ). P3b amplitude in the 1-back was higher compared to both 0-back and 2-back ( $p < .0001$ ), and its latency was positively correlated with RTs ( $p < .0001$ ). Regarding EEG resting state, central-frontally theta was negatively correlated with 2-back RTs ( $p < .05$ ) and parietal beta was negatively correlated with 0-back and 1-back RTs ( $p < .001$ ). EEG mean dominant frequency and central-frontally delta was negatively correlated with 1-back P3b amplitude and non-target P3b latency ( $p < .050$ ).

Different WM loads correlates with different neurophysiological evoked and resting state mechanisms.

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### **Sleeping through emotional memories over a week**

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Sleep seems to play a key role in consolidating emotional memories. Nevertheless, whether sleep preferentially facilitates the consolidation of negative memories over time remains unclear. Here, we investigated the role of sleep in remembering emotional information over a week. Thirty-one university (24F) students encoded 40 neutral and 40 unpleasant pictures; afterward, they performed an immediate recognition test followed by a delayed recognition test 7-days later. Sleep between the two sessions was monitored by actigraphy. At the immediate recognition, participants showed a higher memory recognition for neutral compared to unpleasant pictures. One week later participants showed a reduced performance compared to the immediate test for both memory types, with a reduced degree of forgetting for emotional memories. Subjective arousal decreased between the sessions for both stimuli types, while valence remained stable. Interestingly, individuals who spent more time awake

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showed less forgetting for emotional memories. We suggest that emotional memories are more resistant to forgetting than neutral ones over a week, and poor sleep may induce a paradoxical effect, turning these memories even more resilient.

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### TALK SESSION 17

#### 10:00 - 11:30, Salón Grados Education DEVELOPMENTAL

##### **Computer-based training in working memory improves functional brain connectivity in the attentional networks: a study with primary school-aged children**

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<sup>4</sup>*Servicio de Radiología, Hospital Morales Meseguer, Murcia, Spain*

Sánchez-Pérez et al. (2018) reported improvements in both cognitive and academic skills in primary school-aged children trained in working memory (WM). Here we aimed to further analyze the effects of training on functional brain connectivity changes in the attention networks (ATNs). Findings showed stronger relationships between inhibitory control improvements and connectivity in a middle frontal gyrus (MFG) cluster, and between reading skills improvements and connectivity in an inferior frontal gyrus (IFG) cluster, both in the right ATN, in trained children compared to untrained children. Also, seed-based functional connectivity analyses revealed that connectivity between the right MFG and homolateral parietal and superior temporal areas on one hand, and between the right IFG and mesial and left inferior occipito-temporal

areas on the other hand, were more strongly related to children's inhibitory control and children's reading skill improvements, respectively, in the training group compared to the control group. These findings highlight the relevance of our computer-based WM training program, which was integrated into school routine, in boosting both cognitive and academic performance, as well as functional brain connectivity.

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##### **Motion and form perception in children with Duchenne Muscular Dystrophy**

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The cognitive profile of patients with Duchenne Muscular Dystrophy (DMD) is not yet well characterized. This study aims to investigate vision perception in DMD patients.

Seven children with DMD (age range 5–12 years) and a group of thirty aged matched controls took part in the study.

Motion Coherence Test (MCT) and Form Coherence Test (FCT) were computer based tests used to evaluate the ability in motion and form perception respectively. The stimuli consist of luminance dots presented on black background. In the MCT the dots move in specific direction and the child has to identify the direction of the movement. In the FCT the child has to recognize a shape obtained by coherently aligned static dots. Different levels of difficulty are presented. Accuracy in motion and form perception is evaluated for each subject.

The DMD patients showed impaired motion and form perception as compared to controls. These findings are in accordance with the cerebellar hypothesis of cognitive deficits in DMD.

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##### **Artificial realities fool us: Our poor sense of video speed**

C. de'Sperati<sup>1,2</sup>, F. Rossi<sup>3</sup>, E. Zuliani<sup>3</sup>, M. Caputi<sup>3</sup>, S. Scaini<sup>4</sup>, & G. Baud Bovy<sup>1,2</sup>

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## TALK SESSIONS

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We live almost literally immersed in an artificial visual reality, especially videos. Here we show that our tuning to video clip speed is quite poor, and changes during childhood.

Firstly, we found a remarkable lack of sensitivity to speed manipulations when viewing a soccer match. None of 100 naïve observers spontaneously noticed speed alterations up/down to 12% (JND=18%). When measured with a constant-stimuli discrimination task, speed sensitivity was still low (JND=9%).

Secondly, using short clips of human motion, mixed human-physical motion, physical motion and ego-motion, speed underestimation was typical, although largely dictated by clip content, with PSE errors from 2% to 32%. These speed biases were robust: manipulating display size or adding arbitrary soundtracks was irrelevant. PSE was uncorrelated with estimated duration of the video clips, thus pointing to a distinct sense of event speed.

Thirdly, in 142 children aged 6 to 10, the video clip speed subjectively perceived as “natural” (PSE) decreased steadily until reaching adult levels, as if maturational processes speeded up visual perception. Uncertainty (JND) also decreased with age. Children were also assessed for response control, and scored for impulsivity/inattention and visuo-motor habits. PSE and JND correlated with response times, which also decreased with age, but not with response accuracy, which remained high. No correlations were found with psychological and habits scores, except videogame playing.

Besides the relevance in clinical and developmental contexts, measuring the subjective sense of speed may help to optimize video reproduction speed and validate “natural” video compression techniques based on sub-threshold temporal squeezing.

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### **The effects of lifelong musical practice on cognitive function in healthy aging: A systematic review and meta-analysis**

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The rhythm of cognitive and brain decline occurring in non-pathological aging is not fixed. Lifelong musical practice is one of the most promising factors with a protective effect on aging. However, it has not been well studied. To our knowledge, this is the first meta-analysis about the benefits of musical activity in cognitive aging. We managed two types of evidence. First, experimental studies with short-term music training programs (from 4 to 6 months) in naïve elders. The meta-analytic results showed that short-term musical practice produced a better general cognitive function, with remarkable effects over reasoning and cognitive flexibility. Secondly, the meta-analysis with correlational studies including musicians with an extensive musical activity, which showed that lifelong musical practice was associated with enhancements in almost all studied cognitive functions. Moreover, those advantages correlated with variables of musical activity, such as the amount of practice or the age of onset. Altogether these results point to musical practice as an useful tool not only in the clinical field, but also to reduce the impact of age-related changes.

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### **Counterfactual, an easy context for negation**

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We report an experiment to examine how people understand affirmative and negative counterfactual conditionals. Participants listened to short stories, for example, Miguel went to a flower shop and did not know whether to buy roses or carnations. They heard a critical sentence, such as ‘if he had arrived early, he would have bought roses’. We compared affirmative causal assertions, e.g., ‘Because he arrived early, he bought roses’, negative causal assertions, ‘Because he did not arrive early, he did not buy roses’, to affirmative counterfactual conditionals, ‘if he had arrived early, he would have bought roses’, and negative counterfactual conditionals ‘if he had not arrived early, he would have not bought roses’. Participants listened to the stories while looking at four printed words on a computer screen, e.g., roses, no roses, carnations, no carnations. We used eye-tracking methods to examine where their eyes looked while they heard the target sentences. The results showed that participants looked at the target word ‘roses’ when they heard the affirmative causal assertions and the negative counterfactual conditionals,

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whereas they looked first at the word 'roses' and then at the word 'carnations' when they heard the negative causal assertions and the affirmative counterfactual conditionals. We discuss the implications of the results for the dual meaning account of counterfactuals.

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# **POSTER SESSIONS**

Wednesday, 4<sup>th</sup> July 2018

**POSTER SESSION 1**

**10:00 - 11:00, Psychology Hall**

**1. Differences in Lateral Prefrontal Cortex oxygenation to affective faces**

I. Lucas<sup>1</sup>, F. Balada<sup>2</sup>, E. Blanco<sup>1</sup>, A. Blanch<sup>1</sup>, J. Lario<sup>1</sup>, A. Aluja<sup>1</sup>

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Introduction: Very few studies have focused on Prefrontal Cortex (PFC) role in emotional induction processes. Functional Near-Infrared Spectroscopy (fNIRS) is a suitable technique to study those mechanisms. Affective faces are useful stimuli to induce emotional states, they can present different valences without changing the stimuli features. Methods: 46 healthy right handed female participants took part in this study. The procedure was a block-design paradigm with passive viewing of Happy (Positive), Inexpressive (Neutral) and Angry (Negative) faces from validated databases. 2 blocks of each valence were presented in a pseudorandom order. Results: Repeated measures MANOVA reported different patterns of oxygenation changes for Time x Valence interaction in Ventrolateral channels, mostly in the left hemisphere. Negative block stimuli maintained oxygenation over the presentation whereas Positive and Neutral stimuli showed progressively decreased oxygenation through the block. Discussion: Results are in accordance with the relevance of Ventral Prefrontal regions on emotional processes. Lateral PFC may be involved in attending and evaluating affective responses. Left PFC could modulate the emotional responses of other cortical and subcortical structures.

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**2. Cingulate Cortex and Inferior Frontal Gyrus matter volume reduction in Neglectful Mothers**

I. Leon, M.J. Rodrigo, I. Quiñones, J. A. Hernández, L. García, & S. Roldán

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Although many studies have evidenced that early neglect or abuse alter the child's gray and white matter brain organization, the neurological bases that underpin

and sustain maternal neglectful behavior remain less explored. Previous studies have investigated white matter deficits or an attenuated response to infant crying faces in Neglectful mothers. In this study 24 Neglectful Mothers and 24 Control Mothers underwent an anatomical MRI brain scans. Using Voxel Based Morphometry Analysis we show that Neglectful Mothers compared to control mothers renders substantial changes also in gray matter. Primarily reductions in gray matter volume in regions subserving maternal behavior such as cingulate cortex, or empathy-related areas such as Inferior Frontal Gyrus (IFG) were found. Our data provide the first evidence of structural gray matter deficits in Neglectful mothers. All together with white matter or functional alterations in visual tracts our present results help further to elucidate the neural basis of inadequate parenting.

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**3. Pain perception modulated by unconscious emotional pictures in fibromyalgia: neural indices**

I. Peláez, D. Ferrera, P. Barjola, R. Fernandes, & F. Mercado

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Present study was aimed to explore the neural correlates related to the influence of visual masking emotional stimulation on the processing of a painful stimulus in patients with fibromyalgia (FM).

27 FM and 29 healthy controls–HC women participated in an emotional masking paradigm. Two stimuli were presented: an masked image (neutral, negative and pain-related) followed by a somatosensory stimulus (painful and painless). ERP were recorded at sixty scalp electrodes. A based- ERP amplitude approach was carried out to define and quantify the main components of brain attentional response.

ANOVAS indicated that occipital regions of P1 component were sensitive to the interaction between type of stimulus by group ( $p < 0.05$ ). Specifically, FM patients showed higher amplitudes to pain-related pictures than neutral and negative.

Emotional modulation of P1 component suggests that potentially threatening information would generate a rapid and specific attentional bias in patients with FM, even for unconscious information. These data provide objective evidence that some processes of central mechanisms are altered in these patients but further research, is needed to fully understand this possible alteration.

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## POSTER SESSIONS

### 4. Do deaf bilinguals activate sign translations when reading Italian words?

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The present study investigates written word processing in deaf bilinguals, proficient in Italian and Italian Sign Language (LIS). The activation of LIS phonology was examined by using the paradigm first presented by Morford et al. (2011). Deaf bilinguals and a group of hearing Italian native speakers judged the semantic relation between two written Italian words; critically, half of the stimuli had a phonologically related translation in LIS. To avoid the use of strategies (i.e., retrieving the LIS translation) when performing the task, a short SOA was used (300ms). The results showed that deaf bilinguals were marginally faster when responding to semantically related word pairs with phonologically related LIS translations than to words with unrelated LIS translations. In addition, they were slower to respond to semantically unrelated words with phonologically related signed translations than with phonologically unrelated translations. Importantly, the phonological manipulation had no impact on the hearing participants. These findings show that deaf bilinguals activate the LIS translations of written words under conditions in which the translation is not required to perform the task

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### 5. Lexical and semantic access in balanced bilinguals: a behavioral and electrophysiological study.

J.A. Obrador, Pilar Ferré, & J. Demestre

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Previous behavioral studies that examined bilinguals performing a translation recognition task observed a form-interference effect, suggesting that translation equivalents (TEs) in another language are automatically activated. Recent ERP studies have shown that this effect elicits modulations on the LPC (Moldovan et al., 2016). However, it could be possible that this effect is only observed when participants are asked to retrieve the TE. This study aimed to examine whether the effect is observed when participants are not asked to retrieve the TE. The EEG was registered while early balanced Spanish-Catalan bilinguals performed a lexical-decision task. The experiment contrasted semantically-related pairs, form-related pairs and unrelated pairs. Behavioral effects were observed in the semantic condition, but not in the form condition. The ERP data showed that

whereas semantically-related pairs elicited a reduced N400, form-related pairs failed to modulate the LPC. These results seem to suggest that the co-activation of the TE is not automatic, occurring only when participants are asked to retrieve the TE. These findings have implications for the RHM model (Kroll & Stewart, 1994).

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### 6. Designing of a computerized version of the "Reading the Mind in the Eyes" test.

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The Reading the Mind in the Eyes' test (RMET) is a widely used instrument that explores the ability to match the correct semantic definition of a mental state to a picture of the eye-region expression. The present study is aimed at designing a computerized version of RMET and at assessing its reliability compared to the paper-pencil version. To this aim both the digital and the paper-pencil version of the test have been administered to a large cohort of healthy subjects in a well counterbalanced design. Internal consistency and correlation between the two versions have been assessed. Compared to the paper-pencil version, the computerized RMET includes two type of control stimuli to evaluate motor and perceptive factors. Furthermore, it permits the subject to respond in a given time frame and allows to record reaction time. The development of the digital version of RMET will allow to set up specific experimental protocols for a more comprehensive investigation of the ability to recognize mental states by combining its use with neuroimaging and neuromodulation.

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### 7. The SANchild (Spanish Affective Norms for Children)

L. Sabater<sup>1</sup>, L. Collado-Madurga<sup>1</sup>, M. Salinas-Gonzaga<sup>1</sup>, M. Guasch<sup>2</sup>, P. Ferré<sup>2</sup>, I. Fraga<sup>3</sup>, J.A. Hinojosa<sup>1</sup>

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The processing of emotional language by children has been scarcely investigated up to date. This gap might be due in part to the lack of stimuli that have been adequately assessed by children. We report here data from a normative study in which 1200 children and adolescents from ages 7, 9, 11, and 13 rated 1400 Spanish words in the affective dimensions of valence and arousal through the Self-Assessment Manikin (Lang, 1980). The relations between both affective variables were examined through correlational analyses. We also explored the relation between both valence and arousal and other psycholinguistics variables such as word length and word frequency in children. Finally, we analyzed gender differences when assessing both affective dimensions. The SANchild database will allow researchers to investigate the interplay between language and emotion in children of different ages.

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### **8. Side biases in euro banknotes perception: The horizontal mapping of monetary value**

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In two experiments we investigated the perception of two Euro banknotes having different value (5€ and 100€) in a divided visual field paradigm.

Results show that the left hemisphere (right visual field) is more responsive to difference in value, while the right hemisphere (left visual field) is not. Specifically, 100€ is recognized faster when presented on the right, compared to the 5€, while this difference has not been found on the left.

When lateralized banknotes are presented as priming stimuli, the recognition of rotten foods (having negative affective valence), presented centrally as a target, results inhibited (slower reaction times) when the prime was 100€ (positive emotional valence), compared to the 5€ (neutral emotional valence), only in the right visual field. No effects have been found in the left visual field. These results have implication for the valence hypothesis, which states that the left hemisphere is more sensitive to positive emotional valence. We expand previous results, regarding biologically relevant stimuli (e.g. faces), showing that the economic value is probably coded in a similar fashion.

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### **9. Exploring the causal role of the motor system in the comprehension of action language: A tDCS study.**

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Understanding action language elicits motor process in the brain. However, evidence that the human primary motor cortex (M1) is causally essential to comprehension of action language is meager. To directly demonstrate causal links between M1 and features of linguistic meaning, we are running experiments that externally perturb the left M1, before an action-language memory task. Anodal and cathodal transcranial direct current stimulation (tDCS) is been applied offline over M1, with the aim of increasing and reducing the M1 activity respectively. The accuracy in the recall of action-sentences is registered and analyzed. If understanding action language critically relies on M1 processing, we expect that anodal and cathodal tDCS would improve and impair performance in the task involving action sentences. No similar effects are expected for non-action sentences. These findings would indicate that the left M1 is functionally relevant to processing linguistic meanings, thus showing that high-order cognitive functions are grounded in motor system.

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### **10. Falsifying facts with negations or with alternatives: the construction of counterfactual antecedents**

J. Gómez-Sánchez<sup>1</sup>, S. Moreno-Ríos<sup>1</sup>, & C. Frosch<sup>2</sup>

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Thinking about counterfactuals such as (1) “If his sister had entered his bedroom silently, he would have been awake”, requires the consideration of a false situation through the negation of the antecedent ((2) “His sister did not enter silently”). In our study we evaluated whether people understand antecedents in counterfactuals by either considering the negation of the clause (2) or by discarding that possibility and considering an alternative situation ((3) “His alarm clock sounded”).

In eight stories we manipulated whether the counterfactuals were associated with concrete negation

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(3) or abstract negation (“He suffered from insomnia”). Furthermore, the stories presented an alternative (the boy was awake because his sister made noise or because his alarm clock sounded) or disabler in which the relation between antecedent and consequent is broken (e.g., “If you pour water in a holey bucket it will be empty”). Results showed that, to create the negation of the antecedent in counterfactuals, adults exhibit a preference for using the alternative situation (3) instead of just negating the antecedent (2).

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### **11. The age of acquisition of emotional nouns in children**

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Children begin expressing emotions early in time. However, the development of emotional lexicons through infancy remains poorly understood. The current study aimed to get some knowledge of children's gain of emotion-denoting vocabulary from preschoolers to adolescence by examining the contribution of emotion and psycholinguistic variables to the age of acquisition of words. Three hundred and eighty participants from preschool (32 months) to adolescence (14 years) were tested, divided into eighteen age groups each including 20 participants. Each participant had to name two hundred familiar drawings denoting positive, negative and neutral nouns. The results of regression and mixed model analyses indicated that positive words are learnt earlier than neutral words, which is followed by the acquisition of negative words. Besides word frequency and children's age, word valence was a significant predictor of task performance as we found more accurate responses to positive relative to negative words. Interestingly, this effect was observed for girls but not for boys. We did not observe effects of arousal in word acquisition. The theoretical implications of these effects are discussed.

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### **12. Efficacy of mindfulness-based interventions in enhancing executive functioning: A systematic review of RCT in adults**

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Mindfulness meditation has been claimed to be effective in enhancing executive functioning. However, these claims are mostly based on research that accuses several methodological limitations. In an attempt to address this issue, we conducted a systematic review of the literature considering only randomized controlled studies. We investigated the efficacy of mindfulness-based interventions (MBIs) in enhancing working memory, inhibitory control and cognitive flexibility, as assessed by neuropsychological tests and computerized cognitive tasks. Four databases were searched obtaining a total of 822 references. After a systematic filtering process, 16 studies were retained for evaluation. Our results suggest that MBIs (1) are moderately effective in enhancing executive functioning; (2) do not impact differentially working memory, inhibitory control and cognitive flexibility; and (3) are differentially effective depending on the age of the sample being tested, so that younger participants profit more from the intervention than older ones. This review is not without limitations. Most notably, in absence of quantitative meta-analysis of the data these results are only partially informative. Considerations for future empirical and meta-analytical research are discussed.

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### **13. Health body priming and food choice: An eye tracker study**

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The gaze bias theory suggesting that people tend to look longer at items that are eventually chosen, was not entirely confirmed for food choice. Although the presence of healthy prime could orient both the consumers' attention and choice, the effect of body shape primes are less known: we investigated how severely overweight (OW) and underweight (UW) body shapes, influenced attention and choice towards low-calorie food (LcFd) and high-calorie food (HcFd). We hypothesized that OW and UW primes could activate opposite (respectively weight-loss vs. weight-gain) health goals. Fifty females were involved in a primed food choice task in which choices between LcFd and HcFd, paired for subjective liking, were presented after control or human body shapes (normal weight, UW or OW). Results showed that chosen HcFd was looked longer when preceded by OW prime compared to chosen

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LcFd and chosen HcFd preceded by UW prime. Also, HcFd was looked longer than LcFd without a corresponding higher amount of HcFd choice. Overall, these data shed light on the interactions between attention, health priming and food choice.

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### 14. Physical activity modulation over attentional control in chronic low-back pain patients

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The aim of this study was to analyze the modulating effect of physical activity on mood, general health and cognitive performance in two groups of chronic low-back pain patients, classified as physically active (n=14) and passive (n=14). Anxiety, depression, physical health, mental health and subjective pain intensity were assessed, using the Spanish versions of GAD-7, PHQ-9, and PROMIS General Health, respectively. An electroencephalographic recording was also carried out during a computerized version of the Eriksen Flanker Task. Both groups of patients were comparable in age, sex, educational level, anxiety and depression. The active group obtained higher scores in physical and subjective health, lower pain intensity scores, shorter reaction times and fewer errors. They also showed greater amplitude and latency in the N2 and P3 components during the attentional task in both conditions (congruent and incongruent), compared to the passive group. These results are consistent with other studies that indicate the influence of physical activity on the intensity of pain and health in general, as well as greater speed and accuracy in an attentional task.

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### 15. The more neurotic you are, the less you align: Neuroticism as a predictor of lexical alignment

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People tend to converge on common ways of speaking (Pickering & Garrod, 2004), such as employing the same lexical choices, known as linguistic alignment (Garrod & Anderson, 1987). Given that personality and empathy are key to communication (Kourmosi et al., 2017), we investigate whether personality and empathy predict lexical alignment and, if so, the degree of lexical

alignment. 30 participants first filled the IPIP's Big-Five Factor Markers questionnaire (Goldberg, 1992), measuring Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism and the Toronto Empathy Questionnaire (Spreng, McKinnon, Mar, & Levine, 2009). Then, participants completed two paper maps from the HCRH corpus (Anderson et al., 1991), both as Instruction Giver (IG) and Instruction Receiver (IR). The IR had to follow the IG instructions to complete a route. The IG's map had a pre-printed route and a finishing point, but the IF's map did not. Crucially, some landmarks and words were altered between the two maps, in order to induce lexical alignment. Our results showed, for the first time, that neuroticism negatively predicts lexical alignment.

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### 16. Recognizing negative words in a lexical decision task: The negligible effect of arousal

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Recent research has shown that emotional valence plays a role in visual word recognition (Kuperman et al., 2014). In a lexical decision task (LDT), Padron et al. (2017) found an effect of emotional valence on response times. Critically, it did not interact with an effect that modulates early encoding such as stimulus quality. Here we conducted two LDT experiments in which we compared neutral and unpleasant words. The two main aims were: 1) to explore whether arousal had an effect on lexical access, and 2) to test whether the effects of stimulus quality could be modulated by arousal, thus pointing to an early locus of arousal (see Citron, 2012, for ERP evidence). In Experiment 1, we employed unpleasant words with neutral, moderate, and high-arousal values, whereas in Experiment 2, only high-arousal unpleasant words were compared to neutral words. Results showed an effect of stimulus quality, whereas there were no clear signs of an effect of arousal (or an interaction). Therefore, unlike emotional valence, arousal does not affect behavioral responses during lexical access.

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### 17. Neural processing of negative intense words in borderline personality disorders

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Disturbances in the processing of negative emotions have been associated with borderline personality disorder (BPD) by using two different types of emotional stimuli: facial expressions and scenes. In the present study, event-related potentials (ERP) were used to compare neural activation in 22 unmedicated patients with BPD and 22 age- and sex-matched healthy controls during an emotional lexical decision task that required discriminating between emotional words (negative and neutral personal adjectives) and pseudowords. Thus, this paradigm introduces stimulus negative valence incidentally relative to the explicit behavioral task. Scalp-level ERP analysis showed that late positive component (LPC) amplitudes were sensitive to lexical effects (words>pseudowords) in both groups. By contrast, emotional effects (negative>neutral) on LPC amplitudes were found in the control but not in the BPD group. The present study therefore obtain further evidence for an abnormal neural processing of negative emotions in patients with BPD using emotional words. This study was supported by grants from the Instituto de Salud Carlos III (PI11-00725; PI14/01449) and from MINECO (PSI2014-54853-P; PSI2017-84922-R).

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### 18. The role of emotion on task selection and cognitive effort

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Recent research suggests that, when faced with two alternative lines of action, humans tend to choose the less cognitively demanding one, given the intrinsic cost of cognitive control. In parallel, several studies show how control itself can be modulated by our affective state. However, how different emotions impact strategic task selection and subjective effort remains unknown. In two experiments, we explored this question using a demand-selection task. In this task, participants freely

choose between two cues represented by images with different valence. Unbeknownst to them, one cue was associated to high task-switching probability (high demand), while the other frequently led to task repetition (low demand). Preliminary results suggest that negative valence impacted task performance, increasing reaction times and the perceived effort associated with the tasks. However, selection of the high or low demand task was not modulated by the underlying affective state. This suggests that the valence of the information in a task has no effect on choices linked to cognitive control. Further studies are needed to establish the limits of this lack of effect.

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### 19. Reduced modulatory effects of distraction on pain due to aging

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Although pain and aging can both produce plastic changes, little is known about the effects of aging on cognitive modulation of pain. In the present study, we evaluated the impact of distraction on pain in 21 young ( $20.6 \pm 2.2$  years) and 20 older adults ( $66.0 \pm 3.2$  years). Participants received painful electrical stimuli (1ms duration) with an intensity above individually determined pain thresholds when they were performing a high- (n-back) and a low-distracting (simple RT) cognitive task. N200 and P300 amplitudes elicited by painful stimulation, as well as pain ratings were analyzed. Results indicated that although painful stimulation was always rated as less intense and unpleasant during the high than during the low-distracting task, pain was perceived as more intense and unpleasant in older than in younger participants. In line with these findings, N200 and P300 amplitudes were smaller during the high than during the low-distracting task, and smaller in older than in younger participants. Our results suggest the existence of dysfunctional pain regulatory neural mechanisms in the elderly, mainly characterized by reduced analgesia associated with distraction.

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### 20. Cognitive processes common to reading and arithmetic

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## POSTER SESSIONS

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In psycholinguistics, two processing routes have been proposed for reading: a direct route (lexical route) and another route that involves the use of grapheme-phoneme conversion rules (sublexical route). In numerical cognition, two processing routes have been proposed for arithmetic: a direct route to retrieve the result of operations from memory and an indirect route by which we use procedures to reach the result. In this study the relationship between language and arithmetic according to the two forms of processing described above (direct access, procedures) is evaluated. Participants performed language tasks associated with the direct route (e. g., very frequent words reading) and sublexical route (e. g., non-word reading), and arithmetic tasks that involved direct retrieval (1D sums with one-digit operands) or the use of procedures (e. g., 2D sums with two-digit operands). The performance in the 1D sums was predicted by direct route linguistic tasks and the performance in the 2D sums by linguistic tasks involving the use of procedures. Thus, the results show a clear relationship between language processing and arithmetic.

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### **21. Exploring autobiographical memories for real life sequences of event episodes with a wearable camera**

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A current hallmark in Autobiographical Memory (AM) research is to unravel how individual sequences of real-life event episodes are encoded and retrieved from long-term memory. To address this question experimentally, we recorded electroencephalographic activity (EEG) while participants retrieved their individual AMs cued

by pictures taken automatically by a wearable camera from the past one-week daily life. As our experience is continuous, we sampled real life experiences into segments of context-based episode units identified automatically by a semantic regularized clustering algorithm (SRclustering), that groups together temporally adjacent images sharing contextual and semantic attributes (extracted employing a convolutional network based approach). This approach allowed a simplification and an unbiased identification of the possible underlying structure of the sequential nature of the autobiographical experience.

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### **22. Arrows vs. eye-gaze in a spatial interference task**

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Eye-gaze may represent a special kind of stimuli for the human attentional systems. Responses to arrows are shorter when the arrow direction is congruent with its position (congruent-trials), as compared to incongruent trials, while the effect reverses when eye-gaze stimuli are presented. The reverse congruence effect observed with eye-gaze stimuli can be explained by fast explicit judgments about other peoples gaze direction when eye contact is maintained. But, it is not known whether and how the implicit processing of eye-gaze direction can affect behavior. In this study, we explore the implicit and explicit processing of eye-gaze in a spatial interference task in which participants were asked to classify the direction (explicit-task) or the color (implicit-task) of the stimuli presented (arrows or eye-gaze). Results showed that in the explicit task, eye-gaze and arrow stimuli led to opposite spatial interference effects. When the task was implicit, no interference effects were observed. These findings suggest that interference effects observed for eye-gaze stimuli in the explicit task rely on motor and spatial components, activated during explicit but not implicit tasks.

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### **23. Affective norms of valence, arousal and concreteness for 3,022 Croatian words**

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Researchers interested in investigating relationships between language and emotions rely on normative studies which include large lists of words evaluated on different emotional dimensions by a huge number of participants. Most databases used in research are made for Germanic and Romance languages. The present study introduces the first database in southern Slavic group of languages, i.e. Croatian. Many features of Croatian differentiate it from other languages, e.g. three genders, seven cases, and "one letter per sound" orthographic system. The database includes 3,022 words, and scores for three emotional dimensions (arousal, valence and concreteness) were collected. Each word was rated by at least 25 participants. Correlations between arousal, valence, concreteness and psycholinguistic variables were explored. Considering the differences in the language structures between Croatian, Romance and Germanic languages, this database will allow researchers interested in affective psycholinguistics to explore new questions that remained unanswered.

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### **24. Ventral and dorsal white matter pathways contributions to the testing effect**

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Retrieval practice is highly beneficial for long-term memory consolidation. Compared to repeated study, testing or repeated retrieval enhances later performance on tested information and facilitates learning from subsequent encounters with that information. Despite of extensive behavioral research and a few functional neuroimaging studies examining the neural correlates of the testing effect in the last decade, there is still no clear evidence regarding the contribution of white matter ventral and dorsal pathways connecting distant regions involved in memory retrieval, such as the medial temporal lobe and the prefrontal cortex, on this effect. We conducted a MRI study with young adults (N=38) aimed at investigating microstructural properties of ventral (uncinate fasciculus) and dorsal (cingulum bundle) white matter pathways and their associations with participants' behavioral performance and their functional activation at memory retrieval 48 hours after encoding (i.e., 100 Spanish-Swahili word pairs). Hindrance modulated orientational anisotropy revealed the anatomical connectivity profile underlying

behavioral and functional modulations of the testing effect, shedding light on the contribution of ventral and dorsal fiber tracts on this effect.

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### **25. Negation modulation of inhibition-related theta power is not modality-specific**

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Behavioural and physiological effects of negation are frequently explained by invoking inhibitory processes which specific nature remain to be determined. Recently, we have suggested that linguistic negation partially relies upon the neurophysiological mechanisms of response inhibition; specifically, on those signalled by modulations of fronto-central theta oscillations in GNG tasks. In the current EEG study, we ponder this proposal by testing whether negation reuses of response inhibition is selective for action related sentences, or on the contrary, involves a more general-purpose mechanism. To that end, we employed the same dual-task paradigm than in our prior study – sentence comprehension plus GNG task – but including both action and non-action (abstract) related sentences. Results confirmed that theta power increases elicited by NoGo trials were smaller in the context of negative sentences than in the context of affirmatives, and also that this polarity effect was statistically similar for both action and non-action related sentences. Thus, a general-purpose inhibition mechanism, rather than specific for action language, is likely operating in negation.

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### **26. Positive bias in recalling future positive and negative autobiographical events in young and older adults**

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Autobiographical memory not only includes past experiences, it is also the vehicle that allows us to travel through time mentally to the future. The objective of this study was to examine the positive bias in recalling future positive and negative autobiographical events in young and older adults. The participants were presented with eight positive and eight negative representative future events as a model and the corresponding cues to generate their own positive and negative future events.

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The participants correctly recalled more positive than negative events. The young adults recalled more events than the older participants whilst the older participants showed better recall of their own imagined future events than the model's events, and they committed more errors when recalling the models events than their own imagined events. More than half of the errors were valence changes, most of these being from negative to positive events, and these valence changes were more pronounced in the older than in the younger adults. Our findings suggest that people are well disposed toward recalling positive imagined future events.

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### **27. Automatic attention in associative learning: Evidence from the dot probe task**

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In two experiments, we measured attention to cues during associative learning (AL) by using the dot-probe task. AL and dot-probe tasks were programmed in alternating trials. In the AL task, participants learned to categorize compounds of two cues. These cues differed in colour and shape, but only the colour was relevant for categorization. We used the same stimuli for the dot-probe task, but now the shape was the only relevant feature since the probe appeared more frequently over one specific shape. In the dot-probe task, participants were informed that colour was irrelevant and that they should look for a particular shape. RTs to the probe were faster when it appeared over the instructed shape. More importantly, the predictive value of the colours (in the AL task) influenced performance in the dot-probe task: Predictive colours captured attention more than non-predictive colours, regardless of their shape. These results suggest that attentional biases acquired during AL might operate in an uncontrollable way.

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### **28. Effects of (grasped) handles alignment on keypress responses with two-handed objects**

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Background: Previous research has shown effects of handle alignment on keypress responses when participants judged the upright or inverted orientation of depicted, one-handed graspable objects. In two Experiments, we explored whether such effects still hold for graspable objects that are usually grasped by two hands (i.e. two-handed objects; e.g. shears) when they appear as grasped on one side by either one's own (Experiment 1) or other people's (Experiment 2) hands. Methods: Participants were asked to categorize two-handed objects as being mainly used in the kitchen or during spare time. Each object could appear as not grasped, as grasped by the two hands, or as grasped by one hand only (i.e., left or right). When the object was grasped by one hand only, the grasping hand could be spatially compatible (on the same side) or incompatible (on the opposite side) with the actual responding hand of the participant.

Results: Results from both experiments showed a better performance when the depicted grasping hand and the actual responding hand were spatially compatible (on the same side) than incompatible (on opposite sides).

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### **29. Curvature effect on paintings in two contexts**

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Objects with curved contours are usually preferred over similar objects with sharp-angled contours (Bar & Neta, 2006; Munar et al., 2015). This phenomenon also shows up regarding geometric figures (Silvia & Barona, 2009), rooms (Vartanian et al., 2013) and meaningless shapes (Palumbo & Bertamini, 2016). The present experiment examines the likelihood of this preference to be playing a role on the appreciation of art paintings. We used artworks from Robert Pepperell. Paintings were divided into triplets, each of them featuring the same object but with different contours: curved, mixed and sharp-angled. Participants saw the artworks individually and had to rate to what extent they would bring that particular painting to their home (task 1) or to an art gallery (task 2). Results reveal a preference for the curved paintings in the "home" condition and no significant difference between contour versions in the "art gallery" condition. This suggests relevant roles of contour and context regarding the appreciation of art paintings and helps strengthen the link between Perception and Art.

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### 30. Music effects on spatial task in younger and older adults

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Based on the seminal study by Rauscher et al. (1993), the Mozart effect refers to the temporary enhancement of performance on spatial tasks in standardized tests after exposure to the first movement “allegro con spirito” of the Mozart sonata for two pianos in D major (KV 448). However, these findings turned out to be astoundingly hard to replicate, leading to the dissemination of conflicting results.

In order to shed light on the role of Mozart sonata for two pianos in D major, and music in general, on spatial tasks in younger and older adults, we asked our participants to complete a Wechsler Adult Intelligence Scale (WAIS) subtest before and after listening to different musical excerpts. Results on the differences in the spatial task between groups, and before and after listening to musical excerpts, are discussed in line with existing literature.

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### 31. Extinction of human avoidance develops slower in a red context than in a blue context

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A recent study by Claassen, Mazilescu, Thieme, Bracha & Timman (2016) using human eye-blink conditioning found that the rate of extinction was slower when the context where extinction took place was orange, than when the context was blue. According to these authors, the differences could be explained because orange is similar to red, and humans usually associate red to danger, something that would have prompted the avoidance behaviour. The goal of this study was to test these result within a different learning procedure explicitly using a red, rather than an orange context. An Avoidance-learning videogame simulating the “Space Invaders” classical videogame was employed. Different auditory warning signals were associated with the presence or the absence of an aversive outcome. Two groups of participants received acquisition and extinction training with one of the warning signals. The only difference between groups was the context in

which extinction took place (blue or red). Results showed that rate of extinction was slower when extinction took place in the red context than when extinction took place in the blue context.

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### 32. Inhibitory properties of a latent inhibitor after being exposed in compound with novel stimuli

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Latent inhibition refers to a retardation in the development of a conditioned response (CR) when the conditioned stimulus (CS) is preexposed alone prior to its pairings with an unconditioned stimulus (US). Previous literature has established that a latent inhibitor does not show an active tendency to reduce the level of conditioned responding when it is presented in compound with other stimuli with excitatory properties. According to the Hall-Rodríguez account of latent inhibition, this happens because preexposure neutralizes the preexisting excitatory value of the stimulus (i.e., the CS initially evokes the expectancy that some event may occur, but this is gradually neutralized by the CS-no event learning during preexposure). This account also predicts that a latent inhibitor may become a net inhibitor if it is repeatedly preexposed in compound with novel stimuli, which ensures that the expectancy that some event may occur is actively maintained (CS+N1, CS+N2, CS+N3...). We present multiple sources of evidence supporting this latter prediction using summation tests in different learning paradigms both with humans and rats.

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### 33. Circadian synchrony effects in economic decision-making

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Chronotype relates to individual differences in circadian rhythms (sleep/wake, body temperature), affecting multiple psychological dimensions (morning-types show more cautious decision-making than Evening-types).

Does chronotype influence physiological, cognitive and affective factors involved in decision-making?

METHODS. We tested the influence of circadian chronotype (32 Morning-type vs. 32 Evening-type) and time of day (8 am vs. 10 pm) on interpersonal decision-making (acceptance rates of fair vs. unfair offers in the

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Ultimatum Game task), physiological arousal (wrist skin temperature), affective state (PANAS questionnaire) and the EEG.

RESULTS. Wrist temperature: Morning chronotypes had earlier circadian phase than evening types (midsleep time 4:45 vs. 6:40 am).

EEG: The frontal P200 discriminated between fair and unfair offers, selectively in Morning-types.

Behaviour: Morningness was related to rational decision-making: accepting unfair offers optimises benefits.

DISCUSSION. Circadian chronotype can influence economic decision-making. Morningness was related to optimal performance in an economic decision-making task. Morning-types could have made more rational decisions than Evening-types on the basis of selective neural responses (P200) to unfair offers.

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### **34. The leftmost-digit detrimental effect in comparing multidigits of different length**

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Research in multi-digit number comparison usually considers stimuli with the same number of digits (e.g., 3452 vs 7831). This task simply requires comparing the leftmost digit of each multi-digit number. Surprisingly, no research exists on comparing numbers that differ in length (e.g., 995 vs 1000), which demands focusing in the number of digits in each multi-digit. Although these differences have been explicitly acknowledged in the literature (Huber et al., 2016), no experimental evidence exist. This study explores whether the comparison of different-length numbers is affected by the identity of the leftmost-digit of each multi-digit. Eighteen undergraduates (12 females, mean age= 23.9) compared numbers in blocks with different proportions of same-length and different-length multi-digit pairs (25% vs 50% vs 75%). Stimuli in the different-length condition were number/length-congruent (the number with more digits started with a bigger number: 2384-107) or number/length-incongruent (the number with more digits started with a smaller number: 2675-398). Performance was better in number/length-congruent pairs than in incongruent pairs. Additionally, this effect was linearly modulated by the proportion of different vs same-length multi-digit pairs.

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### **35. Influence of adult attachment style on the eye-gaze following: evidence from social and nonsocial stimuli**

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The influence of individual differences in attachment style on cognitive functions, social cognition and functioning has been extensively demonstrated in a wide range of studies. The current investigation tested whether attachment style modulated individual responses to social and non-social attentional cues (eye-gaze and arrows, respectively). To this aim, a questionnaire measure of the attachment style and social and non-social variants of a spatial cueing task were administered to 176 undergraduates. Results showed that the normal tendency to orient attention in accordance with another individual's eye gaze was indirectly correlated with attachment insecurity, while it was directly correlated with attachment security. However, attachment style had no influence on a nonsocial form of orienting. These results support the idea that social attention is modulated by the attachment style and suggest that the tendency to follow the direction of another individual's gaze is reduced in observers reporting insecure attachment.

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### **36. How does alcohol consumption influence the electrodermal activity in intimate partner violence perpetrators?**

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Intimate partner violence (IPV) perpetrators' with impulsive traits tend to show a higher reactivity to stress. However, although alcohol consumption has demonstrated to affect the way a stressor is reacted, the majority of research has not considered it. Thus, this study aims to analyze the electrodermal response and impulsivity traits of IPV perpetrators with high (n=27) and low (n=33)-risk alcohol consumption to an acute stressor compared to controls (n=35). IPV perpetrators scored higher in executive dysfunctions and impulsivity than controls. Furthermore, those with low-risk alcohol consumption showed higher skin conductance levels in response to stress, particularly during preparatory, task, and recovery periods. This information could be useful complete the IPV perpetrators psychophysiological

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profile in order to develop more efficient prevention and intervention programs and with this, to reduce the incidence and recidivism of IPV.

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### **37. Cardiorespiratory response to acute stress in intimate partner violence perpetrators: the role of alcohol consumption**

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Intimate partner violence (IPV) perpetrators have been classified based on autonomic nervous system (ANS) reactivity to acute stress. Proactive or reactive perpetrators differed in their ANS pattern. However, findings are controversial due to several studies failed in their replication and they did not consider moderate factors such as the alcohol consumption. The aim of this study was to analyze the cardiorespiratory profile of IPV perpetrators with high (n=27) and low (n=33)-risk alcohol consumption to an acute stressor when compared to controls (n=35). Perpetrators with low-risk alcohol consumption had higher RR during preparatory, task and recovery periods than controls. In all groups, HR increased from resting to the preparatory period and from then to the tasks, afterwards decreasing to recovery, PEP shortened from resting to the task period and then lengthened to recovery, and parasympathetic markers (HF and RSA) decreased from resting to the tasks and then increased to recovery. Only IPV perpetrators showed decrease in positive affect after the session. These results could help developing the perpetrators self-regulation and decreasing the recidivism risk.

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### **38. Modifiche di aspetti di personalità, locus of control, creatività in soggetti adulti frequentanti un gruppo di Teatroterapia**

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L'obiettivo di questa ricerca è di dimostrare come la Teatroterapia abbinata alla Terapia Cognitivo Comportamentale produca un cambiamento nella creatività e della personalità, Locus of Control e livello di ansia.

Il campione composto da dieci persone ha partecipato ad una terapia di gruppo (Teatroterapia abbinata alla Terapia Cognitivo-Comportamentale). Gli incontri erano una volta alla settimana per sei mesi. Tutte le

sedute sono state registrate. Il primo e l'ultimo giorno di Terapia sono stati somministrati due test: (BFQ), il Torrance Tests of Creative Thinking, (TT), un test di Locus of Control (LC) e lo State-Trait Anxiety Inventory (STAI-Y).

I risultati il BFQ mostrano un incremento dei fattori di personalità. I risultati dell'ANOVA per il TT mostrano un forte incremento del valore medio della creatività al test di pensiero creativo. I risultati del LC mostrano un incremento del LC interno. Mentre si osserva una diminuzione dello stato di ansia di tratto.

I risultati dell'analisi del discorso mostrano una modifica dei temi nel corso del tempo a favore di una maggiore trattazione di temi centrati sulla propria persona.

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### **39. The fuzzy future: time horizon, prospective memory, and emotional distress in gambling disorder**

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Previous studies demonstrated that disordered gamblers show foreshortened time horizon and reduced future-oriented mental time travel ability. Furthermore, converging evidences indicated that negative emotional states are significant correlates of problematic gambling. The study first investigated the interplay of time perspective, retrospective and prospective memory, and emotional distress to gambling severity. 116 adults participated in the study. Two equal-number groups of non-problem (NPGs) and probable pathological gamblers (PGs) completed the South Oaks Gambling Screen (SOGS), the Consideration of Future Consequences scale (CFC-14), the Prospective and Retrospective Memory Questionnaire (PRMQ), and the Depression, Anxiety and Stress Scales-21 (DASS-21). Relative to NPGs, PGs showed shorter time horizon, a higher incidence of memory errors or memory problems, and reported experiencing higher levels of depression, anxiety, and stress. Regression analysis indicated that present orientation, poor prospective memory, and high level of anxiety significantly predicted gambling severity. It may be that gambling addiction impairs the ability to mentally navigate the future in the long run, probably because heavy gamblers seem to be insensitive to the future consequences of their actual behavior.

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### **40. Financial well-being and subjective/psychological well-being among youth: How uncertainty and ambiguity tolerance affects their relationship**

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Financial well-being has recently become a topic of considerable interests. It refers to the subjective experience of being financially healthy and is based on subjective evaluation of one's financial experience. Financial well-being has been considered a predictor of psychological and subjective well-being. However, the role of personal characteristics in affecting their relationship has rarely been considered. The present study aims at exploring the relationship between financial well-being and subjective/psychological well-being in a group of 449 Italian and Portuguese young adults by accounting for the individual differences concerning the ability to tolerate ambiguity and uncertainty.

We firstly performed a cluster analysis to identify different profiles of ambiguity and uncertainty tolerance. Later, we performed a multi-group analysis in order to test if the relation between financial well-being and subjective/psychological well-being changes across the 4 profiles we identified.

Results indicate that the ambiguity and uncertainty tolerance is a significant moderator of the relation.

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### **41. On the role of repetition, familiarity and knowledge in the illusory truth-effect**

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People is more likely to judge repeated statements as true compared to new, non-repeated statements. This illusory truth effect is thought to reflect the reliance upon repetition-induced familiarity that occurs when knowledge about a statement is not available. The current study tested this account in two different studies. First, we examined whether the effect extends to statements for which participants had demonstrated

knowledge. Second, we explored whether subjective familiarity rather than objective repetition accounted for increased true judgments for statements on which participants had no explicit knowledge. The first study revealed illusory truth effect for well-known true and false statements, suggesting so that a lack of explicit knowledge about the statements is not a requirement for the illusion. In addition, the second study showed that perceived familiarity – for both repeated and new statements – increased true judgments more than objective repetition. Thus, the illusory truth-effect is not limited to unknown statements, as it also affects to well-known truths and falsities, seems to depend on the subjective feeling of familiarity.

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### **42. Development of a new approach for neuropsychological and clinical screening in fragile subjects and immigrant patients with chronic disease**

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Multiculturalism and progressive stabilization of migrants present new challenges for national health systems. In particular, clinical practice may benefit from the analysis of their clinical needs and preferred uses of health services. The project aimed at outlining healthcare needs of stabilized migrants presenting chronic diseases in the context of the Italian health system, as well as potential difficulties experienced by healthcare professionals while answering such needs. Based on a preliminary survey on Italian patients, we have devised a novel approach for the concurrent evaluation of patients' neuropsychological and clinical condition and of healthcare professionals' representation of patients' condition and needs. The section of the screening tool dedicated to patients includes standardized tests for neuropsychological assessment and a semi-structured interview for the collection of social, clinical, and psychological data. The section dedicated to healthcare professionals focuses on their cultural representations concerning their work and the engagement of migrant patients towards health. This new approach, by integrating

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different sources of information, allows for obtaining a multidimensional assessment of patients' needs and of risk factors in medical assistance.

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### **43. A new experimental paradigm to investigate prospective and working memory**

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Prospective memory (PM) concerns the ability to achieve a previously organized future intention in a given time. This mechanism requires the involvement of working memory (WM), which allows to coordinate simultaneous processes. The relation between WM and PM is a debated theme in literature. The present study aims to observe the engagement of WM in PM, investigating how these two mechanisms are correlated or partially independent. Two ongoing activities concurrently with a prospective switching task were administered to a sample of 21 healthy participants. The first task (arithmetic) consists in the development of a low-cognitive WM activity together with a PM task to be conducted after the presentation of a cue (event-based) or at a given moment (time-based). The second experiment (PASAT) demands to perform a high load WM activity and a PM task according to the same modalities of arithmetic task. Results show that WM influences PM performance only in high load WM tasks requiring an active PM self-retrieval (time-pasat). Such findings support the partially independent of WM and PM, consisted of distinct processes.

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### **44. Neuromanagement and leadership: an EEG-hyperscanning study**

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Organizational research has increasingly matched its concerns with an innovative neuroscientific hyperscanning approach and the present research studies leadership topic, with a focus on the effects of leadership style on emotional and empathic processes inside a leader-employee dyad. 11 leader-employee dyads took part to the experiment and were involved in a role-played interview about employee's performance evaluation. During the interview, the leader had to use a participative style of leadership or a more directive one,

depending on the condition to which they were assigned. Cortical activity was measured (electroencephalography, EEG) during the whole video-recorded interview. Results showed an increasing of Delta and Theta EEG bands power and coherence measure in DLPFC areas for the participative style dyads, suggesting a greater engagement in the interview for the participative dyad components compared to the directive one, with a particular emotional connotation of the interaction. These dyads better focused their attention on the interaction, based on the increased Beta power on the DLPFC. This study shows encouraging highlights about interpersonal processes for the promotion of health at work.

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### **45. Multisensoriality and consumer experience: a neuromarketing study**

I. Venturella, G. Fronda, & M. Balconi

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This study integrates sensorial marketing with a neuroscientific approach to investigate the influence of sensory stimulation on consumer experience. Twenty one subjects had to explore for a maximum of 15 minutes a cosmetic shop, well-known for fragrances and bright colors' use. Depending on the sensorial channel they could use (olfaction, touch or hearing), the sample was divided in three conditions. Cortical (electroencephalography) and autonomic (biofeedback) measures were recorded during the exploration. Results suggested an unpleasant experience of shop areas where products were difficult to manipulate, reflected by increasing of Delta band activity in right frontopolar and frontal areas. A greater Skin Conductance Level was detected when participants could touch the products; the same subjects spent more time in areas with classic hand-creams instead of areas with less manipulable products, for which, as seen before, there was a greater frontal Delta band activity, connoting the unpleasant experience. Olfaction users spent less time in areas with packaged products, searching for cosmetics to smell. This study gave interesting highlights on the implicit channels use for enhance consumer preference.

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### **46. The speech sound leads to the recognition of the meaning of unknown languages: a sound symbolism study**

## POSTER SESSIONS

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Sound symbolism (SS) theory supports the existence of a non-arbitrary correspondence between the sound of a word and its meaning. To better investigate SS in the domain of natural languages 215 native Italian and Polish participants heard words pronounced in 4 non-Indo-European languages (Finnish, Japanese, Swahili, Tamil) unknown to them and tried to guess the correct meaning of each word among 3 alternatives. Three word categories were presented: nouns, verbs and adjectives. A first analysis supports a semantic role of sound symbols, with performance of participants higher than chance. When analyzed separately for language and for word category, results were significant for Finnish and Japanese (not for Swahili and Tamil) and for nouns and verbs (not for adjectives). The present study confirms a sound-symbolic component in the processing of natural languages, which could be attributed to subtle similarities in the iconicity of languages. Furthermore, the evidence that the performance did not differ between Italian and Polish participants, allows us to conclude that SS is independent from listeners' mother tongue at least between Indo-European languages.

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### **47. Explicit and implicit timing deficits in Huntington's disease**

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Huntington's disease (HD) entails an early degeneration of the basal ganglia, a structure responsible for internally and externally triggered explicit timing. We assessed HD patients in an explicit and implicit timing tasks. In the explicit task, participants were instructed to detect a target preceded by a temporal cue with 75% validity. In the implicit task, participants were asked to discriminate the pitch of a syllable at the end of an alternating two-syllable sequence. The timing of the syllable sequence

could be rhythmic or non-rhythmic and the cue identity predicted of the identity of the target syllable or was non-predictive. In contrast to healthy matched controls showing validity effects for both time intervals, HD patients showed validity effect only in the short interval. In the implicit task, controls showed significant facilitation in rhythmic conditions but HD patients did not. Controls benefited the most from the convergence of both predictive and rhythmic cues while, in HD patients, rhythm helped speed responses in non-predictive trials only. Overall, HD-related temporal orienting deficits affect both explicit and implicit timing.

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### **48. Neurophysiological differences in reward processing after aneurysmal subarachnoid hemorrhage**

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Patients with aneurysmal subarachnoid hemorrhage (aSAH) secondary to ruptured anterior communicating artery aneurysms (ACoA) often experience deficits in executive functioning and decision-making. In the present study, we recorded electrophysiological responses (event-related potentials [ERPs] and oscillatory activity) during a gambling task in a series of 16 aSAH patients. Previous ERP studies have identified a feedback related negativity (FRN) component associated with an increase on frontal medial theta power in response to negative feedback or monetary losses, which is thought to reflect the degree of negative prediction error. Our findings clearly show a decreased MFN and theta oscillatory activity for the aSAH group when compared to the control group. These results provides us with novel neurophysiological markers regarding the maladaptive decision-making patterns in aSAH patients, illustrating the decreased sensitivity to punishment and conflict detection in this group of patients.

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### **49. Early audiovisual interactions in visual areas promote the sound-induced visual detection enhancement**



## POSTER SESSIONS

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Sounds can interact with visual processing enhancing the detection threshold of visual targets. However, where in the brain and how early in time this crossmodal interaction takes place still is under debate. In our current study we used magneto-encephalography (MEG) to address this question. 24 participants had to detect noisy vertical Gabor patches at two different visual field eccentricities (center and periphery) under visual-only and audiovisual conditions. For each participant we selected a region of interest (ROI) comprised by the 25 most sensitive MEG channels to signal/noise stimuli differences. The resulting channels were primarily localized in the occipital cortex. An evoke response field potential (ERF) analysis on the selected ROIs showed that sounds maximized transiently the ERF differences between the signal and noise stimuli in both visual fields compared to the visual-only conditions at early post-stimulus stages (~200ms). Interestingly this ERF difference only predicted behavior (probability of hit) when the participants attended to the central visual field. Our results reveal that the sound-induced visual enhancement takes place in visual areas at early stages of signal processing.

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### **50. Differential influence of Field Dependence-Independence on retrospective time estimation and flicker-induced time dilation**

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Field Dependence-Independence (FDI) is a stable dimension of individual functioning, transversal to different cognitive domains. While the role of some individual variables in time perception has received considerable attention, it is not clear whether prospective and retrospective timing processes differ according to the FDI dimension. In this study, we tested the hypothesis that FDI differently affects performance in a prospective and in a retrospective timing task. Participants were assessed for FDI using the Embedded Figures Test (EFT). They were asked to reproduce the duration of a flickering stimulus, and to retrospectively estimate the duration of the task. While both FD and FI

individuals underreproduced the stimulus duration, FD participants significantly underestimated the duration of the timing task compared to FI individuals. These results suggest that individual differences in timing processes according to FDI are apparent only when the task strongly involves high-level cognitive processing; conversely, these differences do not affect basic sensory processing.

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### **51. Electrophysiological evidence of mood effects on logical reasoning**

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It is commonly assumed that mood interferes with our reasoning abilities. However, the neural mechanisms involved in this phenomenon remain unexplored. In an event-related potential study, the consequences of an induced mood on the electrophysiological correlates of reasoning were examined. First, short film clips were presented to participants to induce either a highly arousing positive, highly arousing negative, or neutral affective state. Participants then performed a reading task indicating whether the conclusions of categorical syllogisms logically followed or not from previous premises. Behaviorally, more errors were committed for illogical compared to logical conclusions. Electrophysiologically, different brainwave patterns were elicited for logical and illogical conclusions. Under a highly arousing negative mood, logical conclusions elicited a smaller N400-like component compared to positive and neutral moods, indexing that participants had developed a more analytical reasoning style. In addition, a post-N400 positive ERP component was elicited for those illogical conclusions presented under neutral, relative to positive and negative moods, suggesting that highly arousing emotional states (both positive and negative) interfered with the post-processing of illogical conclusions.

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### **52. The easiest could be the hardest: Logical quantifiers bias scanned by means of a Negative Priming Paradigm**

## POSTER SESSIONS

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Literature on reasoning has shown that logical biases are likely due to an executive failure to inhibit misleading strategies. However, several studies on quantified sentences interpretation have explained errors in the subject's response through linguistic accounts. Few studies, so far, have framed this evidence into the logical domain, to test whether an inhibitory failure mechanism may be at the basis of quantifier interpretation errors.

With this purpose, in this study a Negative Priming paradigm based on a sentence-picture matching task has been administered to 44 adults. After each picture, participants were asked to answer questions with particular vs universal quantifiers. Each trial consisted of a prime-probe couple: the same no conflict probe could follow a prime in which a cognitive inhibition might be required (test condition) or not required (control condition).

Main findings showed worst performance in prime test than prime control. Also, higher error percentage was observed in probe test than probe control, together with faster reaction time on correct responses. Results will be discussed into the light of dual reasoning process theories.

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### **53. Fluctuations in Alpha/Theta phase in episodic memory encoding**

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Studies in perception and attention suggest behavioural fluctuations in the alpha/theta band (5-12 Hz). Here, we address memory encoding using an associated-pairs memory task (N=30). We used an auditory transient as a resetting signal to pace the presentation of each associated pair of images ( Cue to Target Onset Asynchrony, 0-500 ms). The experiment contained +2000 memory trials per participant, divided in encoding blocks pairs followed by recognition trials (participants judged whether a given image pair was present during encoding). We measured successful memory (hit rate) as a function of CTOA and analysed oscillations in performance. We found that recognition fluctuated at 4Hz and at 10 Hz. These results suggest Theta and Alpha periodicity on visual episodic memory

performance, and that the phase at which relevant information arrives for encoding might be determinant for successful recognition later on. However, because of the exploratory nature of this experiment and the strong multiple comparison correction, these oscillatory patterns did not reach a sufficiently high significance levels and must be considered cautiously and replicated in a hypothesis-driven manner.

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### **54. Attention profile in spinocerebellar ataxia type 2: cerebellar cognitive and topographic patterns**

M. Lupo<sup>1</sup>, G. Olivito<sup>1</sup>, C. Iacobacci<sup>2</sup>, S. Clausi<sup>1</sup>, S. Romano<sup>2,3</sup>, M. Masciullo<sup>1</sup>, M. Molinari<sup>1</sup>, M. Cercignani<sup>4</sup>, M. Bozzali<sup>4</sup>, & M. Leggio<sup>2</sup>

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Spinocerebellar ataxia type 2 (SCA2) is an autosomal dominant neurodegenerative disease characterized by a progressive cerebellar syndrome and multiple-domain cognitive impairments. Aim of the present study was to investigate the different sub-components of attention and to analyse possible correlations between attention deficits and specific cerebellar regions in SCA2 patients. To this purpose, 11 SCA2 patients underwent an exhaustive attention battery. Negative Z-scores were obtained in tasks assessing selective, divided, and sustained attention. Furthermore, Mann-Whitney U test evidenced significant differences between SCA2 and 33 controls allowing us to speculate on cerebellar involvement in tasks that required a high cognitive demand.

The voxel-based morphometry analysis showed a pattern of significantly reduced grey matter volume in specific cerebellar lobules as in bilateral regions of the anterior cerebellar hemisphere (I-V) as well as in the posterior lobe (VI-IX) and posterior vermis (VI-IX).

Statistical analysis showed significant correlations between these cerebellar lobules and impairments in specific attention sub-components, giving further support to the inclusion of the cerebellum within the attention network.

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### **55. The clash of spatial representations: modality mixing knocks out the Simon effect**

## POSTER SESSIONS

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Many past studies report strong spatial compatibility effects between stimulus and action, such as the famous Simon effect. These Stimulus-Response (S-R) compatibility effects have been found in the various sensory modalities tested. Moreover, given that different sensory modalities represent spatial information in radically different formats, S-R compatibility effects classically abide to the dominant frame of reference of the particular sensory modality used for the task (e.g., spatiotopic for vision, anatomical for touch). However, unlike these single-modality situations, real-life scenarios involve various sensory modalities along with spatial information coded in their different 'native' coordinate systems. What is the frame of reference in these multisensory scenarios? No studies so far had considered this question. We addressed the behavioural and electrophysiological (ERP, EEG) expression of the compatibility effects that arise in mixed-modality contexts (vision, touch or audition). A remarkable outcome was that, in such scenarios, the visual Simon effect consistently disappeared when mixed with touch but not when mixed with auditory events. Our results highlight the importance of action-oriented reference frames in maintaining, and updating spatial representations.

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### **56. Dissociating the role of repetition and semantic association in the learning of new words: ERP evidences**

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Learning new words requires that learners create new links between arbitrary sounds and conceptual representations. Here we conducted two ERP experiments to track the time course of this word-to-world mapping process. In Experiment 1, we examined

the brain responses of 25 participants acquiring new vocabulary over 5 consecutive days. In Experiment 2 we replicated day 1 but, differentially, participants were assigned to a Learning Group (LG) where the associations object-word were consistent, or to a no-learning Group (NLG), where the associations were inconsistent. Experiment 1 revealed a decrease of the N400 at centro-posterior sites when words acquire meaning. Experiment 2 showed correctly learned associations elicited a decrease of N400 amplitude through training only in the LG and a decrease in the amplitude of the P200 component in parietal electrodes in the NLG. These results provide new evidences regarding the role of semantic integration and repetition during language learning and showed evidences that the learning process is boosted when new words acquires meaning, most probably through faster integration of the new traces into the existing semantic networks.

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### **57. Backward associative strength (BAS), forward associative strength (FAS) and theme identifiability (ID) on false recognition**

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We report three experiments examining the role of backward associative strength (BAS), forward associative strength (FAS) and theme identifiability (ID) on false recognition (FR) using the DRM paradigm. In this paradigm, words associated to a non-presented critical lure are studied and, subsequently, critical lures are often falsely remembered/recognized. In Experiment 1, participants studied 8 low-BAS and 8 high-BAS lists, not differing in terms of FAS and ID. In Experiment 2, participants studied 8 low-FAS and 8 high-FAS lists, and the lists did not differ in BAS and ID. And, finally, in Experiment 3, participants studied 8 low-ID and 8 high-ID lists, and the lists did not differ in BAS and FAS. Results showed that the FR effect was found in all three experiments. Furthermore, high-BAS lists produced higher FR (MHigh-BAS=39.51) than low-BAS lists (MLow-BAS=29.02) (Experiment 1). In Experiment 2, high-FAS lists produced higher FR (MHigh-BAS=45.68) than low-FAS lists (MLow-BAS=15.68). And, interestingly, low-ID lists produced higher FR (MLow-ID=39.31) than high-ID lists (MHigh-ID=15.68) (Experiment 3). Therefore, BAS, FAS, and ID play a key role on false recognition.

## POSTER SESSIONS

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### **58. Effects of perceived severity on medical decisions**

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We assessed to what extent the perceived severity and the comprehension of statistical data related to a medical condition influence decisions. Participants saw information concerning the prevalence of breast cancer and hypertension, and regarding a preventive measure, through either icon arrays or natural frequencies. Before seeing the data, participants rated the severity of the disease and how bothering they considered the preventive measure. After the health scenario, they rated how worrisome and difficult to understand it was, as well as the prior and posterior probabilities provided. Finally, they rated the extent to which they would recommend the preventive measures. Participants' numeracy was also assessed.

The cancer scenario obtained higher scores in perceived severity and worry. A model including these variables best explained decisions in that scenario; in contrast, a model including the posterior probability and severity rates best explained the recommendations concerning hypertension. We conclude that, irrespective of presentation format and participant's numeracy, the perceived severity and worrisome of a health condition modulate the use of probabilistic information for decision-making.

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### **59. Changes in brain structure volume related to music reward**

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**Introduction:** Individual differences in the level of pleasure induced by music have been associated to the response of the striatum (Blood & Zatorre, 2001) and also related with auditory regions (Mueller et al, 2011). The aim of the present study was to investigate whether individual differences in music reward are related to the structure of the striatum and the ability for pitch discrimination.

**Method:** The sample consisted of 32 musicians who enrolled in a musical degree program, and 26 nonmusicians. The participants completed the Spanish version of Barcelona Music Reward Questionnaire

(BMRQ), and the Jake Mandell Test to measure individual differences in pitch discrimination. Images were acquired on a 3-T Philips Achieva. A 3-D structural MRI was analyzed using CAT12 toolbox.

**Result:** BMRQ scores were correlated with a lower striatum volume in caudate and accumbens nuclei. Furthermore, BMRQ scores were also positively related to pitch discrimination abilities.

**Conclusion:** These results are consistent with the proposal that individual differences in music reward should be understood as a mixture between reward network and the auditory areas.

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### **60. Why do bilinguals outperform monolinguals in word learning?**

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Bilinguals may be better than monolinguals at word learning due to their increased experience with language learning. However, it is not clear why bilinguals are better at word learning or which are the specific characteristics of their linguistic experience that trigger this benefit. The current study examines how bilingual and monolingual children learn words with different orthotactic characteristics. Participants were asked to learn new strings that violated (illegal) or respected (legal) the orthotactic rules of the languages they knew, and we explored how this learning was affected by the degree of similarity between the bilinguals' two languages. Three groups of children took part in the experiment: Spanish monolinguals, Spanish-Basque bilinguals, and Spanish-Catalan bilinguals. After an initial learning phase, they were tested in a recall task and a recognition task. Results showed that Spanish-Basque bilinguals performed differently than the other two groups, showing equal performance in learning illegal and legal patterns, as compared to a clear-cut legality effect found in the other two groups. A parallel study was then conducted with adult participants and results showed important differences possibly due to developmental aspects related to language mastering.

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### POSTER SESSION 2

17:30 - 19:00, Psychology Hall

#### 1. Increased false recognition of semantic associates in paranormal believers

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It has been suggested that paranormal believers and skeptics might present different cognitive processing styles. Specifically, previous studies have pointed out that believers in the paranormal may be more susceptible to false memories than non-believers. We tested this hypothesis by means of the Deese-Roediger-McDermott paradigm. After listening to 18 lists composed of 12 words semantically associated to 18 not-presented critical lures, participants responded to a false recognition questionnaire consisting of previously presented words, critical not-presented words and unrelated not-presented fillers. They were asked to rate their confidence in recognizing each word on a 1-4 scale. Then, we presented them with the Spanish version of the Revised Paranormal Beliefs Scale. Bayesian correlation analyses showed strong evidence favoring a positive association between results in the paranormal beliefs scale and confidence in the recognition of semantically related unrepresented words. Our results reveal significant individual differences in cognitive functioning linking proneness to believe in paranormal phenomena with variability on semantic processing.

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#### 2. Brain oscillatory activity related to auditory rhythms follow temporal expectations

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Temporal expectations enhance visual analysis of task-relevant events, especially when these are coupled with spatial expectations. In a similar way, rhythms with different paces can drive temporal preparation exogenously, affecting early and late stages of auditory neural processing. Oscillatory brain activity has been implicated in regulating excitability in visual areas as a function of anticipatory spatial attention. Here we asked whether temporal expectations derived from regular, rhythmic auditory events can modulate ongoing oscillatory activity, so that the changes in cortical excitability are focused over the time intervals at which

target events are expected. The participants performed a simple auditory reaction time task in which a regular rhythm with either a fast (400 ms interval between the tones) or a slow (900 ms) pace was presented prior to the target. The target tone could be presented, with the same probability, 400 ms or 900 ms after the offset of the rhythmic sequence. Time frequency analysis showed that the amplitude of oscillatory brain activity followed the time course of temporal expectations with auditory stimuli.

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#### 3. A Demand-Selection task to study effort-avoidance employing multivariate pattern recognition

D. Lopez-García, A. Sobrado, J.M.G. Peñalver, J.M. Gorriz, & M. Ruz.  
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Cognitive effort is costly and partly aversive, and thus humans usually avoid it if given the chance. In Demand-Selection tasks (DST; Kool et al., 2010), participants tend to choose the easy option over the hard one. The neural underpinnings of this effect, however, are not well understood. The current study is an initial approximation to adapt a DST to a format that allows measuring concurrent high-density electroencephalography and employing machine learning techniques for automatic pattern recognition. Here each trial consists of a cue-target sequence in which participants are required to choose (freely or forced, in different blocks) the color of the upcoming stimulus and discriminate the orientation (right or left) of a target surrounded by compatible or incompatible distracters. Cognitive effort is manipulated through the percentage of congruent or incongruent trials associated with each color. Initial behavioral results replicate well-known conflict effects and effort avoidance in blocks of free decisions. Electrophysiological analyses will focus on applying MVPA to different frequency bands to predict effort choices across conditions.

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#### 4. A task to study the proceduralization of novel verbal instructions

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<sup>2</sup>*Ghent University*

Verbal instructions allow acquiring and implementing novel behaviors in a few seconds. However, little is known about how instructions are proceduralized, that is, how verbal codes turn into action codes, binding stimuli to the appropriate responses according to the pertinent rules. Recent research in our lab shows that the semantic content of instructions structures brain activity in several brain regions, but the impact of proceduralization on this neural structuring is not known. In this study we have developed a task that compares the implementation of novel instructions with their mere memorization. The whole instruction pool varied in the category of the target stimuli (food, faces), in response complexity and in the need to integrate across vs. within stimulus dimensions. Initial results show that whereas memorization responses take longer, the instruction content has a stronger effect on behavior during instruction implementation. This suggests that the preparation to implement a verbal instruction, that is, its proceduralization, requires a different set of mechanisms than those involved in its memorization.

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**5. Association between resolution of chronic pain and blood pressure-related hypoalgesia**

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Introduction: Resting blood pressure (BP) is inversely associated to pain perception in pain-free individuals. Prior studies indicate that this BP-related hypoalgesia is reduced in patients with chronic pain. Objective: This study examined whether resolution of chronic pain was associated with greater BP-related hypoalgesia compared to nonresolution. Method: Ninety-nine individuals in whom chronic functional abdominal pain had resolved, and 51 individuals with this ongoing condition, were studied. BP was recorded followed by the assessment of thermal pain threshold, tolerance and temporal summation. Results: Higher resting systolic BP was significantly associated with higher pain threshold and tolerance, and lower temporal summation only in the group with resolved functional abdominal pain ( $p < .05$ ). Interactions between BP and resolution status for temporal summation were only significant in males. Conclusions: BP-related hypoalgesia seems to be more effective in individuals in whom chronic pain has resolved compared to those with ongoing chronic pain. Whether BP-related hypoalgesia is a consequence of-or-contributor to resolution of chronic pain needs further investigation. Sex differences should be taken into account in future studies.

**6. Association between salivary alpha-amylase and selective attention performance in healthy children**

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Objective: Salivary Alpha-Amylase (SAA) is a non-invasive biomarker that has been associated with improved executive function and working memory (WM) performance in recent studies conducted in various laboratories. The main aim of this pilot study was to examine the association between selective attention performance and SAA in a sample of 60 children. Method: Selective attention was assessed by means of D2 test, a neuropsychological tool employed with this purpose in clinical settings. Three parameters were derived: number of correct responses, number of errors of omission and number of errors of commission. SAA activity, output and salivary flow rate (SFR) were measured as follows: baseline (10 minutes prior to testing), one minute prior to testing and one minute after the end of the test. Results: Our statistical analyses revealed only an association among delta SAA activity and the number of commission errors but not with the number of correct responses or omission errors. Conclusions: These results are discussed according with the role of the LC-system in cognition and arousal regulation.

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**7. Cerebral blood flow velocity variability and its connection with cardiovascular oscillations and cognitive performance at rest and during mental stress**

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This study analyzed variability in cerebral blood flow velocity (CBFV) and possible underlying physiological mechanisms during rest and a mental arithmetic task.

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Blood flow velocities were bilaterally recorded by transcranial Doppler sonography in the anterior and middle cerebral arteries of 43 participants. Electrocardiography, continuous blood pressure (BP) and respiratory recordings were additionally obtained. Fast Fourier transformation revealed a spectral profile with two main components in CBFV, one in the very low frequency (VLF, 0.01-0.025 Hz), and the other in the low frequency band (LF, 0.075-0.11 Hz). CBFV variability markedly decreased during mental stress, particularly in the LF and VLF bands. While heart rate variability and respiration had only weak impacts, BP variability was closely associated with CBFV variability. LF CBFV variability correlated negatively with task performance. The findings indicate an impact of BP oscillations on those in CBFV, supporting the notion of a connection between peripheral and cerebral hemodynamics, presumably mediated by the passive pressure-flow relationship, which exists despite CA stabilization of CBFV, and neural mechanisms (baroreflex system). The marked modulations of LF CBFV during the arithmetic task, as well as its close association with task performance, may indicate the suitability of this parameter as an index of mental effort load.

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### **8. Cingulate cortex and Inferior Frontal Gyrus matter volume reduction in Neglectful Mothers**

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Although many studies have evidenced that early neglect or abuse alter the child's gray and white matter brain organization, the neurological bases that underpin and sustain maternal neglectful behavior remain less explored. Previous studies have investigated white matter deficits or an attenuated response to infant crying faces in Neglectful mothers. In this study 24 Neglectful Mothers and 24 Control Mothers underwent an anatomical MRI brain scans. Using Voxel Based Morphometry Analysis we show that Neglectful Mothers compared to control mothers renders substantial changes also in gray matter. Primarily reductions in gray matter volume in regions subserving maternal behavior such as cingulate cortex, or empathy-related areas such as Inferior Frontal Gyrus (IFG) were found. Our data provide the first evidence of structural gray matter deficits in Neglectful mothers. All together with white matter or functional alterations in visual

tracts our present results help further to elucidate the neural basis of inadequate parenting.

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### **9. Cooperación vs competición: ¿Qué sucede cuando te fuerzan?**

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**Introducción.** La cooperación y la competición son estrategias que se emplean con el fin de alcanzar determinados objetivos. Mientras que la cooperación implica la colaboración entre personas para lograrlos, la competición conlleva el empleo de estrategias hostiles. Por ello, sería necesario analizar como la cooperatividad y hostilidad rasgo afectan a la puesta en marcha de las mismas.

**Material y Métodos.** Se trabajo con 118 jóvenes sanos que fueron forzados a cooperar o competir con un desconocido con el fin de realizar una tarea validada de laboratorio. Los niveles de Csal fueron evaluados antes y después de la tarea. Para los rasgos de personalidad se emplearon el TCI-R y el BDHI.

**Resultados.** Aquellos participantes menos cooperativos y que se vieron obligados a cooperar experimentaron un incremento de los niveles de Csal tras la tarea. Sin embargo, los que eran menos hostiles y se vieron forzados a competir mostraron un mayor incremento en dicha hormona.

**Conclusiones.** El hecho de verse forzado a cooperar o competir puede ser altamente estresante si no se poseen determinados rasgos de personalidad.

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### **10. Differences in Lateral Prefrontal Cortex oxygenation to affective faces**

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**Introduction:** Very few studies have focused on Prefrontal Cortex (PFC) role in emotional induction processes. Functional Near-Infrared Spectroscopy (fNIRS) is a suitable technique to study those mechanisms. Affective faces are useful stimuli to induce

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emotional states, they can present different valences without changing the stimuli features. Methods: 46 healthy right handed female participants took part in this study. The procedure was a block-design paradigm with passive viewing of Happy (Positive), Inexpressive (Neutral) and Angry (Negative) faces from validated databases. 2 blocks of each valence were presented in a pseudorandom order. Results: Repeated measures MANOVA reported different patterns of oxygenation changes for Time x Valence interaction in Ventrolateral channels, mostly in the left hemisphere. Negative block stimuli maintained oxygenation over the presentation whereas Positive and Neutral stimuli showed progressively decreased oxygenation through the block. Discussion: Results are in accordance with the relevance of Ventral Prefrontal regions on emotional processes. Lateral PFC may be involved in attending and evaluating affective responses. Left PFC could modulate the emotional responses of other cortical and subcortical structures.

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### **11. Differential effects of cognitive reappraisal on ERPs and facial activity in blood-injection-injury phobia and snake phobia**

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We studied the ERP activity and the facial response related to emotion regulation in 14 blood-injection-injury phobics (BII) and 13 snake phobics. We used a S1-S2 task: S1 were two words indicating the conditions (passive viewing/reappraisal and blood/snake), and S2 was a picture. S1 and the S1-S2 interval lasted 2000ms each, and S2 lasted 4000ms. We recorded the EEG activity at 59 locations and the corrugator supercilii EMG activity. The ERPs were submitted to a mixed model, cluster mass permutation test using a family-wise alpha level of 0.05. All time points between 400-4000ms from picture onset at frontal electrodes were included in the tests. The integrated EMG activity during picture viewing was deviated from activity 1s previous to trial onset. Results revealed that BII phobics showed a reduction of the LPP during reappraisal of blood-related pictures at 2304-2960ms, which was accompanied by a decrease of EMG activity. These effects were not found, however, in snake phobia. These data show that, in contrast to other specific phobias, BII phobia reactions are influenced by emotion regulation processes.

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### **12. Dissociation between hedonic and motivational components of music reward processing**

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Music is considered one of the most enjoyable experiences. Different studies have consistently shown that pleasant music activates areas of the reward network. However, little is known about the role of the different components of reward processing (e.g., liking and wanting) in the musical reward experience. In order to dissociate these two components, we designed a new paradigm in which healthy participants (N=29) had to listen to classical music excerpts and decide in which moment they wanted to change the piece they were listening. Results showed an increase in the Skin Conductance response in pleasant excerpts, but also a dissociation between the liking rates and the time spent in each piece. In addition, participants showed no consistent pattern in the liking rate selected when changing the musical piece. These results suggest that the hedonic and motivational components might be dissociated, opening new possibilities in the study of these components in music reward processing.

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### **13. Efecto de tDCS en el Surco Temporal Superior Derecho en el recuerdo de frases que implican relaciones sociales.**

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El cerebro tiene una disposición general para procesar los estímulos en función de su valencia (positivos - negativos), y dar respuestas de aproximación y evitación respectivamente (Lang y cols., 1997). Esta intencionalidad ha infiltrado en el lenguaje; en las relaciones sociales es frecuente escuchar "Alejandro [acerco a/ alejo de] su grupo a Marta". En este estudio examinamos la participación del Surco Temporal Superior derecho (rSTS), asociado a la intencionalidad social (Pelphrey et al., 2004) en la codificación de frases que narran eventos sociales. Para ello pedimos a 48 participantes recordar 40 frases que relatan una relación social entre dos personas, 28 participantes recibieron estimulación Anódica en rSTS y 20 estimulación Sham. Se manipuló la Valencia de la frase; Aproximativa (Elvira potencio a Rodrigo) o Evitativa (Elvira debilito a Rodrigo). Encontramos que la estimulación anódica mejoró el recuerdo de frases respecto a la condición



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Sham. No encontramos diferencias en función de la valencia para ninguna de las condiciones. Demostramos el efecto de rSTS en la codificación de eventos sociales, aun cuando estos escenarios están descritos verbalmente.

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### **14. Effects of cue-to target duration on change detection ERPs to peripheral retro-cueing.**

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There is evidence for an internal focus of attention by retro-cueing in tests of visual working memory tasks where performance is improved when attention is voluntary guided during the maintenance period. However, few studies have addressed the time course of this effect by varying the interval between the retro-cue and the onset of the target (CTOA) and none of them have used exogenous retro-cues. The main objective here was to manipulate the time course of exogenous retrocuing, in a change detection paradigm, to check whether the CTOA duration modulated performance and the electrophysiological correlates of change detection. Behavioural facilitation was observed only in trials with valid cueing in the short CTOA condition. Similarly, higher amplitudes of the P300 component were observed in valid versus invalid cueing in posterior regions only with short CTOAs. These results suggest that exogenous attention directed to the internal representations causes behavioral and electrophysiological effects similar to those observed when attention is directed towards the perceptual environment.

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### **15. El rol de la red frontoparietal en la detección e identificación de cambios congruentes e incongruentes**

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Aunque en el campo del procesamiento visual de escenas tradicionalmente se ha reportado un mejor rendimiento ante objetos semánticamente congruentes con su contexto, estudios recientes han demostrado que, bajo ciertas circunstancias, los objetos incongruentes atraen la atención más rápidamente que los congruentes. Una reorientación atencional rápida similar se ha visto

relacionada con la actividad de distintas regiones del lóbulo parietal derecho. En el presente estudio se utilizó una tarea de detección de cambio en la que se manipula la congruencia entre el objeto a detectar y la escena de fondo como herramienta para disociar los procesos de detección e identificación de objetos. Además, nuestra manipulación crítica consistió en la aplicación de estimulación magnética transcraneal (TMS) online en un diseño intrasujeto y con tres regiones de interés: la unión temporo-parietal derecha (TPJ derecha), el lóbulo parietal superior derecho (SPL) y el vértex como área. Los resultados son discutidos de acuerdo con la hipótesis de que la TMS aplicada sobre TPJ derecho mejorará la identificación y empeorará la detección de los objetos incongruentes, mientras que la aplicación sobre SPL empeorará la detección para los objetos congruentes.

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### **16. Electrocutaneous responses to affective pictures and psychopathy: the role of meanness**

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Here we examined electrocutaneous responses to affective pictures in relation to the three phenotypic domains of the triarchic model of psychopathy (boldness, meanness, disinhibition), as assessed by the Triarchic Psychopathy Measure. EEG was recorded from 256 channels while participants ( $n = 132$  undergraduates) passively viewed 90 intermixed IAPS pictures (erotica, thrill, objects, neutral faces, threat, and victim scenes), 2 s presented. Multiple regression analyses using gender-corrected triarchic scores as predictors revealed that Meanness scores uniquely predicted enhanced early relative positivity over central sensors (200-280 ms) and enhanced late positivity over centro-parietal sensors (P300 and LPP; 350-550 ms and 600-900 ms, respectively) for erotica (4.6, 3.1 and 3.2% explained variance, respectively, beta weights = 0.24, 0.20 and 0.20, all  $ps < .05$ ). Our results suggest that the meanness phenotype is specifically related to a preferential processing (from early automatically captured attention to late, sustained elaboration of motivationally-salient information) of erotic pictures. The extent to which this finding may contribute to refine the conceptualization of this phenotype is in need of further clarification.

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### **17. Electrocutaneous responses to emotional facial expressions**

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This study examined electrophysiological indices of early perceptual processing of faces (P1/N1 complex, N170/VPP complex) in response to emotional expressions. EEG activity was recorded from 256 channels while 125 undergraduates passively viewed 18 fearful, 18 happy, and 18 neutral NimStim faces, along with scrambled versions of the neutral ones, in intermixed order. Each picture was presented for 500 ms, being repeated 4 times along the task. Analyses on mean amplitudes showed enhanced P1 (parietooccipital cluster; 90-110 ms) and N1 (frontocentral cluster; 90-110 ms) for all faces compared with scrambled stimuli ( $p < .001$ ), and enhanced N170 (temporooccipital cluster; 130-150 ms) and VPP (Vertex Positive Potential; frontocentral cluster; 130-150 ms) for fearful compared with happy and neutral faces and scrambled stimuli, which was more robust over the right hemisphere (Emotion x Hemisphere  $p < .0001$ ), consistent with a right hemisphere advantage in processing of emotional expressions. These results suggest that the N170/VPP complex is modulated by emotional processes, being the earliest relevant ERP indicator in the study of the neural mechanisms underlying facial expression processing (Hinojosa et al., 2015).

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### **18. Excluding intrusive thoughts from awareness through dorsolateral prefrontal activity: the sooner the better**

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The ability to control intrusive thoughts is essential for maintaining mental health. Previous research has evidenced that suppression of intrusive memories through inhibitory control relies on the dorsolateral prefrontal cortex (DLPFC). Here we combined magnetoencephalography (MEG) recordings with phenomenological reports to track the temporal dynamics of this inhibitory control at suppressing unwanted mental images. Participants were instructed to

terminate the retrieval of unwanted images while being scanned with MEG. Additionally, they reported their success at regulating awareness of the intrusive thought after each trial. Right dorsolateral and medial prefrontal activity at late latencies was greatest when participants tried to terminate episodic retrieval of unwanted images. Of interest, those participants who engaged earlier DLPFC inhibitory control experienced greater reductions of involuntary intrusions over trials. These findings further support the role of DLPFC in controlling unwanted thoughts and provide new evidence suggesting that activating inhibitory mechanisms earlier benefits individual's ability at purging intrusive memory from consciousness.

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### **19. Exploring proactive interference modulation of EEG dynamics**

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Proactive interference (PI) in working memory (WM) is the disruptive effect of no longer relevant information on memory retrieval. Although PI has attracted research interest for a long time, little is known about the brain dynamics that underneath overcoming PI. Thus, in order to explore the aforementioned brain activity, EEG signals were recorded from 35 young adults while they performed a modified recent probes task with high- and low-PI trials. Participants responded to high-PI trials less accurately and slower than low-PI trials. Principal component analyses of EEG activity during WM retrieval yield five factors explaining 92.6% of data variance. Among them, only one factor peaking between 560 and 690 ms after stimulus onset distinguished between high and low PI trials. This factor's source activity as estimated by sLORETA was higher for low than high PI trials at right Insula. In contrast, scalp level analysis of EEG spectra in that time window revealed higher theta activity synchronization (relative to baseline) for high than low PI trials at fronto-central electrodes.

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### **20. Functional networks underlying musical appreciation and familiarity**

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Listening to pleasant music activates the brain reward network, but little is known about brain electrical activity associated with musical reward. In the present study we used EEG coherence to identify functional networks underlying musical appreciation with high temporal resolution. We conducted an EEG experiment where healthy participants listened to a set of musical stimuli while they continuously reported the degree of pleasantness experienced. In order to induce pleasantness experimentally, we divided the experiment in two sessions: in the first session participants listened to and rated a set of 30 novel excerpts, and 24 hours later they listened to and rated the same set and a new set of 30 novel excerpts in a second session. The purpose of this design was to induce familiarity for some of the stimuli, which has been shown to have a positive relationship with appreciation. Results confirmed that familiarity increased participants' liking ratings for the repeated excerpts. In addition, we identified coherent functional networks in 3 oscillatory bands (theta, alpha and beta) underlying different states of appreciation and familiarity.

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### **21. Heart rate variability and the boldness domain of psychopathy**

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This study examined, in a mixed-gender sample of undergraduates ( $n=72$ ; 33 men) assessed by the Psychopathic Personality Inventory-Revised (PPI-R), the contribution of the triarchic phenotypic domains of boldness, meanness, and disinhibition on vagally mediated heart rate variability (vmHRV). ECG was recorded during a 5-min resting period and subjected to a spectral analysis to obtain the high-frequency power (HF). Inter-individual differences in age, body mass index and respiratory activity were included as control variables in the analysis (see Quintana et al., 2016); both HF and peak of respiratory frequency were logarithmically transformed to account for deviations from normality distribution. Multiple regression – using control variables and PPI-Triarchic psychopathy scores as predictors – showed that only respiratory activity (beta weight =  $-.30$ ) and PPI-Boldness scores (beta weight =  $.27$ ) predicted a significant proportion of variance of the vmHRV (7%;  $ps < .05$ ). This result suggests that the emotional regulation ability – assessed by vmHRV – is specifically associated with individual differences in the adaptive phenotypic expression of the

low fear disposition (boldness), providing empirical support to the triarchic model of psychopathy.

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### **22. Índices neurales del procesamiento atencional dirigido a rostros de dolor en pacientes con fibromialgia**

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**Objetivos:** El objetivo principal del presente estudio fue caracterizar neuralmente la respuesta atencional a eventos emocionales en pacientes con fibromialgia (FM), así como desgranar los subprocesos atencionales involucrados en el procesamiento emocional de la información.

**Método:** Participaron 52 mujeres (26 FM y 26 sanas) en un paradigma señal-diana. Tras los estímulos señal (palabra “DOLOR” o “NEUTRO”), y un intervalo variable (100-900ms), se presentó el estímulo target (Rostros de “Dolor” o “Neutros”). Los potenciales evento-relacionados (PER) se registraron mediante 60 electrodos. Basándonos en la distribución topográfica, se calculó el pico de la amplitud para la ventana temporal comprendida entre los 72-122 ms (P1).

**Resultados:** Los ANOVAs para el SOA 100 mostraron diferencias significativas ( $p < 0.05$ ) en las amplitudes del componente P1 (regiones parieto-occipitales). Concretamente, las pacientes con FM mostraron mayores amplitudes para los rostros con expresión de dolor.

**Conclusiones:** El incremento en la amplitud de P1 ha sido interpretado como un índice neural relacionado con sesgos atencionales en el procesamiento automático de la información. Estos datos confirman la relevancia de las influencias emocionales en el procesamiento de la información en FM.

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### **23. Motivational relevance of food and erotic stimuli in bulimia nervosa**

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Cognitive-behavioural models hypothesized that bulimia nervosa suffer from an abnormal processing of

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food and body shape. This symptomatology might affect the motivational relevance of food and body-related cues. This study examines the late positive potential (LPP) response, as an index of motivational salience, to personally irresistible food and emotional pictures (erotic couple -depicting naked people-, neutral objects and human attacks) in bulimics and healthy women. The pictures were pseudo-randomized within the passive pictures-viewing paradigm. All participants showed a LPP pattern consisting in a higher reactivity to emotional than to neutral pictures, which was consistent with previous findings. Specifically, erotic couples prompted the highest LPP reactivity, followed by unpleasant cues. Food and neutral pictures provoked the lowest LPP amplitude. However, bulimics women showed a larger LPP to food and erotic pictures compared to healthy participants. Those differences were not found for unpleasant and neutral cues. The data suggests that the characteristics of bulimia nervosa might alter the motivational salience of food and body-related cues, what could be considered within treatment programs as an improvement index.

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### **24. Neural processing of negative intense words in borderline personality disorder**

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Disturbances in the processing of negative emotions have been associated with borderline personality disorder (BPD) by using two different types of emotional stimuli: facial expressions and scenes. In the present study, event-related potentials (ERP) were used to compare neural activation in 22 unmedicated patients with BPD and 22 age- and sex-matched healthy controls during an emotional lexical decision task that required discriminating between emotional words (negative and neutral personal adjectives) and pseudowords. Thus, this paradigm introduces stimulus negative valence incidentally relative to the explicit behavioral task. Scalp-level ERP analysis showed that late positive component (LPC) amplitudes were sensitive to lexical effects (words>pseudowords) in both groups. By contrast, emotional effects (negative>neutral) on LPC amplitudes were found in the control but not in the BPD

group. The present study therefore obtain further evidence for an abnormal neural processing of negative emotions in patients with BPD using emotional words.

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### **25. Neuro-psychological profile of young people with subjective memory complaints. Importance of personality traits**

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In the last years, the number of young people who manifest subjective memory complaints (SMC) has increased even in clinical contexts. These SMC could be linked to different situational and individual factors, including some deficits in attention and certain personality traits. The aim of this study was to analyze if the SMC are related to an inattentive and neurotic profile. In order explore it, the Memory Failures of Everyday Questionnaire (MFE-30), a battery of neuropsychological tests and a personality questionnaire (NEO-FFI) were applied to a sample of 70 health young people (between 18-33 years old). First, results show that the people who expressed SMC did not differ from those without SMC in the attention performance. However, the SMC group showed higher neuroticism scores, showing a personality profile that would explain why they attribute more relevance and worry to attentional and mnesic failures. More studies are necessary to characterize the memory complaints and how they are influenced by different factors and personality traits.

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### **26. Pain perception modulated by unconscious emotional pictures in fibromyalgia: neural indices**

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Aim of Investigation: Present study was aimed to explore the neural correlates related to the influence of visual masking emotional stimulation on the processing of a painful stimulus in patients with fibromyalgia (FM). Methods: 27 FM and 29 healthy controls - HC women participated in an emotional masking paradigm. Two stimuli were presented: an masked image (neutral, negative and pain-related) followed by a somatosensory stimulus (painful and painless). ERP were recorded at

sixty scalp electrodes. A based- ERP amplitude approach was carried out to define and quantify the main components of brain attentional response.

Results: ANOVAS indicated that occipital regions of P1 component were sensitive to the interaction between type of stimulus by group ( $p < 0.05$ ). Specifically, FM patients showed higher amplitudes to pain-related pictures than neutral and negative.

Conclusions: Emotional modulation of P1 component suggests that potentially threatening information would generate a rapid and specific attentional bias in patients with FM, even for unconscious information. These data provide objective evidence that some processes of central mechanisms are altered in these patients but further research, is needed to fully understand this possible alteration.

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**27. Parkinson's disease and autonomic response to pain: study of a case**

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Objective: Describe a Parkinson's patient and her autonomic response to pain.

Clinical case: An 82-year-old woman with Parkinson's disease (PD) for 13 years before. Without consumption of salicylates. Treated from the beginning with levodopa, at the time of the assessment, was used Levodopa with entacapone (Stalevo®) (750mg./day) and Rotigotine (16 mg./day) with obvious fluctuations. She complained of generalized pain, preferably in ""wearing off"" period, with an intensity of 8/10 on the visual analogue scale (EVA). However after the neurophysiological examination of pain thresholds (hand grip) there was a peripheral decrease that made the measurement of blood pressure (BP) was not very stable. The increase in systolic and diastolic blood pressure generated by the isometric contraction was observed with a minor change, not proportional to the heart rate (HR). Sympathetic activity and nociceptive sensitivity were diminished, expressing the postganglionic noradrenergic myocardial denervation already known in parkinsonian patients.

Conclusion: We consider that the lack of response to pain is due to the sympathetic decrease. In addition, the results of the SNA study of this patient agree with similar trials in which it has been proven that nociceptive sensitivity decreases in PD according to standard parameters in the normal population.

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**28. Psychopathy and psychosocial stress: a phenotypic approach**

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Psychopathic features have been associated with a low reactivity of the autonomic nervous system (ANS) to aversive stimulation (Benning et al., 2005). We intend to characterize the Boldness, Meanness and Disinhibition phenotypes of the Triarchic Model of Psychopathy (Patrick et al., 2009) in terms of their influence on autonomous activity. 57 healthy young subjects (28 women), aged between 18-36 years (mean age = 23 years old) were evaluated. Heart rate (HR) and HR variability (HRV) were measured. Participants were assessed with the Triarchic Measure of Psychopathy (TriPM, Patrick et al., 2010) and were submitted to Trier Social Stress Test (TSST).

Total Psychopathy was associated with a lower HR response to the TSST. Regarding the phenotypes, Boldness was positively associated with the parasympathetic response to the TSST, more specifically to the arithmetic task whereas Meanness was positively associated with the sympathetic response. This study clarifies the association between Psychopathy and the ANS response to psychosocial stress, highlighting the relevance of the dimension of low fear for the understanding of Psychopathy.

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**29. Psychophysiological response related to music performance anxiety**

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Music performance anxiety is defined as an experience of apprehension and a real impediment to playing in a public context, with a real decrease in interpretive skills without just cause given the individual musical aptitude, training and level of preparation (Salmon, 1990).

The people who suffer it are afraid of the characteristic physiological symptoms of anxiety (airsickness,

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palpitations, sweating ...) as well as the fact that the public can see these symptoms.

The target of this work is to compare the psychological response of two groups of musicians (with high music performance anxiety and without anxiety) in every phase of the musical performance. For this reason, 24 musicians were evaluated in the context of a public musical performance. For a more reliable evaluation, the musical interpretation took place within a virtual reality environment in the controlled context of the laboratory. Previously, these musicians were evaluated through objective tests (KMPAI-E) in order for categorizing them in subjects with high or low scoring in music performance anxiety.

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### **30. Reader's brain is sensitive to the reader's perspective. An approach based on Dynamic Causal Modeling**

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Dynamic Causal Modelling (DCM) is a technique of analysis applied to neural data, aiming to estimate effective connectivity in the brain by establishing coupling among neural regions. We applied DCM to ERP data involving spatial perspective induced by deictic verb. Participants read paragraphs describing coherent motion (going-distant; coming-close) or incoherent motion (going-close; coming-distant). The ERPs were sensitive to coherence with the geographical readers' perspective (de Vega et al. 2015), and to the protagonists' in fiction narratives (Garcia-Marco et al. 2016).

Applying DCM analysis we found that in the context of motion indexed by verb 'to come', the perspective taken differentially modulated connection among Middle Temporal Cortex and Frontal Pole. For the verb 'to go' we found evidence of a bidirectional fronto-temporal coupling but no distinction among perspectives. This supports the hypothesis that motion indexed by 'to come' requires specific brain regions depending on the perspective taken by the reader.

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### **31. Reduced cerebral blood flow adjustment during proactive control in chronic hypotension**

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In addition to complaints including fatigue, mood disturbance, dizziness or cold limbs, chronic low blood pressure (hypotension) is associated with reduced cognitive performance. Deficiencies in cerebral blood flow regulation may be involved in the mediation of this impairment. This study investigated cerebral blood flow modulations during proactive control in hypotension. Proactive control refers to various cognitive processes during anticipation of a behaviourally relevant event that allow optimization of readiness to react. Using functional transcranial Doppler sonography, bilateral blood flow velocities in the middle cerebral arteries were recorded in 40 hypotensive and 40 normotensive participants during a precued Stroop task. Hypotensive participants exhibited smaller bilateral blood flow increases during response preparation and longer response time. The group differences in blood flow and response time did not vary by executive function load, i.e. congruent vs. incongruent trials. Over the total sample, the flow increase correlated negatively with response time in incongruent trials. The findings indicate reduced cerebral blood flow adjustment during both the basic and more complex requirements of proactive control in chronic hypotension. They also suggest a general deficit in attentional function and processing speed due to low blood pressure and cerebral hemodynamic dysregulations rather than particular impairments in executive functions.

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### **32. Reduced emotional arousal modulation of entrained brain rhythms and threat bradycardia in depressed patients**

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Previous reports showed reduced emotional arousal modulations of stimulus driven cortical steady state responses in the right temporo-parietal junction (TPJ) in depressed patients. However, these reports did not validate this observation with autonomic measures of emotional arousal. The aim of the present study was (i) to replicate previous results of reduced arousal modulation of TPJ activity in depressed patients and (ii) validate the construct of reduced emotional arousal by

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an autonomic measure such as heart rate (HR) deceleration for high arousing emotional pictures. Thereby, we recorded stimulus driven steady state responses (SSR) using Magnetoencephalography (MEG) and HR responses during the viewing of high and low arousing emotional pictures taken from the IAPS. We replicated the observation of reduced SSR in right TPJ in depressed patients compared to a control group. Further, depressed patients showed reduced threat bradycardia to high arousing emotional pictures validating that reduced SSR in TPJ is due to reduced emotional arousal in depression.

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### **33. Replicabilidad de la topografía del componente N1 en el paradigma de oddball visual**

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El objetivo del estudio fue comprobar el grado de replicabilidad de la topografía del componente N1. Una muestra de 8 varones y 9 mujeres con una media de edad de 36 años participaron en una tarea de oddball con presentación bilateral de estímulos visuales. La señal de EEG se adquirió en 64 canales entre dos medidas separadas por 116 días de media. El análisis de los mapas topográficos mostro un alto grado de correlación cuando los estímulos son presentados en el lado izquierdo, ( $r=0.92$ ), o en el lado derecho ( $r=0.97$ ) entre sesiones. En cuanto al análisis topográfico del N1 en función del lado de presentación, los mapas de gran promedio mostraron una distribución contralateral al lado de presentación del estímulo. Sin embargo, en un análisis individualizado de los mapas no se presencio siempre la distribución contralateral presente en el gran promedio. Estos resultados sugieren que el N1 es un componente cognitivo altamente estable, idoneo para su uso en la evaluación de los cambios atencionales en estudios longitudinales.

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### **34. Retinotopic mapping of visuospatial endogenous attention**

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Visual stimulation has been employed for decades to investigate the neural substrates of attention. Stimuli are commonly located in a region of the space where

participants are asked to pay attention. The spatial location of stimuli in the visual field is known to influence perception, as indicated by behavioral as well as visual event-related potential (ERP) studies. However, the influence of stimuli location on visuospatial attention has not been systematically investigated. Consequently, the purpose of this study was to perform a detailed retinotopic mapping of the modulation of visual ERPs by endogenous attention. In order to do this, we recorded electroencephalographic (EEG) activity while participants performed a spatial cuing task where they had to detect orientation changes of a gabor placed at 24 different spatial locations, varying in polar angle and eccentricity. Our results show a differential effect of attention as stimuli are presented from the fovea to the periphery of the visual field, consistent with behavioral attentional benefits.

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### **35. Self-face recognition in the upside-down world: The relevance of local and holistic information in self-face recognition**

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It is commonly known that faces are processed holistically. But, do all faces receive the same holistic emphasis? This not seems the case for our own face. Contrary to other faces, self-face recognition is more resistant to the Face Inversion Effect. This effect is generally explained by the fact that the disruption of holistic information by inversion would slow down and increase the difficulty of face processing. We use a Face Inversion Paradigm to investigate whether self-face processing is based more on local than on holistic information. To this aim, we designed a face recognition task where the subjects had to identify their own face and a friend face while their EEG activity was recorded. According with the ERPs literature, our results showed that inversion enhances N170 amplitude and delays its latency in both faces. P2 component also was sensitive to inversion showed a decreased in amplitude, but only in the friend face condition. Intriguingly, P2 was inversion resistant for self-face, suggesting both the individual features and the configural properties appear relevant to self-face perception.

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### **36. Self-produced walking sounds change body-representation: An investigation on individual**

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### **differences and potential positive impact on physical activity**

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Auditory contributions to mental body-representations remain largely unexplored. We demonstrated these for sounds paired with bodily actions. We showed that altering the sounds produced by people walking on a flat surface, so that they seem produced by a lighter/heavier body, leads people to represent their bodies as thinner/lighter, feel happier and walk more dynamically. Here we investigated individual differences and the potential to facilitate more demanding physical activity. In two experiments participants used a gym step or climbed stairs under three walking sound conditions. We measured implicit/explicit body-representation changes. Participants represented their bodies as thinner in the “light” sound condition, accordingly changing gait and feelings of being quicker, lighter, feminine, finding exercise easier. The sound effects on visualized body size interacted with participant’s actual weight and aspirations to be more masculine/feminine, but not with body fitness or gender. The effects on gait and feelings interacted with participant’s body weight and fitness. These effects did not hold once the sound was removed. This work informs of malleability of body-representations and opens opportunities for facilitating physical activity.

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### **37. Spatial processing in highly math-anxious individuals: an event-related brain potential study**

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This study aimed at investigating whether highly math-anxious (HMA) individuals and their low math-anxious peers (LMA) differ in spatial ability by using event-related potentials (ERPs) and behavioral measures. Twenty HMA and 20 LMA participants were presented with letters in six orientations and were asked to make mirror-normal discriminations. Response time and error rate increased with angular deviation in both groups. Moreover, HMA individuals were slower than LMAs. As for ERPs, a slow posterior negative deflection of the event-related potential (rotation-related negativity-

RRN), that is superimposed on a late positive complex (P3), is considered a direct electrophysiological correlate of the mental rotation process. In our case, the amplitude became more negative the greater the degree to be rotated in the 450-550 ms window (RRN), with no differences between groups. In contrast, the P3 amplitude was larger for the HMA group in greater deviations. Given that P3 amplitude reflects attentional resources invested in the categorization of the relevant stimuli, these results suggest that HMA individuals might need to devote more processing effort in greater angular displacements.

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### **38. The affective processing of loved familiar faces and names: integrating fMRI and autonomic measures**

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The neuroscientific study of love has been boosted by an extended corpus of research on face-identity recognition. However, few studies have compared the emotional mechanisms activated by loved faces and names and none have simultaneously examined fMRI and autonomic measures. The present study combined fMRI with heart rate and skin conductance while participants were passively viewing the face or the written name of 4 loved people and 4 unknown ones. Results showed a pattern of increases in heart rate and skin conductance, together with brain activations, significantly higher for loved people than unknown ones, stronger for faces than names. Significant correlations were found between heart rate and brain activation in frontal areas, for faces, and temporal areas, for names. The results are discussed in the context of previous studies using the same passive viewing procedure highlighting the relevance of integrating peripheral and central measures in the scientific study of love.

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### **39. The age of acquisition of emotional nouns in children**

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Children begin expressing emotions early in time. However, the development of emotional lexicons through infancy remains poorly understood. The current study aimed to get some knowledge of children's gain of emotion-denoting vocabulary from preschoolers to adolescence by examining the contribution of emotion and psycholinguistic variables to the age of acquisition of words. Three hundred and eighty participants from preschool (32 months) to adolescence (14 years) were tested, divided into eighteen age groups each including 20 participants. Each participant had to name two hundred familiar drawings denoting positive, negative and neutral nouns. The results of regression and mixed model analyses indicated that positive words are learnt earlier than neutral words, which is followed by the acquisition of negative words. Besides word frequency and children's age, word valence was a significant predictor of task performance as we found more accurate responses to positive relative to negative words. Interestingly, this effect was observed for girls but not for boys. We did not observe effects of arousal in word acquisition. The theoretical implications of these effects are discussed.

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### **40. The relationship between resilience and defensive responses in women: a psychophysiological study**

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Resilience has been defined as the ability to recover from negative events. The autonomic nervous system plays an important role in the adaptive response of the organism, particularly para-sympathetically-mediated cardiac recovery. The aim of the present study was to examine the pattern of the Cardiac Defense Response (CDR), and the eye-blink Startle Reflex (SR) in women with high and low resilience. The sample was composed of 55 female psychology students from the University of Granada, aged from 18 to 28 years (Mean = 19.50; Standard deviation: 2.48). The sample was composed of 28 women with the high scores on resilience and 27 women with low scores in resilience. The results showed (a) a higher CDR in the low resilience group than in the high resilience group (b) a high SR in the low resilience

group than in the high resilience group. Our results suggest a greater defensive autonomic reactivity in a low group of resilience showing different patterns in both groups of people, a finding needing further explanatory investigation.

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### **41. The sound of us walking together in time and space: Exploring how temporal coupling affects represented body size, peripersonal and interpersonal space in group interactions**

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Coordinating our actions with others may act as a social glue. When part of a marching band or walking down a sidewalk, we regularly hear and integrate the sounds and proprioceptive information of our footsteps along with those of others, often getting a sense of being part of a group and of personal enlargement. Here, participants marched in synchrony with a metronome, while listening to footstep sounds of 8 confederates walking around them. We manipulated the temporal synchronicity (synchronous/ asynchronous) and footwear congruency (same/different) of the footstep sounds of the group. We measured temporal coordination, self-other feelings, represented body size, peripersonal space and comfort interpersonal distance. Beyond merely tracking interpersonal affiliation, our results show effects of synchronicity on peripersonal space and on feelings of body strength, elongation and emotional valence/dominance, and an interaction between synchronicity and congruency on interpersonal distance. Results suggest that when part of a group, we feel a smaller part of the whole, affecting our action space accordingly. Further, the more similar we sound as a group, the closer we feel to others.

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### **42. The triarchic conceptualization of psychopathy and ERP indices of inhibitory control**

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This study examined the relationships between the three phenotypic domains of the triarchic model of psychopathy – boldness, meanness, disinhibition – and electrophysiological indices of inhibitory control (NoGo-N2/NoGo-P3). Participants ( $n = 135$  undergraduates) were assessed via the Triarchic Psychopathy Measure and performed a Go/NoGo task with three types of stimuli (60% frequent-Go, 20% infrequent-Go, 20% infrequent-NoGo). Multiple regression analyses using gender-corrected triarchic scores as predictors revealed that only Disinhibition significantly predicted reduced NoGo-N2 amplitudes at FCz (3.5% explained variance, beta weight = .23,  $p < .05$ ) and reduced P3 amplitudes at CPz for NoGo and infrequent-Go trials (3.1 and 3.2% explained variance, respectively, beta weights = -.21,  $ps < .05$ ). Our results indicate that high disinhibition entails deviations in early conflict monitoring processes (reduced NoGo-N2), as well as in latter evaluative and updating processing stages of infrequent events (reduced NoGo-P3 and infrequent-Go-P3). The null contribution of meanness and boldness domains in these results suggests that N2 and P3 amplitudes in Go/NoGo tasks could be considered as neurobiological indices of the externalizing tendencies comprised in this personality disorder.

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### **43. Time course response of the heart during emotion regulation with unpleasant picture contents**

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This study explored the time course of HR changes during a cognitive reappraisal task where a “cue” (2s) signaled the instructions (Look, Increase, Decrease) during unpleasant or neutral pictures (8s). Cardiac R-spikes were converted to beats-per-minute for successive 500ms and converted to change-scores regarding the baseline (1s-mean prior to picture-onset). Results showed a response pattern characterized by a HR acceleration followed by a deceleration. Moreover, greater HR acceleration was clearly found when participants had to increase their negative emotions compared to decrease or passive-viewing conditions, being significant basically across the whole picture presentation (from 1.5s until 7s). Regarding specific content, victim scenes prompted greater HR acceleration

during up-regulation compared to down-regulation and looking at pictures, being significant from 2.5s until 8s. For threatening scenes, however, scarce effects of instructions were found, with significant differences only between up-regulation and looking at pictures (from 1.5s till 5s). These findings suggest that voluntary modification during emotion regulation has sustained effects on cardiovascular activity that might vary depending on picture content, reflecting furthermore cognitive effort attributable to reappraisal.

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### **44. Tracing individual differences in inhibitory control at retrieval**

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Selective retrieval of target memories may lead to subsequent forgetting of related (but competing) memories. This retrieval-induced forgetting (RIF) is thought to be the consequence of an inhibitory control mechanism in charge of solving retrieval competition (Anderson, Bjork & Bjork, 1994; Wimber et al, 2015). As it is the case in relation to other executive-control capacities, individual differences exist in the ability to exert inhibitory control during selective retrieval, such as previous studies on aging or psychiatric disorders have shown. Despite this, few attempts have been made so far to address individual differences in this ability in healthy young adults. In the present study we aimed to dive deeper into this issue by 1) studying its relation to other cognitive control measures (i.e., the reliance on proactive versus reactive modes of cognitive control (see Braver, 2012), and 2) exploring the role of certain personality traits such as self-control, mindfulness or grit.

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### **45. Understanding the frequency-following response and its generators to sounds of different frequencies: A meg study**

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The auditory frequency-following response (FFR) to periodic complex sounds provides a non-invasive measure of the neural transcription of sounds, as well as

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how auditory experiences transform these representations. Since seminal studies, it has been assumed to originate from subcortical structures of the auditory pathway. Yet, the single study published so far using magnetoencephalography (MEG) to locate the sources of the FFR challenged this assumption, demonstrating that FFR receives major contribution from the auditory cortex. Based on frequency-specific phase-locking capabilities along the auditory hierarchy, we hypothesized that FFRs to higher frequencies would receive less cortical contribution than those to lower frequencies, hence supporting subcortical involvement for these high-frequency sounds. We recorded simultaneously electroencephalographic (EEG) and MEG FFRs to pure tones of 89 and 333Hz, delivered with a jittered stimulus onset asynchrony ranging 241-265ms. To allow a more precise source separation, individual anatomical MRIs of all the participants were obtained. FFRs elicited to high and low frequency sounds are observable on both MEG and EEG recordings. By using distributed source modelling; midbrain, thalamic, and cortical contribution to FFR is analyzed and described. These findings are relevant for our understanding of the neural encoding of sounds along the auditory hierarchy, and suggest a hierarchical organization of periodicity encoding.

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### **46. Psychopathy and psychosocial stress: a phenotypic approach**

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Psychopathic features have been associated with a low reactivity of the autonomic nervous system (ANS) to aversive stimulation (Benning et al., 2005). We intend to characterize the Boldness, Meanness and Disinhibition phenotypes of the Triarchic Model of Psychopathy (Patrick et al., 2009) in terms of their influence on autonomous activity. 57 healthy young subjects (28 women), aged between 18-36 years (mean age = 23 years old) were evaluated. Heart rate (HR) and HR variability (HRV) were measured. Participants were assessed with the Triarchical Measure of Psychopathy (TriPM, Patrick et al., 2010) and were submitted to Trier Social Stress Test (TSST).

Total Psychopathy was associated with a lower HR response to the TSST. Regarding the phenotypes, Boldness was positively associated with the

parasympathetic response to the TSST, more specifically to the arithmetic task whereas Meanness was positively associated with the sympathetic response. This study clarifies the association between Psychopathy and the ANS response to psychosocial stress, highlighting the relevance of the dimension of low fear for the understanding of Psychopathy.

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### **47. A latent variable approach to the interplay between natural language switching and executive control processes**

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Language switching (LS) is a common behavior in bilinguals that requires the management of two competing languages by selecting one of them and inhibiting the other, a process involved in language control (LC). It has been proposed that LC involves and trains general executive control (EC) processes. In this vein, we explored the interplay between self-reported LS habits and several measures tapping on different subcomponents of EC through structural equation modeling (SEM) adopting a latent variable perspective. Results showed that, after controlling for the age of the second language's onset, frequent self-reported LS was associated with better EC abilities. Moreover, a better fit was found when considering EC as a unitary mechanism as compared to a competing model with a direct relation between LS and several EC subcomponents. Specifically, the EC improvement was indexed by larger working memory span (updating), and both faster response times in a Flanker task (interference inhibition), and in the feature-switching task (task switching). These findings endorse the hypothesis that bilinguals show benefits in EC mechanisms under non-verbal conditions due to their experience in controlling two languages.

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### **48. A meta-analytic review of the association between monoamine-related gene polymorphisms and response inhibition performance**

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Response inhibition is essential to an adaptive behaviour in daily-life, but a deeper understanding of this ability is still needed, particularly in the understudied adult non-clinical population. From a genetic perspective, in the present work we first performed a systematic review of genetic association studies linking monoaminergic genes and polymorphisms to measures of response inhibition derived from the Go/No-Go and/or Stop-Signal tasks. Thirty-eight research articles examining over 15 candidate genes were identified, but evidence was inconclusive. Therefore, we then performed meta-analyses using random effects models on those polymorphisms investigated in at least three studies. Data from 11 independent studies was analysed in three meta-analyses for the following polymorphisms: SLC6A3 3'UTR VNTR (k = 6 samples; n= 1463 participants), COMT Val158Met SNP (k = 7 samples; n = 784) and SLC6A4 5-HTTLPR (k = 4 samples, n = 204). We found no significant associations between any of the polymorphisms investigated and response inhibition performance. To conclude, the methodological and theoretical implications of these findings are discussed.

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### **49. A voice in the noise: Evidence of a Right Ear Advantage even in the absence of auditory stimuli**

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The Right Ear Advantage (REA) occurs when two different auditory stimuli are delivered in the two ears simultaneously.

In this study, participants were presented with white noise (WN) in both ears at 60 dB for 250 ms (WN condition). In the left ear (LE)/right ear (RE) conditions, besides binaural WN, a voice was presented in the left/right ear, respectively, for the same duration as the WN. The voice was presented either at 42, 48, 60 or 66 dB. In all trials (including WN) participants were asked to report in which ear they had heard the voice. In the WN condition participants reported having heard a voice more frequently in the right than in the left ear (imaginative REA). In LE and RE conditions, when the volume of the voice was lower than that of the WN (42 and 48 dB), the accuracy was better in the RE than in the LE condition (perceptual REA). Moreover, participants with a stronger perceptual REA also showed a stronger imaginative REA.

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### **50. Action shapes the sense of body ownership across human development**

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The sense of body ownership is a core aspect of self-consciousness, and it has been shown to arise mostly from crossmodal interactions involving vision, touch, and proprioception. To date, no study has investigated the contribution of the motor system to the development of the bodily self. To this aim, we present a new version of the classic rubber hand illusion (RHI), in which 4-5 year-old children and adults could actively self-stroke the rubber hand while being synchronously or asynchronously touched on their unseen hand. In three experiments, we showed that while for children active movement promoted the emergence of an adult-like RHI, both reporting the feeling of owning the rubber hand and recalibrating their real hands towards the rubber hand, for adults active movements disrupted the RHI. These novel findings suggest that self-produced actions have a crucial role in building a coherent bodily self across development, and support the notion that actions are necessary to also maintain a unitary and coherent sense of body ownership in adulthood.

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### **51. An investigation of memory and response inhibition in pathological gambling**

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Several psychopathologies, including addictive disorders, are characterized by inhibitory deficits. We investigated different components of inhibitory processing in pathological gambling. Twenty participants with pathological gambling and twenty matched controls participated in two sessions. In the first session, the Retrieval Practice Paradigm was administered, which allows to reveal Retrieval-Induced

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Forgetting (RIF), an effect thought to reflect the integrity of memory inhibition. In the second session, the Sustained Attention to Response Task (SART) was used to test response inhibition. Self-report questionnaires on impulsivity were also administered. Self-rated measures showed higher trait impulsivity in pathological gamblers, particularly for motor and non-planning impulsivity subscales. In contrast to our expectations, RIF was significant but not statistically different in the two groups, suggesting a preserved ability to inhibit interfering memories in the clinical group. Interestingly, patients exhibited an increase in commission errors during SART performance, suggesting that a vulnerability in response inhibition might be the most reliable marker of their altered inhibitory abilities. Therefore, behavioral addictions appear to be characterized by a different inhibitory profiles compared to substance-related disorders.

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### **52. Analysis of mental rotation training in 2nd year of preschool education**

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Several studies and meta-analysis have showed that Mental Rotation (MR) is a spatial ability can be improved with training. However, studies with preschoolers are scarce and their results are inconsistent. This project has been designed to observe training effects in 4 year-old preschoolers, as well as to analyze the performance of the participants in which participants were involved. A total of 61 children took part, of which 30 performed a MR training with different angular disparities. The results have showed a significant improvement in trained participants with respect to non trained participants. Furthermore, a decrease in response accuracy was observed when angular disparities increased in the training with a noticeable performance drop in the three most difficult degrees. These results suggest that MR is a spatial ability present in early development stages such as in 4 year-old children, and this spatial ability can be trained and improve if we applied a specific training program adapted to this particular stage.

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### **53. Assessing the memory representation of the distinctive elements of similar stimuli in the Intermixed-Blocked effect**

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It has been suggested that repeated exposure to similar stimuli enhance discrimination due to a comparison process (Gibson 1963). Mundy et al. (2007) explain this process in terms of attention bias towards the distinctive elements of the stimuli that are processed to a large extent, and thus have a better representation. This better representation makes these elements less likely to learn about them for loss of associability. In an experiment with rats as subjects and flavors as stimuli, we directly measure the associability of the distinctive elements by pairing them with a LiCl injection after intermixed or blocked preexposure. If intermixed preexposure results in a better representation of the distinctive elements, we expect to find a slower conditioning for this group. Our results suggest more latent inhibition and less associability in the intermixed condition as we found a slower conditioning for their distinctive elements.

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### **54. Attentional effects on the spatialization of time in an implicit reaction time task**

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It has been suggested that repeated exposure to similar stimuli enhance discrimination due to a comparison process (Gibson 1963). Mundy et al. (2007) explain this process in terms of attention bias towards the distinctive elements of the stimuli that are processed to a large extent, and thus have a better representation. This better representation makes these elements less likely to learn about them for loss of associability. In an experiment with rats as subjects and flavors as stimuli, we directly measure the associability of the distinctive elements by pairing them with a LiCl injection after intermixed or blocked preexposure. If intermixed preexposure results in a better representation of the distinctive elements, we expect to find a slower conditioning for this group. Our results suggest more latent inhibition and less associability in the intermixed condition as we found a slower conditioning for their distinctive elements.

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### **55. Attentional impulsivity and drinking onset predicts alcohol-related problems in university students**

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Alcohol is the most widely used recreational drug, and its consumption is increasing in young people. They exhibit a pattern of consumption known as binge drinking (BD), which is associated with long-term health consequences and multiple psychosocial problems. So, determining which factors predict its occurrence is highly relevant. It has been demonstrated that BD produce significant deficits in executive control, and also, prefrontal cortex dysfunction. For this reason, the impulsivity has been often associated with BD. University students (n=63) completed several questionnaires that evaluated drinking habits (AUDIT), impulsivity (BIS-11) and sensation seeking (SSS). Also, measures of response inhibition (go/no-go task) and decision-making (Two-choice task) were assessed. Multiple regression analyses were utilized to evaluate the predictive role of each impulsivity facet in BD. The analyses revealed that drinking onset and attentional impulsivity were significant predictors of alcohol use disorders. However, the rest of variables evaluated failed to predict it. These data suggest that different components of impulsivity (mainly, attentional impulsivity) may be contributing to the drinking patterns and stress the need to deepen in that aspect.

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### **56. Bilateral activation of area hMT in hemianopic patients in an orientation discrimination task with moving and static stimuli**

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Hemianopia is a visual field defect characterized by impaired vision in the contralateral field of both eyes due to a lesion along the post-chiasmatic visual pathway. Some unconscious visual abilities can be preserved especially when presenting moving stimuli. We tested fMRI activation following orientation discrimination of moving or static stimuli shown in the blind or intact

hemifield in a group of hemianopic patients with different lesion sites and extent. General Linear Model analysis was used to obtain statistical parametric maps, including age and gender as nuisance factors. We performed correlation analysis between signal amplitude and performance, both at the level of the whole brain and within Regions of Interest. When presenting moving stimuli to the blind hemifield we found a bilateral activation of area hMT that was positively correlated with behavioral performance. We observed a partial integrity of interhemispheric fibers connecting areas hMT and of ipsilateral fibers connecting hMT with subcortical structures. We hypothesize that the above connections are likely to be responsible for the role of area hMT in unconscious orientation discrimination of moving stimuli in the absence of area V1.

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### **57. Brief Inventory of Thriving: The Italian version development and the cross-cultural invariance between Italian, Portuguese, and Chinese versions**

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Su, Tay, & Diener (2014) proposed the 10-item Brief Inventory of Thriving (BIT) to measure well-being overcoming the classic distinction between psychological and subjective well-being. Specifically, authors conceive the subjective well-being as a sub-dimension of the psychological well-being that, in this wider view, is considered as synonymous of thriving. The current paper presents two studies. The first study aims to develop the Italian version of the BIT, verifying its mono-dimensionality and collecting evidence about its reliability. Data were collected from 227 emerging adults (sample 1) and 292 adults (sample 2). Mono-dimensionality has been tested on both samples. In order to verify test scores' reliability, the longitudinal sample (sample 2) has been used to perform SEM models testing internal consistency, structural stability, and differential stability. The second study aims to test cross-cultural measurement invariance of the scale. Data were collected from Italian (n=471), Portuguese (n=190), and Chinese (n=320) emerging adults. The model requiring configural invariance has good fit indices:

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$\chi^2(105)=311.739; p < .001$ ; RMSEA=.078(.068 .088); CFI=.929; SRMR=.043. Furthermore, full metric invariance has been found ( $\hat{\Gamma}CFI=-0.010$ ).

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### **58. Cognitive/emotional control of attentional distraction**

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Several attentional mechanisms, both voluntary and involuntary, are responsible for improving the processing of relevant stimuli and/or ignoring irrelevant stimuli (distractors) for the optimal performance of a task. In this investigation, we will focus on the study of the attentional control of irrelevant stimuli (distractors) in contexts of high or low rate of appearance, where different types of attentional control will come into play: proactive or reactive. Distracting stimuli will be images with negative and neutral emotional content, with the added objective of investigating whether this cognitive control induced by distractors can be modulated by emotion.

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### **59. Comparing the effects of deviant sounds after Go and NoGo trials in young and older adults**

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Participants in a visual categorization task where every target follows an irrelevant sound exhibit longer response times (RTs) when this sound deviates from an otherwise repetitive, standard, sound (deviance distraction). If the task involves trials without a target (NoGo trials), deviant sounds elicit - relative to a standard sound - different effects depending on type of preceding trial: longer RTs following a Go trial, shorter RTs following a NoGo trial. Here we compared these effects in 46 young (M age = 20.39) and 46 older adults (M age = 65.15) using a cross-modal oddball task in which half the trials contained no target. We found that (1) deviant sounds following Go trials elicited longer RTs in young and in older adults (significantly more so in the latter); and that (2) deviant sounds following NoGo trials elicited significantly faster response times in young adults but not in older adults. The results suggest that older adults are more distracted by deviant

sounds but benefit less from it to disengage from the non-action mode induced by NoGo trials.

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### **60. Do psychopathic traits impair autobiographical memory for emotional life experiences?**

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An abnormal emotional processing has been widely reported to be central to psychopathy. Among the numerous aspects of the traditionally investigated psychopathy-emotion link, a relevant space is covered by the memory for emotional stimuli. The current work aimed to investigate the role of psychopathic traits on emotional richness and phenomenological quality of autobiographical memories for emotional life experiences in a non-forensic sample (n = 114), and in a criminal sample of inmates (n = 44). Participants of both samples were asked to recall an important emotionally charged event (positive or negative), and were then administered the Psychopathic Personality Inventory-Revised (PPI-R), the Flashbulb Memory Checklist (FBMC) and the Autobiographical Memory Characteristics Questionnaire (AMCQ) in individual sessions. Moreover, a linguist content analysis was applied to inmates' memory transcriptions. Results showed that individuals with high levels of psychopathy provided memories which were emotionally deprived, lacking in phenomenological details and in affective labels, and associated to a low attribution of emotional intensity and implication. These preliminary results encourage further investigation concerning the emotional processing deficit in psychopathic disorder.

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### **61. Does attention and depressive mood affect the processing of time?**

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It has been suggested that people in a depressive mood pay more attention to the past and spend time ruminating past negative events. In the present study we aimed to test whether attention and mood can affect the processing of time in both an explicit and an implicit task. We manipulated attentional focus on the past or future by asking participants to write a short essay about

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a day in their lives either 15 years ago or 15 years ahead. We then measured the spatial location of past and future using an explicit diagram task as well as the processing of words with past and future reference using an implicit reaction time task. We also measured emotional mood and explored its correlations with time processing in both tasks. The results of this work in progress will extend current knowledge on the interrelation between attention, emotion and time.

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### **62. Does bilingualism ameliorate age-related declines in executive functioning?**

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Recent findings suggest a positive impact of bilingualism on cognition, including later onset of dementia. However, it is not clear whether these effects are due to a simultaneous acquisition of both languages during childhood, or if second-language acquisition during adulthood might provide similar benefits. In the current study, early simultaneous bilinguals, late highly immersed bilinguals and monolinguals older adults performed a task-switching task under low (predictable sequences) versus high (random alternation) demands of top-down executive control. The results showed that, independently of the age of acquisition and the balance in the use of both languages, bilinguals committed significantly fewer errors, and had lower switching costs than monolinguals in the difficult condition, whereas we did not find group differences in the easier condition. The performance of monolinguals decreased significantly conforming increased task difficulty, whereas in the bilingual group this trend was absent. Our results suggest a positive effect of bilingualism on later-life executive functioning, delaying age-related cognitive decline including in those who acquired their second language during adulthood.

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### **63. Does resting-state functional connectivity predict individual differences in the visual attention system?**

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Functional connectivity is supposed to capture the lifetime learning experience, generating individual

differences. Visual attention and information processing models have highlighted the relevance of the primary visual area (V1), posterior parietal cortex (PPC), dorsolateral prefrontal cortex (DLPFC), and dorsal anterior cingulate cortex (dACC) during visual search tasks (VST). We tested the Spontaneous Trait Reactivation (STR) hypothesis, which proposes that resting-state Functional Connectivity (rs-FC) measures may reflect the individual differences in cognitive abilities. Forty-two undergraduate students completed an fMRI study which included an rs-FC session and a VST scan. A correlation analysis was conducted between the seed-based pairwise rs-FC of V1, PPC, DLPFC and dACC, and the behavioral measures of VST (reaction times and accuracy). Results showed that higher rs-FC values between rPPC/dACC were positively correlated with faster speed response. The PPC is a key region for visual search as it holds the priority maps. The dACC usually exerts executive inhibitory control in cognitive tasks thus could facilitate target detection. According to STR hypothesis, high rPPC/dACC connectivity predicts individual differences in VST and information processing.

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### **64. Efecto Von Restorff de acuerdo con las instrucciones de aprendizaje y el tipo de estímulo**

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El Efecto Von Restorff (ER) predice que los elementos no similares o aislados de un conjunto homogéneo se recordaran mejor que los similares. Este efecto ha sido ampliamente estudiado bajo aprendizaje intencional; sin embargo los resultados bajo aprendizaje incidental y recuerdo libre no son concluyentes. En el presente estudio, manipulamos las instrucciones de aprendizaje para involucrar a los participantes bajo aprendizaje intencional o incidental en el mismo paradigma de ER con aislamientos semánticos y una prueba final de memoria de recuerdo libre. Además, contrastamos la hipótesis de si el formato del estímulo (imágenes o palabras) provocaba un ER más elevado. El estudio completo estuvo compuesto por 395 participantes (edad promedio = 20.79 años, DS = 1.91 años) con grupos independientes para cada condición experimental. Los resultados mostraron ER en ambas condiciones y, como



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se documento previamente, fue mayor bajo aprendizaje intencional. En cuanto al formato del estímulo, a diferencia de la literatura anterior, el aislamiento semántico de los elementos durante la codificación no beneficia a las imágenes sobre las palabras, es decir, no se encontró ninguna diferencia.

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### **65. Effect of exposure to similar flavours in Sensory Specific Satiety: implications for eating behaviour**

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Sensory-specific satiety (SSS) is the decline in pleasantness of the sensory properties of food by the time it is eaten. SSS is specific to the eaten food, but it can also generalise to other meals that share similar properties to the satiated food. It is possible that this phenomenon could become more specific due to perceptual learning (i.e. an increase in the distinctiveness of similar stimuli after extended exposure). This would reduce generalization of SSS to other similar meals, keeping their hedonic value intact and being more appetizing. To test this hypothesis, two experiments were carried out using rats as experimental subjects and flavoured solutions as stimuli. On Experiment 1 our main goal was to find the basic SSS effect. Results showed a higher consumption of non-sated solutions in comparison to sated ones. Experiment 2 evaluated how repeated exposure to two similar solutions affected generalization of the SSS. Results showed that rats that had repeated exposure to the flavours showed a SSS expression whereas familiarised ones not. These results highlight a potential mechanism linking obesogenic environments with dietary habits.

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### **66. Effect of task complexity on motor and cognitive preparation**

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Given that brain correlates of task complexity in the pre-stimulus preparatory phase are still unknown, we investigated motor and cognitive preparation preceding stimulus presentation in simple and complex discriminative response tasks with a visual Go/No-go paradigm. We recorded event-related potentials (ERPs) in 16 participants discriminating between one target/non-target pair and in 16 participants discriminating between two target/non-target pairs. We predicted that the simple task would need less motor and cognitive preparation as shown by modulation of the main pre-stimulus components. For the post-stimulus ERPs, we predicted smaller activity for prefrontal components more related to task execution. Behaviourally, performance was faster and more accurate in the simple task. Pre-stimulus ERPs, BP and pN, showed earlier onset and larger amplitude in the complex task. Post-stimulus ERPs in the simple task showed smaller pP1 and pP2, a larger N2 (due to pP1 and pP2 complexity modulation and not to additional brain activity), and a smaller P3 associated to less intense task closure. In conclusion, simple tasks require less motor and cognitive preparation in premotor and prefrontal areas.

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### **67. Effects of sub-chronic delta-9-tetrahydrocannabinol administration on schedule-induced drinking in rats**

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Schedule-induced drinking (SID) reproduces an excessive behaviour pattern that has been proposed as an animal model to study compulsive spectrum disorders. Cannabis derivatives are the most consumed illicit substances worldwide but there is growing interest on their clinical applications in psychological disorders associated to compulsivity. However, little is known about their effects on SID once has been developed. The aim of this study was to explore the potential therapeutic properties of delta-9-tetrahydrocannabinol (THC) in this compulsive behaviour model and its effects in their specific features. After SID acquisition, 5 or 10 mg/kg THC doses or vehicle were administered to rats 23 hours before behavioural testing for 7 days. The results showed that THC treatment produced an increase of licking behaviour only with the 5 mg/kg dose, and affects to its temporal distribution. Thus, we conclude that THC treatment is not a good approach to reduce

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compulsive behaviour in this model. Moreover, it could also have side effects such as alterations on temporal discrimination.

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### **68. Effects of Transcranial Direct Current Stimulation (tDCS) in supplementary motor area (SMA) on Anticipatory Postural Adjustments in Fitts' law**

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In this study we applied transcranial direct current stimulation (tDCS) to induce changes in the excitability of the human motor cortex (excitation (anodal) or inhibition (cathodal)) and measured the Anticipatory Postural Adjustments (APAs) modulation in a typical Fitts' law task. Eighteen participants (9 males and 9 females) were recruited and tDCS stimuli delivered for 20 minutes, before performing the task, in three randomized sessions (anodal vs. cathodal and sham as a control) on supplementary motor area (SMA). The task was to point with the big toe to targets having different sizes and positioned at different distances to obtain several indices of difficulties (IDs).

The movement time, at the three shortest distances (10, 20, and 40 cm), followed a linear correlation with the ID for all conditions (anodal, cathodal and sham). However, no significant difference, among conditions, was found for APA's onset and magnitude. In conclusion, this study showed that tDCS application on SMA maintains APAs onset and magnitude unchanged given the different type of excitation induced.

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### **69. Effects of visuo-spatial training in Primary Education and its relationship with metacognitive and emotional factors**

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Several studies have shown that mental rotation (MR) is a spatial skill that can be improved. However, most training programs for this skill have been conducted in

adults. It has also been found that gender differences in the performance of this skill appear to vary through various investigations. This study aims to investigate the effect of MR training on children ages 7 and 8, analyzing together the results obtained along with other factors that could influence over spatial performance, such as so-called spatial anxiety or confidence in the responses given to the task of MR. The goals are: 1) Evaluate whether there is a significantly higher spatial improvement in the Experimental Group (EG) compared to the Control Group (CG) after MR training; 2) Analyze the differences between groups (EG vs. CG) and sexes (boys vs. girls) in the judge of confidence of the MR task before and after training; 3) Calculate the correlation between spatial anxiety, MR confidence and MR performance, hypothesizing that significant relationship could be found between these variables.

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### **70. Embodiment effects in short-term memory consolidation**

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It is not yet clear if the impact of motor actions is only instrumental in language understanding or if it is also important for the formation and consolidation of memory representations. The role of the sensory-motor processes in the consolidation of information has hardly been addressed, except for a study carried out by van Dam, Rueschemeyer, Bekkering, & Lindemann (2013) showing consolidation effects induced by motor re-enactment in an immediate recognition-memory test for previously learned motor-related words. Experiment 1 was a direct replica of the study by van Dam et al. but with twice as many participants. Experiment 2 used similar manipulations within an immediate free-recall paradigm. The results showed an absence of significant post-learning motor-action effects on immediate memory in both experiments. These findings suggest that the evidence for sensorimotor effects in short-term memory consolidation is far from conclusive.

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### **71. ERPs evidence for mutual influences of emotional language and response inhibition**

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Prior research has shown that the processing of affective visual scenes modulates behavioural and neurophysiological indexes of response inhibition. Here we present two ERPs experiments that, first, extend the reach of this emotional effect to language, and second, reveal that response inhibition also modulates emotional processing. For both studies, we made use of a modified version of the Go/NoGo paradigm in which participants read sentences (positive, negative or neutral) while monitoring cues signalling to either execute or withhold a manual response. In the first experiment, the emotional content of the sentences appeared just before the onset of the Go/NoGo signal and modulated the amplitude of the inhibition-related N2 component. In the second experiment, this signal was shown at the very start of the sentences having an impact on the activity of emotion-related components (P2, N400, and LPP) elicited by the emotional words embedded in the sentences.

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### **72. Evaluation of declarative memory in patients with obstructive sleep apnea, using a verbal memory test with emotional valence: a pilot study**

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The sleep apnea and hypopnea syndrome (SAHS) is one of the most frequent respiratory sleep disorders which gives rise to various clinical and neuropsychological symptoms.

Recent studies have shown that patients suffering from this syndrome endure alterations in the coding and/or consolidation of verbal information, but the results are contradictory. Regarding the consolidation of emotional memory, recent investigations suggest that sleep deprivation negatively affects consolidation of these memories.

The objective of this study is to determine whether these patients show any codification and consolidation deficits, and whether emotional information favours subsequent memories. Fourteen subjects with SAHS and fourteen participants without any sleep disorders, completed an encoding phase of a list of words with emotional content before going to sleep.

The following morning a free recall and recognition test was carried out. The results indicate that SAHS patients present deficits in the codification and consolidation of verbal memory with respect to the control group. Besides, they show decreased memory of positive emotional information, although there are no differences

in the codification of information with emotional content.

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### **73. Free-Association Norms for a Large Set of Words in Spanish**

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The way in which conceptual knowledge is represented in memory provides important information on the organization and processes of the human cognitive system. We present the results of a large-scale study on the associative structure of words in Spanish, derived from free-association data collected from a large sample of young adults. At present, free association norms are available for over 7,000 cue words, with empirically-derived estimations of forward and backward associative strength. The set of cues is composed of words that have been extensively normed in other psycholinguistic dimensions, and therefore constitute a strongly characterized stimuli pool for use in cognitive research. Access to the associative database is open to interested researchers via Internet, with a user-friendly interface that allows for on-line data extraction in real time. The size of the stimuli set and the relevance of the available data makes the norms particularly useful for research in disciplines such as linguistics, cognitive neuroscience, neuropsychology or artificial intelligence.

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### **74. HEROÍNA: the drug or the hero? Valence-meaning norms for 263 Spanish ambiguous word**

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Ambiguous words are quite common in language. Moreover, the different meanings of an ambiguous word can have different emotional content (e.g., the Spanish word heroína could be both negative, the drug, and positive, the feminine version of hero). This fact has not been taken into account in the classical valence measures, in which participants have to rate a word that is presented in isolation. In this study, valence ratings for the two most frequent meanings of Spanish ambiguous words were collected (i.e., participants rated the valence of the word presented with the definition of either the first meaning or the second meaning). We also collected valence ratings for the word presented in

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isolation. Measures of ambiguity were included (i.e., number of associates generated for each meaning, subjective measure of number of meanings, subjective measure of relatedness of meanings). Several analyses were conducted, and it seems that the valence of the word presented in isolation is better predicted considering the valence of both meanings than only the valence of the dominant one.

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### **75. How important is reenacting the gesture for the enactment effect in foreign language learning?**

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The enactment effect is the improved learning of foreign words when they are presented together with a gesture that the participant mimics at the moment of learning. How important gesture imitation is for the enactment effect? Does observing the gesture suffice to improve learning? We hereby tested the influence of gesture reenactment in foreign language learning using a paradigm that includes both concrete and abstract words as well as iconic and arbitrary gestures taken from the vocabulary of Spanish Sign Language. The results of this work in progress will be relevant for the question of the embodiment of meaning and have practical applications in second language learning.

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### **76. Implicit and explicit preference for curvature and symmetry**

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Preference for curvature and symmetry is endorsed by visual aesthetic literature. In this study, our purpose was to determine the relationship between the responses of the participants to an explicit liking task and an implicit affective stimulus-response compatibility task, using the same stimuli. We used four types of stimuli: symmetric-curved, symmetric-sharp, asymmetric-curved, and asymmetric-sharp. There were two blocks with the same stimuli: one regarding contour and the other symmetry.

In the explicit task, we used a seven-point Likert scale, from (1) dislike to (7) like. We conducted multiple linear regression analyses with response time and liking ratings as variables for the implicit and explicit measures, respectively. Despite results from both measures showed a statistically significant preference for curvature and symmetry, our analyses did not find a significant predictive relationship between explicit and implicit measures. These results might be interpreted in line with the idea that explicit and implicit measures use different processing mechanisms.

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### **77. Improving long-term retention through the “testing effect” on a real educational context**

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An important number of studies have shown that taking a test after studying the content of a subject improves later retention, an effect known as the “testing effect” or “retrieval practice” (Roediger & Karpicke, 2006), although its use is not widespread in educational contexts. The aim of this study was to investigate if testing immediately after a lecture improves later retention, as the testing effect predict, in a real educational context. Two groups of students were used. The first one was tested immediately after the lecture and explanation of three topics but not after other three, and vice versa. At the end of term, both groups were tested on a final exam and the scores of the previously tested topics were compared with the scores of the not tested ones. The statistical analyses show that there is a marginally significant difference between the previously tested topics and the not tested ones. Therefore, our results are one of the first demonstrations of the benefits produced by the testing effect on the retention of information by students.

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### **78. Inez, Rosa y Mesa: An ERP investigation of the time course of proper and common names processing**

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All languages have common names for things (CN) and proper names for people (PN). Some languages mark the

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difference at the linguistic level, Italian does so at the orthographic level: Capitalization of the first letter is the rule for PN, but context-dependent for CN. We investigated whether, in Italian, the orthographic differences between PN and CN are mirrored in how the brain processes them. We recorded ERPs in a lexical decision task. PN and CN were presented in their standard (Teresa/matita, pencil) and non-standard (teresa/Matita) form. Results showed effect of both early and late negativities (N100, N400) and early and late positivities (P200, Late Positivity). Positivities showed an interaction between orthographic congruency and name category, while negativities were associated with letter case independently of name category (N100), or with category distinctiveness independently of case (N400). Our results indicate that the brain detects the distinction between PN and CN early on and keeps track of such distinction at different points in time during processing. Results are discussed within the Orthographic Cue Hypothesis (Peressotti et al, 2003).

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### **79. Influence of burnout and engagement on the cognitive performance of Primary school teachers**

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This investigation analyses the attentional consequences of different occupational health variables of primary school teachers, according to their levels of burnout and engagement. Besides, we aim to explore the impact that organization variables (work overload, feedback and autonomy) have on teachers' occupational health and on their cognitive abilities (attention and interference inhibition). We carried out a transversal study with 39 teachers who work in schools of the Community of Madrid and teach Primary Education. They all fulfilled a series of occupational health questionnaires and performed the TMT and Stroop tests. Our results show that the levels of engagement (vigour and dedication) have a positive influence on the teachers' cognitive performance, specifically on their better attention levels and on their ability facing interferences. Regarding burnout dimensions, the emotional exhaustion decreases teachers' interference control. The results also show an indirect influence of the organization feedback variable, through burnout-engagement mediation scores, on the

teachers' attentional performance. These preliminary results suggest that occupational and organization variables may influence employees' psychological health, but also their cognitive and neuropsychological performance.

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### **80. Irrelevant auditory deviant stimuli increase crosstalk interference**

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We assessed whether crosstalk interference interacts with deviance distraction. Crosstalk interference occurs when relevant and irrelevant stimuli compete for selection and action. Deviance distraction occurs when unexpected stimuli capture attention and trigger an involuntary orientation to and semantic appraisal of the deviant stimulus. We sought to determine whether irrelevant stimuli capturing attention by virtue of being deviant enhance crosstalk interference. In a cross-modal task, participants categorized left/right arrows preceded by task-irrelevant sounds (which they were instructed to ignore). In the no deviance condition, every trial involved the word "left" or "right" (with equal probabilities), both equally often congruent and incongruent with the upcoming visual arrow. In the deviance condition, three sounds were used, a standard tone (in 75% of trials), and the words "left" and "right" (in 12.5% of trials each, each equally often congruent and incongruent with the visual arrow). The results exhibited crosstalk interference and deviance distraction. Most importantly, crosstalk interference was greater in the deviance condition, indicating that crosstalk interference increases for deviant distractors.

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### **81. Is your past in front of you when you feel depressed?**

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If asked to locate the past and the future in space, most people think future is in front and past behind. Yet, prior work has shown that when you pay attention to the past, you tend to think of it as being in front of you. Depressive patients often spend time ruminating about their past. Do people in a depressive mood tend to locate the past in front more often than cheerful people? In this study we induced a depressive mood in the participants

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by asking them to write about a sad event in their past at the same time as they listened to sad music. Then, they placed a past and a future event in a diagram showing one character and two boxes, one in front and the other behind the character. This work in progress will shed light on the relations between emotion, attention, and the mental representation of time.

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### **82. Lack of Differential Outcome Effect (DOE) with emotional stimuli as outcomes**

A. Easton<sup>1</sup>, S. Laporta-Monzón<sup>2</sup>, N. Escudero-Giner<sup>2</sup>, M. Martín-Escribano<sup>2</sup>, & G. López-Crespo<sup>2</sup>

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The Differential Outcomes Effect (DOE) refers to the increased performance and terminal accuracy observed in conditional discrimination tasks when each correct choice is reinforced with its own unique outcome. DOE can be considered as a ubiquitous effect as it has been demonstrated with different types of tasks, stimuli and procedures (Lopez-Crespo & Estévez, 2011). However, in most procedures discrete and concrete stimuli has been employed, as tangible reinforcers, pictures of different objects, etc. To our knowledge, the use of emotional stimuli as outcomes has been not employed yet. This study was aimed to test if DOE can be observed in a delayed matching-to -sample task in which different emotions acted as consequences (happy, surprise, sad and fear Ekman faces). 72 university students were tested in this task. No evidence of DOE was found, not with positive nor negative emotions.

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### **83. Multisensory semantic integration in inferential comprehension**

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Although language comprehension is usually multimodal (e.g., listening to speech while observing body gestures), only few studies have investigated the role of multisensory semantic integration in language processing (Willems, Özyürek, & Hagoort, 2009), where, in general, multisensory integration of semantically consistent stimuli is facilitated, whereas it is disrupted with semantically inconsistent stimuli. In

the present study, twenty-eight young adults (M age= 21.54) listened to short stories prompting an inference (e.g., “bear”). Subsequently, they were visually presented with either a consistent or inconsistent but plausible picture (“bear” vs. “penguin”). A final, auditorily-presented sentence was either the expected or unexpected target word (“bear” vs. “penguin”). ERPs measured in the target word showed N400 differences, with larger negativity in the unexpected word especially when coming from the consistent picture (“penguin” coming from the “bear” picture). This effect seems to indicate difficulty to integrate auditory information that fails to match visual information that agrees with our interpretation. A final question (accuracy measure) confirmed that participants’ comprehension has been disrupted after the presentation of multisensory stimuli that were semantically inconsistent.

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### **84. Neural substrates of affective and sensory beer evaluation in participants with different levels of tasting expertise**

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Three groups of participants (non-trained consumers, general food and beverage tasters, and beer-tasting experts,) evaluated visual, olfactive, and gustative sensory attributes, as well as general quality and hedonic value, of four different beers. They were presented with a structured questionnaire for descriptive profiling displayed in a computer screen whereas their brain activity was assessed using 64-channel electroencephalographic (EEG) recording. Consumers and beer-experts differed in the sensory evaluation of the gustative attribute Touch, both in the explicit evaluation as well as in brain activity. The differences were located in areas related to visual processing, object recognition, executive control, semantic memory, and hedonic processing. Although participants did not differ in explicit hedonic and general quality evaluation of the beers, beer-experts and general tasters differed from consumers in the activation of brain areas related to working memory, object recognition and hedonic processing. These results point out that experts and consumers may differ in processes of executive control, decision-making and semantic memory, related to access to expert knowledge, but also in the subjective or hedonic processing of the beers.

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### 85. No effects of tDCS over the left prefrontal cortex on self-paced cycling and EEG

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**Aim:** to test the hypothesis that transcranial direct current stimulation (tDCS) over the left dorsolateral prefrontal cortex (DLPFC) influences performance in a 20'' cycling exercise and electroencephalographic (EEG).

**Methods:** 36 trained males cyclists, completed a 20'' self-paced exercise in three separate sessions, under three stimulation conditions: anodal, cathodal and sham. TDCS was delivered for 20' before each test at 2.0 mA. We measured the power output, heart rate, RPE and EGG.

**Results:** There were not difference in power output ( $F = 0.031 = 0.31$ ,  $p > 0.05$ ) during exercise between conditions: Anodal (235W [95%CI 222 - 249]; Cathodal (235W [95%CI 222 - 248] and Sham (234 W [95%CI 220 - 248]). Neither the heart rate, RPE nor EEG activity were affected by the tDCS (all  $P_s > 0.05$ ).

**Conclusions:** tDCS over the left DLFC did not affect performance, and did not elicit any change on EEG activity either at baseline or during exercise. Our data suggest that the significant effects of tDCS on endurance performance reported by recent studies should be taken with caution.

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### 86. Parkinson's disease and autonomic pain response: a case study

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An 82-year-old woman who was diagnosed with Parkinson's disease (PD) 13 years ago. Without consumption of salicylates. She was treated from the beginning with levodopa and at the time of the assessment, it was administered Levodopa with entacapone (Stalevo®) (750mg./day) and Rotigotine (16 mg./day) with obvious fluctuations. She complained of generalized pain, preferably in "wearing off" periods, with an intensity of 8/10 on the visual analogue scale (EVA). However, after the neurophysiological

examination of pain thresholds (hand grip) there was a peripheral decrease which made that blood pressure (BP) readings wasn't very stable. An increase in systolic and diastolic blood pressure was observed, which was generated by the isometric contraction with a minor change, not proportional to the heart rate (HR). Sympathetic activity and nociceptive sensitivity were diminished, expressing the postganglionic noradrenergic myocardial denervation as it is widely known in parkinsonian patients. We consider the fact that not having a response to pain is due to the sympathetic decrease. Besides, results of the SNA study for this patient match with similar trials in which it has been proved that nociceptive sensitivity decreases in PD according to standard parameters in the normal population.

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### 87. Predictors of 106 line drawing and photo naming in Spanish children and adults

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One of the most frequent practices in psychological and educational research is the use of pictures as stimulus materials, but there are currently few standardized norms for children. Depending on the research purposes, the visual and verbal stimuli often need to be controlled. In this research, we study the predictors of 106 line drawing and photo naming in children and adults. A total of 72 Spanish children in grades 3-4 and 76 Spanish adults participated in the study. We examined seven psycholinguistic variables: age of acquisition, familiarity, imageability, concreteness, subjective visual complexity, word frequency and word length. Child and adult performance was highly correlated. Multiple regression analyses revealed that the significant predictors of picture-naming (H index) in children were word frequency and concreteness. Furthermore, the significant predictors of photo-naming in children were word frequency, concreteness and age of acquisition. In adults, picture and photo naming were significantly predicted by word frequency and subjective visual complexity. Similar lexical predictors (word frequency) but different representation related predictors (concreteness and visual complexity) were obtained for children and adults.

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### 88. Preference for curvature of meaningless novel patterns in a two-alternative forced choice task

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Curved contours stimuli are generally preferred to sharp-angled ones. This preference could be influenced by presentation time of stimuli. In experiment 1, curved meaningless patterns were preferred when presented for 84 ms, 150 ms and unlimited presentation time on a 2AFC task. This preference increased significantly in the unlimited viewing time condition. In experiment 2, participants discriminated poorly between the two versions (curved and sharp-angled) of the meaningless patterns in 84 and 150 ms presentation times. Therefore, participants selected mostly the curved version in short times without being aware of the difference. In conclusion, presentation time influence preference for curvature and this preference does not need conscious discrimination of the stimuli.

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### 89. Prevención del estigma desde un punto de vista social. Principales líneas de actuación

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El término “estigma” en salud mental, engloba una serie de componentes cognitivos, emocionales y conductuales relacionados con dos aspectos principales: el «estigma público “y el «auto-estigma”. Según Sudak y colaboradores, el estigma de la enfermedad mental, en general, es más aceptado que el estigma asociado a una tentativa de suicidio. Conocer las principales líneas de intervención para prevenir el estigma social en salud mental y, en particular, del suicidio. Revisión sistemática. Criterios: restricción temporal (1 -2-2015 a 1-2- 2018); académicos y revisados por expertos. Términos de búsqueda: “prevención”, “estigma social”, “suicidio”. Campos de actuación revisados: el ámbito sanitario, laboral, penitenciario, familiar, educativo, y medios de comunicación. Especialmente relacionado con la prevención del estigma del suicidio se han revisado los tres últimos. En el ámbito familiar se recomienda la educación a los padres sobre conducta suicida. En educación medidas para detectar el acoso escolar (León, 2009). Y en los medios de comunicación, publicar simultáneamente en la emisión de noticias sobre el

suicidio, teléfonos y direcciones de ayuda para la población (OMS.2013).

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### 90. Psycholinguistic and affective norms for 1250 Spanish idiomatic expressions

J.M. Gavilán<sup>1</sup>, J. Haro, J.A<sup>1</sup>. Hinojosa<sup>2</sup>, I. Fraga<sup>3</sup>, & P. Ferré

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Unlike English and other languages, we do not have normative data on psycholinguistic and affective characteristics of idiomatic expressions in Spanish. Given the importance of this type of studies for research in figurative language processing, in this work we present a database of Spanish idiomatic expressions. The study, still in progress, provides psycholinguistic and affective norms for 1250 Spanish idiomatic expressions. Spanish native speakers rated each idiom in 7 subjective variables: familiarity, knowledge of the expression, semantic transparency, literal plausibility, predictability, valence and arousal. To date, approximately 1000 students from three Spanish cities (Tarragona, Madrid and Santiago de Compostela) have participated in the study. In accordance with previous studies, preliminary results show that familiarity and the knowledge of the idiom are strongly correlated with one another. Both variables show a positive association with semantic transparency and predictability. In respect to the affective ratings, preliminary results show that idioms that were rated high in valence were also rated high in arousal.

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### 91. The study of temporal binding with Labclock Web

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Temporal binding is defined as the misperception or misjudgment of the moment in which a target event occurs when another related event occurs contiguous in time. Usually these two events are a participants' action and auditory feedback and most experiments show that they tend to be perceived or judged closer in time than they really are. Garaizar, Cubillas and Matute (2016) developed Labclock Web, an easy-to-set-up and open



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source tool to conduct online neuroscience experiments based on the Libets' clock paradigm. We present three experiments exploring the influence of three procedural manipulations on temporal binding. Experiment 1 tests shorter delays between action and feedback, 1 vs 100 ms instead of 1 vs 500 ms. Experiment 2 tests the effect of presentation order of trials, 1-500 vs 500-1. Experiment 3 tests the effect of visual instead of auditory feedback. Our results suggest that temporal binding is a robust effect that can be replicated under a variety of conditions and that Labelock Web is a powerful and precise tool to conduct experiments in this area.

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### **92. Statistical regularities are explicitly learned within but not between sensory modalities**

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Statistical learning (SL) is the human ability to extract statistical regularities from the environment. Most of the previous studies on SL have focused on the regularity extraction mechanisms taking place within sensory modalities but there is little evidence that statistical regularities can be learnt across different modalities. To test whether SL is a domain-general or modality-specific mechanism (Frost et al., 2015), we exposed 18 participants with a stream of visual and auditory abstract stimuli whereas they performed an oddball detection task. Stimuli were grouped into unimodal (V-V or A-A) or crossmodal (A-V or V-A) pairs and the only cue to identify a pair was a higher transitional probability between the paired elements. After 30 minutes of exposure we measured learning using a 2AFC and gathered the participants confidence on their answers. We found that only the unimodal transitional probabilities could be explicitly reported above chance level. Our prior results favor the hypothesis that SL is a stimulus specific modular system tuned to work within but not between sensory modalities.

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### **93. Neural networks engaged in infants when exogenous prosodic cues enhance rule learning**

A. Martinez-Alvarez J. Gervain, E. Koulaguina, F. Pons & R. de Diego-Balaguer  
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A core ability in language acquisition involves learning of non-adjacent rules, commonly found in syntax and morphology (e.g. is walking, unbelievable). Such rules are first learned at 15 months of age (Gomez & Maye, 2005; Santelmann & Jusczyk, 1998) but observations from natural languages suggest that, when salient cues are present in speech, earlier learning can be detected. To test this hypothesis, we presented 9-10-month-old infants with AXC-type structure sequences, where the A and C syllables predict one another with certainty (e.g., "pedibu", "pegabu") or a random control structure without such dependency (e.g., "dibupe", "bugape"). We increased the pitch of the first and third syllables in both conditions, thus highlighting the elements over which a rule could be extracted. Infants' brain activity produced a larger activation (oxyHb) measured with functional near-infrared spectroscopy (fNIRS) in temporal and frontal areas, more prominent over right-lateralized regions. Another group tested behaviorally showed significant learning also at this early age. In contrast, without pitch cues, two additional groups showed no sign of discrimination behaviorally or in neural responses. The present results suggest that pitch cues, orienting infants' attention exogenously, might highlight dependencies that cannot otherwise be learned yet at a given age.

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**Thursday, 5<sup>th</sup> July 2018**

## **POSTER SESSION 3**

**10:30 - 11:30, Psychology Hall**

### **1. Received cradling bias during the first year of life: A retrospective study on typical and atypical development**

G. Malatesta<sup>1</sup>, D. Marzoli<sup>1</sup>, F. Apicella<sup>2</sup>, C. Abiuso<sup>2</sup>, F. Muratori<sup>2</sup>, G. S. Forrester<sup>3</sup>, G. Vallortigara<sup>4</sup>, M. L. Scattoni<sup>5</sup>, & L. Tommasi<sup>1</sup>

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The majority of human females hold their infants to the left of their body. This asymmetrical cradling behavior seems to be related not only to the mother but also to the infant's brain lateralization and socio-emotional competencies. Research highlighted links between

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cradling lateralization and autism, characterized by impairment in socio-communicative relationships and an early hypo-lateralization of brain functions. We provided a contribution to the bulk of retrospective investigations looking for early behavioral markers, hypothesizing that an atypical developmental trajectory in maternal cradling might be one of the possible signs of an interference in mother-infant socio-emotional communication, and thus of potential neurodevelopmental dysfunctions such as ASD. We examined photos depicting mother-child cradling interactions by consulting family albums of 27 children later diagnosed with autism and 63 typical children. Results show different patterns of maternal cradling during the second half of the first year of life, possibly reflecting the overstimulating interaction in which mothers try to engage infants in response to their lack of responsiveness and social initiative.

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### **2. Rehabilitation of walking in brain injured patients: a clinical and fMRI study**

K. Sacco & the Imaging and Plasticity Research Group  
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The aim of the work is to verify the efficacy of a motor and cognitive training for the rehabilitation of walking and evaluate the cerebral modifications that this training induces in the patients. The training uses a robotic orthosis, developed in collaboration with the Department of Mechanical and Aerospace Engineering at the Polytechnic of Turin, Italy. It has been tested on patients coming from the Neuro-rehabilitation Unit at Fossano Hospital, and the Puzzle Rehabilitation Center in Turin. The sample consisted of 12 vascular patients (5 female, 7 male) with lower limb hemiparesis (6 with right hemisphere lesions; 6 with left hemisphere lesions) and at least 12 months from the lesion event able to stand and with unstable gait. The Berg Balance Scale has been used, being a measure for assessing balance and stability of walking in elderly patients. We also used the Tinetti Balance and Gait scale, which measures movements, postural changes and walking aspects related to a safe and efficient execution of the activities of daily living. On both scales, the group of patients show an absence of changes between T0 (baseline) and T1 (before treatment), confirming the stability of their conditions. On the contrary, a statistically significant improvement emerged between T1 (pre-training) and T2 (post-training) showing that our training positively affected their balance. Indeed, the efficacy of the training is mostly related to balance and stability of gait, as these

parameters are those improving in every single patient. These results suggest that the combined robotic and cognitive training using P.I.G.R.O. can be considered as a promising rehabilitation program for patients with brain lesions, who need the cognitive aspects to be involved in their motor rehabilitation. Brain activations have also been explored: fMRI data are being processed.

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### **3. Retrieval-Induced Forgetting in the Feigning Amnesia Paradigm**

I. Mangiulli<sup>1</sup>, K. Van Oorsouw<sup>2</sup>, A. Curci<sup>1</sup>, & M. Jelic<sup>2</sup>  
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The memory-undermining effect of feigning amnesia for a crime has been pointed out as a consequence of retrieval-induced forgetting (RIF). While retrieving their own version of the crime, simulators might inhibit crucial details of the event, leading to forgetting of crime-related information on the final recall test. Here, we aim to determine whether RIF underlies the feigning amnesia effect. After watching a mock crime, participants had to feign amnesia or confess to that event. Some feigners were given retrieval practice instructions. Immediately and after one day, all of them (N = 120) had to genuinely recall the mock offence. The RIF effect was found for simulators in the retrieval-practice group compared to simulators control at both immediately and after one day memory recall tests,  $F(1,78) = 12.51$ ,  $p = .001$ ,  $\eta^2 = .14$ , and  $F(1,78) = 11.56$ ,  $p = .001$ ,  $\eta^2 = .13$ , respectively. The study suggests that RIF plays a part in the memory-undermining effect of feigning amnesia for a crime.

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### **4. Revisiting the frontal negativity as an electrophysiological index of interpersonal guilt**

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The present study aimed to replicate and extend a previous study in which interpersonal guilt was related to a frontal negativity. Participants were asked to perform a dot-estimation task with their partners, while event-related potential and skin conductance resistance were recorded. While the correct/failure responses were pre-programmed, the paired participants were induced to believe that they would earn money as a function of their performance: a given amount of cash would be

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obtained only when both responded correctly; otherwise, both of them would lose a given amount of money. The feeling of guilt in Self-Wrong condition (SW) was significantly higher than in Both-Wrong and Partner-Wrong conditions. Between 350-450 ms after the onset of feedback presentation, a large negativity was observed in the frontal regions in the guilt condition (SW), reduced or not observed in the other conditions. We conducted a LORETA analysis of the frontal negativity and found medial prefrontal cortex as the neural origin of the guilt-related frontal negativity. Participants were measured in different personality and empathy scales, finding that the empathy dimensions "emotional understanding" and "empathic stress" significantly correlated with the amplitude of the guilt-related frontal negativity. No skin conductance resistance relations were found. Interpersonal guilt seems to involve medial frontal brain areas, evoking a frontal negativity ERP waveform, and related to specific cognitive and affective empathy traits.

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### **5. Semantic neighborhood density effects on memory for single words**

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This study explored the effects of semantic richness, defined as semantic neighbourhood density (SND), in memory for words. SND is a measure of how word representations are organized and connected to each other in semantic space, and it represents the average proximity of meaning-related words to a target word in semantic memory (Buchanan et al., 2001). High SND words have on average more near than distant semantic neighbours, while low SND have more distant than near neighbours. Participants studied single words that were either high or low in SND. After a filler task, they completed a yes/no recognition memory task to test their explicit memory, or a lexical decision task to test their implicit memory for the studied words. We found that high SND words were more accurately recognized than low SND words in the explicit task. In addition, high SND words provided a greater priming advantage than low SND words in the implicit task. These findings reveal that SND is a word feature that influences memory; specifically, high SND facilitates memory for single words.

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### **6. Sex differences in Emotion Regulation: Peripheral physiology and Affective ratings**

N. Fuentes-Sánchez<sup>1</sup>, I. Jaén<sup>1</sup>, M. Escrig<sup>1</sup>, B. Carrión<sup>2</sup>, & M.C. Pastor<sup>1</sup>

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Despite the prevalence of disorders involving emotion dysregulation seems to be superior for women, literature is nearly silent to sex differences, particularly when using peripheral correlates of emotion regulation. This study aimed to investigate sex differences in cognitive reappraisal in a classical emotion regulation task. Each trial began with a "cue" (2s) indicating the strategy (Look, Increase, Decrease) to follow during unpleasant or neutral picture presentation (8s). Acoustic probes were delivered either at 4s or 7s after picture onset to prompt defensive startle reflex. After picture offset, affective ratings were collected using SAM (1-9 scale). Results showed a similar pattern of startle reflex modulation and electrodermal reactivity for men and women, with significant blink potentiation and enhanced electrodermal changes when they had to increase their emotions compared to looking at pictures. Regarding affective evaluations, participants increased or decreased both valence and arousal ratings according to task instructions. Our findings suggest divergences between subjective and psychophysiological correlates of emotion regulation, besides difficulties to decrease negative emotions, independently of sex. Further clinical implications are discussed.

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### **7. Short and long-term near brain transfer effects after working memory training in healthy subjects**

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There are very few studies that investigate the cerebral changes that occur after training in non-trained tasks. Here, we tested the hypothesis that near transfer effects can be better indexed from decreased activation in target brain areas, especially if both tasks shared them. fMRI was used in a sample of 52 healthy subjects to investigate the cerebral near transfer effects from a working memory training task (n-back) to another non-trained working memory task (Paced Auditory Serial Addition Test; PASAT) immediately, after 4 days of training and 5 weeks after finishing the training. Behavioral near transfer effects were not obtained. But, a decreased activation was found in the bilateral

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dorsolateral prefrontal cortex (BA 9/46) in trained participants after training, which remained stable five weeks later. This decrement correlated positively with the improvement in the PASAT performance. Consistently with our hypothesis, these changes in the anterior prefrontal cortex largely overlapped with areas involved in the performance of the n-back task. Our conclusion was that working memory training may cause better neural efficiency that persist over time.

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### **8. The effects of chess training on academic skills and attention: A meta-analysis**

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Does chess training improve some aspect of cognition and academic skills in school children? To answer this question, we conducted a meta-analysis with the 17 original studies published from 1997 to 2016 that fulfilled the inclusion criteria. We analyzed them using the Comprehensive Meta-Analysis program. The results showed a global effect size of 0.38 (CI=[0.27,0.49]). The results showed that chess training has positive effects on attention and mathematics. These findings have educational implications as they suggest that including chess in formal education could lead to improved academic achievement. However, the benefits of learning to play chess do not transfer to all cognitive processes and academic subjects, notably to memory or general intelligence. Importantly, the results of the present meta-analysis will make it possible to compare these benefits with those of other non-chess interventions such as music or video-game training.

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### **9. The emergence of visual awareness at the most basic stimulus levels**

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In the present study, we used a novel masking design with the intention of exploring the temporal emergence (graded vs. dichotomic) of visual awareness at the lower end of the stimulus processing spectrum. Participants had to detect a clear square form in Study 1 (stimulus energy level) or detect and discriminate two different

clear luminance shapes in Study 2 (stimulus feature levels), both of which were masked with different stimulus onset asynchronies (SOAs). Immediately after, participants informed about their subjective awareness of the target on a 4-point scale. In line with our predictions, intermediate ratings increased with increasing SOAs, the highest number of intermediate scores being reported at intermediate SOAs. We conducted logistic regression analyses which consistently showed that awareness ratings were highly significant in describing the probabilities of a correct answer across SOA and task conditions. Moreover, we calculated optimal values for the logistic regression's odds ratio and compared them to the observed values. Overall, our results support a gradual emergence of awareness at the low end (energy and feature levels) of stimulus spectrum.

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### **10. The influence of age on the rubber hand illusion**

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The Rubber Hand Illusion is a perceptual illusion whereby a model hand is embodied during tactile stimulation. Using this paradigm, the aim of the present study is to investigate the onset time of the illusion in relation to subjects age, rarely investigated in past research. To this aim, we used two sensors, made using two Arduino Nano. These sensors were used respectively on the real hand and on the rubber hand instead of the classic brushes, in order to obtain an objective feedback regarding the duration and quantity of the performed touches. In particular, the experimenter pressed a button situated on the sensor placed on the subjects' real hand in order to record the exact moment in which they verbally indicated the time point at which they started to perceive the illusion. The subjects involved in the experiment were divided into different age ranges that include young, adult and elderly subjects. The results show that older individuals experienced later (or sometimes they did not experience at all) the perceptual illusion than younger subjects.

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### **11. The influence of vicarious interracial relations on cognitive control in Italian undergraduate students**

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This study examined the influence of vicarious interracial interactions on cognitive control functioning of Italian white undergraduate students. Sixty students performed the Stroop task watching a video showing an interracial interaction. For half of the participants the video showed a white student being excluded by two black students (exclusion condition), while for the other half the video showed a white student that was accepted in a dyad of two black students (inclusion condition). Prior to viewing the video, participants' racial attitudes regarding Whites and Blacks were measured by means of the Implicit Association Test (IAT) and of structured questionnaires. Cognitive control functioning was measured by assessing Stroop interference and trial-by-trial conflict adaptations. Results showed that, despite the overall low levels of implicit and explicit racial prejudice, trial-by-trial conflict adaptations differed between the two groups, with the group in the exclusion condition showing less efficient adaptations to conflict. This result is consistent with a resource model of executive control and with the results of recent studies showing that interracial interactions, especially negative ones, deplete executive control.

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### **12. The Italian Version of Anger Rumination Scale: Factorial structure and convergent validity**

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The aim of this study was to validate the Italian version of the Anger Rumination Scale (ARS; Sukhodolsky, Golub, & Cromwell, 2000), an instrument investigating the individual's tendency to think and ruminate about anger situations. ARS consists of 19 items divided into four subscales (Angry Afterthoughts; Thoughts of Revenge; Angry Memories; Understanding of Causes). For our purposes, it was translated into Italian, back-translated into English, and administered to 265 undergraduate students ( $M=20,51$  years;  $SD=3,18$ ). Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were run to evaluate the factorial structure of the scale. The analyses confirm the four-factor structure and a good convergent validity with Ruminative Response Scale (RRS), Positive and Negative Affect Schedule-Trait and State (PANAS-T and S), and State Trait Anger Expression Inventory

(STAXI). Overall, the Italian version of the ARS appears to satisfy the validation criteria, by showing characteristics of reliability and validity similar to the original version of the scale. Therefore the study supports the use of the Italian translation of the scale and the validity of its psychometric properties .

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### **13. The more expensive, the better: The economic value of a bogus medical treatment modulates causal judgments**

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Previous studies have shown that the cost of actions associated to a non-effective treatment has an impact on causal judgments, even in a passive, vicarious task. However, in those studies the cost of the potential cause was operationalized through side-effects, which could have had some implications when evaluating the effectiveness of the medication. In the present study we tested whether the economic value of a non-effective medication has an impact on causal judgments. Sixty participants took part in a standard causal learning experiment. They were asked to observe a number of fictitious patients affected by a disease which might be cured by a fictitious medication. Participants were randomly assigned to two different groups; one of them observed an expensive medicine, whereas the other group observed a cheaper one. The actual contingency between the drug and the healings was zero. After observing the medical records, participants had to provide their causal judgment. Our results show that the economic value of a bogus medication modulates the causality perceived between the drug and the healing of a disease

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### **14. The role of emotional biases in working memory deficits in individuals with depressive symptomatology**

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Unpleasant stimuli can interfere with non-emotional relevant information when presented as distractors in working memory (WM) maintenance. In this research we studied people with depressive symptomatology (DS) expecting that they show worse performance than healthy participants at the WM task, particularly for negative distraction, because of their cognitive bias. A sample of 28 young adults, was divided in two groups: DS and control group. We used a delayed-recognition WM paradigm, previously used to address the effect of emotional distractors in healthy volunteers, including four experimental conditions: no-distraction, pleasant, neutral and unpleasant distraction. Corrected recognition scores (hits-false alarms) and reaction times were considered as dependant variables. Unpleasant distraction seems to have a detrimental effect on WM both in healthy volunteers and DS. Contrary to our initial hypothesis, DS individuals showed no significant worsening at the WM task. However their performance was slower, according to psychomotor speech deficits also reported in MDD. These results suggest that people with DS, but with no formal diagnosis, might be in an intermediate stage between health and pathology.

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### **15. The role of emotional valence, prosody and affect on spoken word comprehension**

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Emotionally-laden words are processed faster and more accurately than neutral words in the visual modality (e.g., Kousta et al., 2009). Nevertheless, it remains to be explored whether this effect also occurs in the auditory modality. In Experiment 1, we investigated the auditory processing of emotionally-laden words. Furthermore, in Experiment 2 we explored whether prosody (positive, negative or neutral) and affect (as measured by the PANAS questionnaire) modulate spoken word comprehension. Experiment 1 showed that spoken emotionally-laden words are processed faster than neutral words. Experiment 2 indicated that participants responded faster to emotionally-laden words uttered with neutral compared to emotional prosody; also, participants responded faster when there was a match (as compared to a mismatch) between emotional valence and prosody. Finally, we observed a significant correlation between PANAS Positive scores and response times to positive words and positive prosody, with participants who felt happier responding faster to positive words or words produced with a positive

prosody. Taken together, these results suggest that emotional valence, prosody and affect play an important role when processing spoken words.

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### **16. The role of FEF in early orienting of attention toward social stimuli. A TMS-EEG study**

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The role of distinct cortical regions in guiding social orienting needs further investigation. Our aim was to explore the contribution of the frontal eye field (FEF) in early orienting of attention toward stimuli with a social value. We used a TMS-EEG approach during the cueing phase of a modified version of the dot-probe task, comparing competing (face vs. house) and not competing (house vs. house) conditions. Our results reveal increased amplitude of ERP components in the competing condition, showing greater posterior N170 and centro-frontal vertex positive potential (VPP) and an enhanced frontal negative component at 250-270 msec from cue onset. A reduced positivity at 400 ms was shown when face appeared on the left vs. right side of space. TMS pulses over FEF induced similar N170 and VPP amplified components, which in addition correlated with the performance at the behavioural attentional task. Interestingly, the perturbation of FEF induced lateralized effects on N170 dependent on the side of face presentation. These findings support the role of FEF in early face processing and subsequent attentional bias.

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### **17. The survival effect in memory and the passage of time**

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Memory systems are specially oriented to process information that is relevant for survival, and empirical evidence shows better memory for material processed with survival-related goals, a phenomenon known as the survival effect. The extent to which this effect is also observable when the studied material has intrinsic

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survival value was studied in two experiments, using words either related or unrelated to a survival factor such as searching/locating nourishment. In Experiment 1, the items were presented with intentional memory instructions, while in Experiment 2 an incidental encoding task was used. Additionally, and with the aim of studying the forgetting dynamics of the processed material, the retention interval was manipulated in both experiments, with free recall tests that were immediate, or delayed for 30 minutes, 24 hours, or 7 days. The results showed an overall recall advantage for survival-related words, both under intentional and incidental learning conditions. Interestingly, this advantage tended to diminish with the passage of time, suggesting that this survival-related effect is the result of processes that enhance the initial level of acquisition.

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### **18. There's more than meets the fixations and saccades: multivariate analyses of eye movement data**

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The study of eye movements has been of great interest for cognitive researchers for decades, taking gaze analysis to a remarkable level of complexity. However, traditional analyses have focused mainly on fixations and saccades. Here, we take advantage of the powerful multivariate approach to analyze raw data and point to point movement. This approach has recently experienced an explosion in the analysis of neuroimaging data, since it provides information about patterns of data hidden within complex signals. In this poster we present preliminary results from representational similarity analysis and decoding approaches to eye movements, and discuss possible applications for the field of visual attention and scene processing. Feedback and proposals are welcome!

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### **19. Unconscious processing of emotions alters the feeling of neutral objects: Evidence from 3 month-old infants**

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Infants are able to unconsciously process emotions very early in life and appear to be more sensitive to negative than positive emotions. However, whether unconsciously processed emotions can also alter infants' perception of a neutral object is yet to be understood. In this study, for the first time, we assessed whether infants as young as 3 months of age can change their perception of a neutral object, if previously subliminally primed to a positive or negative facial expression (i.e., happy or angry face), as assessed through changes in skin conductance response (SCR).

Our novel research sheds new light on developmental unconscious processes, and suggest that these unconscious processes are a key feature of the developing brain and influence how it learns.

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### **20. Uno strumento per la misurazione della dipendenza da cellulare in età scolare**

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Negli ultimi anni si è riscontrato un incremento dell'uso quotidiano del cellulare anche in bambini in età scolare. L'interferenza di tale strumento nella gestione di emozioni e relazioni di base sta comportando una distorsione delle funzioni sociali e psicologiche (Sapacz, Rockman, Clark, 2016; Gutiérrez, De Fonseca, 2016; Lim, Choi, 2016; Scott, Valley, Brooke, 2016; Seo, Park, 2016). Obiettivo della ricerca è stato quello di costruire un questionario (21 item) atto alla misurazione della dipendenza da cellulare e dell'utilizzo del cellulare come oggetto transizionale nei bambini in età scolare (N=271). Per quanto concerne l'analisi dei dati è stata applicata un'analisi fattoriale componenti principali, rotazione Varimax. Per la selezione dei fattori si è utilizzato Eigenvalue > 1. Dall'analisi fattoriale delle componenti principali è emersa una struttura fattoriale a 4 Fattori: 'Cellulare come contenimento', come 'compagnia', 'oggetto transizionale', come 'contatto'. Inoltre è stata verificata la relazione tra personalità, locus of control e dipendenza da smartphone.

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### **21. Visual argumentation: Informal reasoning and local coherence for believability changes**

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Believability of propositions varies due to reasons working as an argument's syllogistic middle term (MT). This MT makes ostensive proposition's subject-predicate relation. Images can work as MT in image-plus-proposition arguments. We assume that images activate LTM concepts which would be routinely connected with proposition's subject and/or predicate by local-coherence. When a connection is established, the whole argument is reconstructed by inferring minor and major premises, computing thereby proposition's believability. In a two-task experiment we presented participants with this kind of arguments with propositions to be read and believability assessed. Images-Proposition connection leads to reconstruction of minor/major premises with high(H) and/or low (L) believability, thus obtaining HH, HL, LH and LL believability conditions for every proposition. In a second task, explicitly verbal premises were believability assessed. We expected: 1) higher believability ratings and lower reading-times for propositions when presented in HH condition; and 2) correlations between believability of task1's propositions and task2's premises in all conditions where the connection could be established (i.e., all except BB). All expectations were confirmed.

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### **22. Visual letter similarity effects during sentence reading: Evidence from the boundary technique**

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The study of how the cognitive system encodes letter identities from the visual input has typically been overlooked in models of eye movement control in reading. Here we examined how visual letter similarity affects early word processing during reading using Rayner's (1975) boundary change technique. Unlike previous research that manipulated visual similarity in terms of letter shape (e.g., k and d would be considered visually similar), we selected pairs of letters with a high degree of resemblance in visual similarity norms (i-j; u-v). We employed three types of parafoveal previews: (a) an identity preview; (b) a visually similar preview; and (c) a visually dissimilar preview. Results showed shorter viewing times on the target word when the parafoveal preview was visually similar than when it was visually dissimilar. These findings are consistent with the idea that readers can extract some preliminary letter information from word n+1 and that this process is modulated by visual similarity. Future implementations

of models of eye movement control in reading should incorporate a more developed orthographic-lexical module to capture these effects

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### **23. What happens before gender differences in mathematical performance appear? A cross-cultural study in Chile and Spain**

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Several researches and international assessment such as PISA or TIMSS show gender differences in mathematics in favor of male. The present study compares mathematical abilities in children of two Spanish-speaking countries. 327 Spanish and 236 Chilean children of 2nd and 3rd grades were tested. A symbolic and non-symbolic comparison task, and a calculus and mathematical fluency test were administered collectively. We examine the average performance and the number of boys and girls in the high and low percentiles. The only significant gender difference in average performance was found in Chile: in third grade, males performed better in mathematical fluency, but no significant percentile differences were found. However, in Spain, females in second and third grades have a lower representation in the highest percentile (95 pc). Interestingly, in third grade, a marginally significant difference is also seen in the highest percentile of calculation in favor of males. No numerical processing differences are found, meaning that boys stand out by learning or memorizing the most basic operations. Better strategies of arithmetic facts memorization could equalize gender differences.

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### **24. Habituation to members of ethnic in-group and out-group**

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Pictures of members of a different ethnic group than ours (ethnic outgroup) have been reported to habituate slower than pictures of members belonging to the same ethnic group (ingroup). However, previous designs make difficult to disentangle if this is actually related to prejudice toward the outgroup. To explore this issue, we recorded event-related potentials (ERPs) from 71 participants visualizing pictures of faces from their ingroup (Spanish) and from two outgroups (North Europeans and South Americans). Habituation was indexed as an amplitude reduction of the face-sensitive ERP component N170 after 75 repetitions of these faces. We also measured participants' implicit and explicit prejudice through several questionnaires and the Implicit Association Test. We found that a high implicit prejudice toward outgroup correlated with a low habituation to outgroup, compared to ingroup. This results suggest that implicit attitudes can make the difference between feeling relaxed quickly or alerted for a longer time when interacting with people from different ethnic outgroups. Supported by grants PSI2014-54853-P (MINECO) and FPU13/06512 (MECD).

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### **25. Sensitivity to punishment modulates functional connectivity between amygdala and precuneus**

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The reinforcement sensitivity theory proposes that fear and anxiety are modulated by a personality trait called sensitivity to punishment (SP). Previous neuroimaging studies support this hypothesis by showing that individual differences in volume and activity of fear and anxiety related regions are associated with SP. In this study, we aim to investigate individual differences in the functional connectivity of brain regions related with fear and anxiety and its relation with SP. Eighty-eight participants performed a resting-state fMRI session and completed the SP scale of the sensitivity to punishment and sensitivity to reward questionnaire. Following the revised literature we selected amygdala and hippocampus as the regions of interest. Then, whole-brain seed based functional connectivity analyses were performed in these regions and the association between functional connectivity and SP scores was investigated. We showed a positive correlation between SP scores and the functional connectivity of amygdala with precuneus, a brain region associated with self-consciousness and introspection ( $p < 0.05$  FWE corrected). This result

agrees with the prone to worry and rumination showed in individuals with high SP trait.

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### **26. Category learning and differential feedback**

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Memory studies with both normal and pathological populations, have shown that the Differential Outcomes Procedure (DOP) is a useful tool to improve performance in both memory and learning tasks. The DOP usually speeds up acquisition and betters final task execution. Studies to date have mainly focused on either declarative or working memory. Here we extend the effects of the DOP to procedural memory. Taken the information-integration theory as the contextual framework, the participants performed a perceptual categorization task in which they had to learn in a procedural way if a Gabor stimulus belonged either to category A or category B. Participants were randomly assigned into two groups: one group received the reinforcers differentially (DOP) whereas the other group received the reinforcers non differentially (NOP) in a random way. Participants of the DOP group showed better procedural learning in the categorization task than participants of the NOP. These results make an important contribution concerning the effects of the DOP in procedural learning as well as to the factors that influence both perceptual categorization and procedural memory.

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### **27. Electrophysiological correlates of anticipatory processes over the course of sentence processing**

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From prediction-based models of language processing, incoming contextual information and prior knowledge are interactively combined to guide the pre-activation of the most probable continuations to the unfolding linguistic information. The present study explored electrophysiological correlates of anticipatory processing during sentence comprehension. We recorded the EEG activity of participants ( $n=21$ ) while they read 8-word contexts of varying semantic constraint (high, low or none) with a systematic delay

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(1000 ms) between the penultimate and the final word. Data analyses reveal differences as a function of semantic constraint, with increasingly more negative amplitudes for high than low constraint. The effect of constraint is maximal at left frontocentral sites and towards the end of the sentence (from the fifth word onwards). We also replicate (as in a previous study in the auditory modality) an earlier onset of the N400 congruency effect for highly compared low predictable words. Altogether, we discuss that slow cortical potentials might be useful as multimodal indexes of the pre-activation of semantic features, which converges with the notion of anticipatory processing during language comprehension.

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### **28. Sistema de integración de potenciales relacionados a eventos con seguimiento ocular en comprensión de lectura**

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Los Potenciales Relacionados a Eventos (PREs) han brindado evidencias sobre estudios con tareas de comprensión de lectura, pero no han profundizado en estudios de la terminología del texto presentada en un estímulo visual. En este trabajo, presentamos el desarrollo de un sistema que integra PREs y Fijaciones Oculares (FOs), conformado por: 1) adquisición simultánea de datos por medio del electroencefalógrafo, el seguidor ocular, y la presentación de estímulos en Presentation; 2) procesamiento de datos utilizando herramientas de Matlab®. El sistema identifica las FOs, su duración y los PREs relacionados con cada una de ellas, permitiendo un análisis single-trial. Se realizó un piloto en 10 estudiantes universitarios, con una interfaz gráfica desarrollada que muestra las FOs relacionadas con latencias y amplitudes en todos los canales del electroencefalograma. El sistema también genera un reporte asociando la información de cada FOs con el estímulo presentado. Los resultados del piloto evidenciaron el proceso cognitivo y las áreas corticales donde se generó las FOs de los términos presentados en la tarea de comprensión.

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### **29. Take a look at the instructions! The wording of the problem can influence the relationship between**

### **spatial and verbal working memory capacity and insight problem solving**

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The relationship between Working Memory Capacity (WMC) and accuracy in Insight Problem (IP) is currently the focus of an interesting debate. In two studies we analyzed the impact of both spatial WMC (sWMC) and verbal WMC (vWMC), for the first time as two independent variables and not as a composite variable, in problems involving both capabilities. Moreover, we examined the text of the problems and we identified some critical elements of the instructions. In Experiment 1, participants solved the matchstick arithmetic problems with the original instructions and completed two complex span tasks (verbal and spatial). The results showed that vWMC and sWMC had an opposite effect on accuracy in IP solving (high vWMC hindered insight and high sWMC improved the performance). In Experiment 2, participants solved the matchstick problems with "neutral" instructions. The results showed that both sWMC and vWMC do not affect anymore the solution of IP. These evidences demonstrate that the form of problem presentation influences the relationship between WMC and accuracy in IP

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### **30. Lexico-syntactic interactions in reading temporally ambiguous relative clauses (RC) in the second (L2) and in the first (L1) language: Evidence from eye-movements**

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Although there is extensive research showing the influence of the L1 over the L2 at lexical and syntactic levels of processing, the extent to which the L2 also affects performance in the L1 is scarce. In this work we aimed to analyze whether the cognate-status of the complex-noun-phrase (CNP) that preceded the RC and that was forced to disambiguate either to the first- or the second-host of the CNP (e.g., "Britney recognized the guard of the prisoner who had been honoured for his braveness" vs. "Britney recognized the guard of the prisoner who had been sentenced to death penalty"), affected the reading performance of native-speakers of Portuguese learning English as L2 with different levels

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of proficiency when reading the same sentences either in their L2 (Experiment 1) or in their L1 (Experiment 2). Results showed not only that L1 affected L2 reading performance, but, importantly, that L2 knowledge also affected L1 reading performance. This suggests a bilingual reading system that seems to work in a highly dynamic and interactive way regardless the language in use.

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### **31. Exploring the relationship between impulsivity toward food-reward and bariatric surgery in severe obese individuals**

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In severe obese individuals a tendency to prefer immediate but smaller reward instead attending to receive a greater one delayed in time was frequently observed. This effect seems to be greater when decision involves food-related rewards. Laparoscopic sleeve gastrectomy (LSG) is a bariatric surgical procedure consisting in the reduction of the volume of the stomach, which is able to limit food consumption and to produce changes in hormones that regulate hunger and appetite. Beyond physiological changes induced by LSG, improvement in cognitive functions after surgery has been recently showed. The present study aims to evaluate if LSG modulates inter-temporal decision-making toward food and non-food rewards. Twenty-four severe obese were studied with three inter-temporal tasks with different types of reward (i.e. Euro, discount vouchers, and food), one-month pre-LSG and one-year post-LSG, after significant weight loss. Obese individuals are more impulsive toward immediate rewards compared to normal-weight individuals. Interestingly, impulsivity toward food-related reward seems to partially improve post-LSG, especially in those individuals that show lower fasting glycaemia levels, suggesting that gastrointestinal hormones may affect inter-temporal decision-making

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### **32. Conceptual combination in adjective-noun pairs**

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Conceptual combination is a fundamental cognitive process that produces complex concepts by accessing and merging basic concepts. Previous research has found that individuals respond faster to adjective-noun combinations (A-Ns) that are subjectively related (e.g., clean hospital vs dirty hospital) on various tasks. The purpose of the present study was to investigate how varying the semantic properties of A-Ns using objective measures would influence combinatorial processing on different tasks. The stimuli comprised 50 concrete and 50 abstract nouns, each paired with a semantically close, distant, or unrelated adjective. Participants were randomly assigned to complete a meaningfulness decision task, a lexical decision task (LDT) using pronounceable nonwords, or an LDT using non-pronounceable nonwords. All tasks revealed a concreteness effect, whereas for meaningfulness, the most explicit of tasks, semantic distance affected how concrete, but not abstract, A-Ns were processed with faster response times observed for closer semantic neighbours. These results extend previous findings and suggest that semantic variables and task demands uniquely influence combinatorial processing of A-Ns.

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### **33. Crossmodal correspondence between pitch and spatial elevation: An ERP study**

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We analyzed the electrophysiological correlates of the crossmodal correspondence between pitch and spatial elevation. Event-related potentials (ERPs) were obtained from participants in an audiovisual oddball paradigm. Participants were presented with a visual stimulus (a coloured circle) and a sound (a tone of a certain pitch). In the 'standard' trials, the visual stimulus appeared at the centre of the screen together with a sound. The 'deviant' trials consisted of a visual stimulus that appeared above or below the position of the standard stimulus together with a sound that was either higher or lower in pitch with respect to the standard sound. In this way, the deviant trials could be either crossmodally congruent (e.g., high pitch combined with the circle appearing on the upper spatial position) or incongruent (e.g., high pitch combined with the circle

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appearing on the lower position). Significantly higher amplitudes were observed in the P2 component, but not in the mismatch negativity (MMN), for incongruent than congruent deviants, suggesting that this crossmodal correspondence may be based on non-automatic and relatively late integrative processes

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### **34. Embodied processing of disgust in Mandarin**

#### **words: An ERP Study**

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The present study aims to investigate the theoretical basis and spatiotemporal brain dynamics of emotion processing in Mandarin words. Disgust was chosen as the specific emotion for study as it has a clear neural locus – the insula. Disgust-related words were selected as target stimuli and neutral words were used as control condition. Their lexical and orthographic variables were controlled. Another group of vehicle names were included as fillers. Participants performed a semantic categorization task in which they have to decide whether the presented word refers to a vehicle while their EEG data were recorded. Source localization was conducted to trace the generator of emotion effects. The mean amplitudes of ERP components in several time windows were analyzed in the present study. Three time windows were chosen corresponding to the N170 (160-190ms), EPN (275-305ms) and N400 (350-430ms), analyzed in a posterior regions comprising eight electrodes (PO3, PO5, O1, POz, Oz, PO4, PO6, O2). The eight electrodes covered the left lateral, midline, and right lateral areas of the occipital region. For the more anterior area, two time windows were chosen, P2 (170-200ms) and LPC (450-600ms). Six electrodes covering the frontal-central area (F1, Fz, F2, FC1, FCz, FC2) were selected for P2 analysis and six electrodes in the central area (FC1, FCz, FC2, C1, Cz, C2) were selected for LPC analysis. Paired t-test was used to compare participants' neural responses to the two different experimental conditions in each time window of interest. Source localization was conducted using the standardized low resolution brain electromagnetic tomography (sLORETA) (Pascual-Marqui, 2002). For each participant, sLORETA images corresponding to ERP components with significant differences were defined as the mean current density values for the time windows of interest and were corrected for multiple comparisons. Statistical significant difference was set to  $p = 0.01$ . Disgust-related words elicited larger P2 and LPC amplitudes but

reduced N400 amplitudes compared to neutral words. Stronger activations of the insula and other sensory and emotion-related brain structures, including uncus, superior temporal gyrus, anterior cingulate, cingulate gyrus, posterior cingulate, inferior temporal gyrus and middle temporal gyrus were found for disgust-related words during the P2 time window according to the source estimation. Also stronger activations of precuneus which is responsible for action imagination and preparation were found for disgust-related words during the LPC time window. These results demonstrated the unique brain dynamics of Chinese people during emotion processing in words. The activations of sensory, emotion and action-related brain structures suggested that Chinese people performed a quite specific mental simulation of the emotion when they process disgust-related words, which clearly supports the embodiment theory.

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### **35. Embodied Processing of Sentential Negation in Mandarin: An ERP study**

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The present study aims to investigate whether sentential negation shares neurophysiological mechanisms with action inhibition in Mandarin. An embedded Go/NoGo task was adopted. Participants were asked to read and comprehend both affirmative and negative Mandarin action-related sentences presented character by character and respond to a visual Go/NoGo cue appeared 300 ms after presentation of the action verb. The stimuli were controlled for lexical and orthographic factors. ERP recording was time-locked to the onset of the Go/NoGo cue. Language comprehension was measured offline by a recognition task after presentation of the whole trial. Reaction time of Go trials and error rates of both Go and NoGo trials were analyzed for the Go/NoGo task. Both reaction times and error rates were analyzed for the recognition task. The mean amplitudes of N2 (220-280 ms) and P3 (320-420 ms) components were compared between Go and NoGo, affirmative-Go and negative-Go, as well as affirmative-NoGo and negative-NoGo conditions. Six electrodes (F1, Fz, F2, FC1, FCz, FC2) representing the frontocentral area were selected for analysis. Paired t-test was used to compare participants' behavioral performance and neural responses to different experimental conditions. Further, standardized low resolution electromagnetic tomography (sLORETA) analysis was conducted to

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localize the sources of the current density occurring in the time-range of the N2 component in NoGo condition (Pascual-Marqui, 2002). Statistical significant difference was set to  $p = 0.05$ . The most important finding was the modulatory effect of sentence polarity on NoGo N2 amplitudes, a typical indicator of response inhibition. Specifically, N2 amplitudes were smaller for negative-NoGo than affirmative-NoGo trials. Besides, sLORETA analysis revealed that the main source of Nogo N2 difference was the pre-SMA, a brain region involved in action inhibition. The results strongly suggest that sentential negation shares neurophysiological mechanisms with action inhibition in Mandarin. This study yields the possibility that the proper neural process of negation is embodied in terms of engaging an inhibition of the motor system.

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### **36. The neural bases of the Black-Sheep Effect**

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The Black Sheep Effect (BSE) refers to a group membership evaluation bias accounted by the Subjective Group Dynamics Theory (framed in the Social Identification Approach), where the normative and deviant members of the in-group are judged more extremely when compared to members of the out-group (Marques, Yzerbyt & Leyens, 1988). Although extensively studied in the social psychology field, there is no existing approach to the neural mechanisms underlying the BSE.

The experimental procedure consisted in the presentation of pictures of four targets both representing two within-participants factors: either in-group (same University) or out-group (competing University). Moreover, targets were either normative or deviant regarding their opinions about several relevant social issues. ERPs were extracted considering the presentation of the target's face and opinion, to analyse the N170 and the P300 components, respectively.

Results from twelve participants suggest that the brain correlates of the Black Sheep Effect are consonant with the Subjective Group Dynamics assumptions with extreme peak amplitudes (for both N170 and P300 components) being associated with the processing of the ingroup member, and respective opinion.

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### **37. Shaking the Cocktail Party Problem. Effect of vibro-tactile stimulations in a hearing-in-noise task**

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Multi-speaker environments are frequently characterized by poor localization, identification and intelligibility of relevant sound streams (phenomena often enclosed under the notion of Cocktail Party Problem). Here, we tested in normal-hearing participants (N=17) whether vibro-tactile stimuli delivered to one or more fingertips of the hands, and providing spatial and/or temporal information on the auditory target can mitigate listening in noise. Participants had to report strings of spoken digits embedded in interfering maskers; both stimuli were presented by four loudspeakers. Through vibro-tactile stimulations, different information was provided: information about where (WhereCue) and when (WhenCue) to listen, or both information simultaneously (BothCue). Participants were also tested without additional vibro-tactile stimulation (NoCue). Results indicate that vibro-tactile cues can improve identification of target sounds. Significant differences have been identified between the NoCue condition and the WhereCue and BothCue conditions. However, the lack of efficacy for the WhenCue condition suggests that attention must be paid to the features of the provided stimulation, as there is a labile boundary between a beneficial vibro-tactile stimulation and one which is rather distracting for listeners.

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### **38. Inducing memory consolidation through contextual reactivation**

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Memory consolidation is a dynamic series of processes that lead to a permanent memory trace. Actively retrieving information from memory strongly enhances long-term retention. Besides, there is no doubt that the congruency between the encoding and the retrieval context can improve the amount of retrieved information. In this study, we tested whether covertly reactivating a declarative memory trace using contextual cues may lead to an improvement on the consolidation of that memory. Thirty-three participants encoded a story from the Wechsler Memory Scale III in a musical

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background (Mozart's Concerto No.24 in C minor). Twenty-four hours later, fifteen of them listened to the musical piece alone, while the rest listened to an equivalent time interval of white noise. Forty-eight hours after the encoding, free recall were asked to all participants. Those who were experienced musical-context reactivation significantly recalled more information than those who listened to the white-noise. Our results suggest that using musical context to reactivate a memory trace can improve long-term recall, and establish a link between Context Dependent Memory and the Testing Effect

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### **39. A validation of an ecologically oriented task of executive functions: the virtual kitchen**

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A virtual environment uses artificial stimuli effectively replacing the real ones. Thus, it can be an effective tool for the assessment of executive functions being strongly involved in daily life activities. The aim of this study is to develop a virtual environment and a virtual task which would be able to assess prospective memory, complex planning and action monitoring. Fourteen participants with dysexecutive dysfunctions and twenty matched control participants were asked to interact with a virtual kitchen. Participants were also administered the Behavioural Assessment of the Dysexecutive Syndrome and a brief neuropsychological assessment. Results showed the sensitivity of the virtual kitchen task to detect executive functions deficits. Execution time, type of errors and number of missing actions showed some peculiar difficulties in prospective memory, planning and monitoring behavior. Preliminary evidence from this study suggest that the virtual kitchen task may be an ecologically valid method for executive functions assessment. This task may be especially useful when the assessment needs are related to return to work or at home.

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### **40. Behavior, cognitive processes and mental health of Brazilian university students**

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Because of their entrance into academic life, university students are faced with changes in their lives and behaviors, considering the cognitive processes they

experience and the demands of daily life. The relevance of investigating them is to evaluate, factors and perceptions predisposing and intervening life, at a decisive moment in this set that in development, which will influence society. The objective of the study is to investigate and analyze the behavior of university students, considering the integral vision, the correlates of biophysiological body perception, mental health and general happiness. This is a prospective, descriptive cross-sectional study, funded by CNPq. The contents and results will serve to improve the process. In addition to designing method, to subsidize the decision making of planners and managers in the areas contemplated, to develop strategies to the questions of the own academics. The need for studies that focus on the importance of multiple factors that interfere with behavior, well-being, and mental health, both in the impact on personal life and in the reflections in academic life, arises from the research.

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### **41. Hunger affects proactive inhibition; why never go grocery shopping when you're hungry**

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Food becomes a strong external cue in states of food deprivation. It is also known that hunger is related with compulsory groceries shopping. However, little is known about how hunger affects inhibitory control and inhibitory reaction of the executive function. We used a Go/Nogo (GNG) and Stop Signal task (SST) with food and kitchen accessories as images to assess how proactive and reactive inhibitory processing were affected in fasted state. Participants performed the two tasks twice, in two separated mornings, one day after fasting for the last 10 hours and the other after a usual breakfast taken at home. Level of glucose in blood was measured to verify the fed/fasted state. Our results show a decay of proactive attentional control in fasted state, as indicated by the significant increase of incorrect nogo responses in the GNG task, whereas in the SST reactive inhibition was not affected by hunger. Although the loss of proactive inhibition was seen for all items in the tasks for participants under fasting state, the effect was more marked for food items.

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### **42. From hand to eye: cross modality response on practice effect in the Simon task**

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The Simon effect refers to the observation that responses to a relevant stimulus dimension are faster and more accurate when the stimulus and response spatially correspond than when they do not, even though stimulus position is irrelevant. The Simon effect can be strongly modulated (reduced or even reverse) by prior practice with a spatially incompatible mapping. Several studies aimed at investigate whether such practice effect occurs when different response modalities are employed. However, no one has investigated the influence of manual practice on eye movement responses. To address this issue, we implemented a transfer paradigm in which a manual task with incompatible or compatible mapping (practice) was performed between two ocular Simon tasks (baseline and test). Results showed a strongly reduced ocular Simon effect after both incompatible and compatible practice mapping, demonstrating that the match of response mode between practice and transfer tasks is critical for the practice effect to occur. Evidence for practice effect across response modalities offers important insights into the nature of stimulus-response representations and their modulation.

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### **43. Have you published more than 3000 papers?**

#### **How to become faster to say “yes”**

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It is widely accepted that lying requires a greater cognitive cost as compared to telling the truth (Verschuere & De Houwer, 2011). One of the most accredited explanations relies on the possibility that lying required a two-step process: to inhibit the true response (automatic one) and then to re-program the false one (e.g., Debey et al., 2014). The present study aims to investigate if lying could be speeded by means of a spatial incompatibility task in which participants are required to trained the incompatible response (e.g., pressing the right key when the stimulus appears on the right). Thirty-two participants performed a truth-lie task (baseline) a spatial compatibility task (training; 16 participants trained with a compatibility version and 16 with an incompatibility one) and a truth-lie task (test). Results showed that participants are faster in the second

truth-lie task (test) than in the baseline first one (baseline) due to the general effect of learning. However, the difference between telling the true and lying seems reduced only for the participants that trained with a spatial incompatibility task.

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### **44. Neural basis of risk propensity during hazard evaluation**

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Although risky decision-making is being intensively studied, little is known on the neural basis of risk proneness as personality trait. This research studied the influence of risk-taking propensity on risk evaluation and its neural basis. Participants were selected by the highest and lowest scores in the DOSPERT-scale (percentiles). They performed a risk perception task, while electrical brain activity was recorded. Differences between risk and non-risk prone individuals were tested, and association between estimated activities of brain areas was calculated. As expected, the risk prone individuals showed less risk perception compared to the non-risk prone ones. Different activity patterns were observed in two brain clusters, one embracing parts of the posterior parietal and precuneus, the other located in the ventral prefrontal cortex. The risk prone group displayed greater posterior, but smaller anterior activity than the non-risk prone group. Moreover, posterior parietal activity predicted prefrontal activity better in the non-risk than in the risk prone group. Our results suggest that the connection of these two brain areas can be at the base of risk-evaluation and decision-making.

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### **45. Stronger beta band desynchronization during recognition memory for negative and positive compared to neutral words at short retrieval delays**

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Prior evidence suggests that, recognition memory is enhanced during the retrieval of emotional compared to

neutral words. The beneficial effects of emotions in memory have been described at long and short delays following the initial encoding. However, it is not clear when this benefit disappears with short delays. To answer this question, we examined beta band oscillations, which have been linked to recognition memory. In particular, we manipulated the lag between the presentation of old and new words for neutral and emotional (positive and negative) items at three distances. The lag distance was 4 seconds in the lag 2 condition, and 32 and 64 seconds in the lags 8 and 16 conditions, respectively. An interaction between lag and emotion was found between 386 and 542 ms in the beta band (16-30 Hz), where positive and negative words elicited stronger beta power desynchronization compared to neutral words only for the lag 2 condition. This result suggests that the memory advantage for emotional words fades away after only few seconds, within short delay intervals.

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**46. Response inhibition and binge drinking during adolescence and early adulthood: an fMRI study**

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Response inhibition, defined as the ability to suppress an inadequate response, is considered a key component of executive control. Previous studies have indicated the hazardous effects that binge drinking (BD) during adolescence and youth may have on inhibitory control. However, the potential impact of BD on brain regions involved in response inhibition, such as inferior frontal cortex (IFC), is still not well characterized. This study examines the relationship between BD and brain functioning related to inhibitory control processes.

First-year college students classified as binge drinkers (BDs, n=32) or controls (n=36) completed an alcohol-cue Go/NoGo task during functional magnetic resonance imaging (fMRI). The whole-sample analysis (NoGo > Go) showed common activation in the brain circuitry typically engaged in response inhibition (i.e. precentral gyrus, inferior parietal lobule, inferior frontal cortex and middle frontal gyrus). BDs showed significantly greater activity in the right IFC relative to controls during successful inhibition, despite a lack of performance differences. These results provide new evidence about the anomalies on frontal inhibitory control linked to a risky drinking pattern in young adults.

**47. Have I seen you before? Context reinstatement effect for unfamiliar and familiar faces**

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Generally when the learning environment is restored, memory for items improves, an effect known as context reinstatement effect. According to outshining hypothesis (Smith & Vela, 2001), the memory for target and context influence each other: less familiar is the target, stronger will be the effect of the context. Aim of this study is to understand whether memory for unfamiliar face is facilitated from the visual context and at which point a face becomes familiar. After a first incidental encoding phase in which exposition to faces and variety of context were manipulated, 20 participants had to recognize faces primed by three types of context (congruent, incongruent or new). We expected a facilitation of the congruent context when the face was less familiar. Results suggest a context reinstatement effect but a weak effect for more familiar face in both conditions (exposure and context). These results allow for a better understanding of familiarization for faces.

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**48. Oscillatory activity during attentional processes in paranoid schizophrenia**

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Schizophrenia is a chronic and severe disease characterized by the presence of positive symptoms, or psychotic, negative symptoms and the deterioration of the main cognitive functions. Attention deficits have been considered an important vulnerability marker and suppose a functional alteration for patients. Psychophysiological measures such as ERPs or brain oscillations have been considered as relevant biomarkers related to the cognitive functioning of patients. In this way, it has been shown that ERPs amplitude or frequency noise power have a strong relation with the difficulties in selective attention or attention filtering. An Oddball paradigm with three sounds (standard, target and probe) was used to elicit



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ERP's and to compare the differences in frequency bands between 45 participants suffering from paranoid schizophrenia and 45 healthy subjects. MCCB test (MATRICS Consensus Cognitive Battery) was implemented to measure the cognitive response and PANSS scale to measure the positive and negative symptoms. Data allows to observe possible differences between groups in oscillatory activity related to attentional filtering processes and working memory updating.

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### **49. SUBTLEX-CAT: Sub based word form frequency and contextual diversity for Catalan**

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SUBTLEX-CAT is a lexical frequency database for 455.128 Catalan words obtained from a 278 million words corpus based on subtitles supplied by the public Catalan Television (TV3). As all previous SUBTLEX corpus, ours comprises subtitles from film and TV series. In addition, it also includes other TV shows (news, documentaries, debates, talk shows...) that were not included in most previous SUBTLEX. Word form frequency and contextual diversity measures were computed from the whole corpus and from some sub-corpus which included only a subset of the subtitles meeting certain criteria. In line with other languages, two independent lexical decision experiments revealed that the new frequency measures outperformed the previous available database extracted from written texts (about 6-7% increase in response times' explained variance). Frequency measures computed from the whole corpus were better predictors than any of the sub-corpus. Moreover, the superiority of the whole corpus over the sub-corpus including only films and TV shows indicates that frequency estimates improve as more diverse subtitles are included.

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### **50. Reconsolidation and extinction of predictive judgments in humans**

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Recent research on reconsolidation has been focused on non-invasive techniques to target the reconsolidation of

memories in humans. However, all the studies have been conducted with aversive preparations (fear conditioning). Thus, the main goal of the present experiments was to explore whether acquisition memories can be updated with extinction information provided during the reconsolidation window. In both experiments participants learned a specific relationship between two cues (X and Y) and two outcomes (O1 and O2) in Context A during the first phase. Then, only one of the cues was extinguished in Context B. Half of the participants received a standard extinction procedure, while the other half experienced a reactivation treatment (a brief exposure to extinction, followed by a retention interval and then extinction continued). Testing participants in Context A, produced the renewal of the first-learned information. We failed to find the reconsolidation effect despite the manipulation of the number of trials used in the exposure to extinction (Experiment 1) and to the length of the retention interval (Experiment 2).

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### **51. Processing of traffic sign messages: unimodal vs. bimodal presentation**

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There is some evidence that the acquisition of information from in-vehicle traffic systems can be better with bimodal than with unimodal message presentations (Liu, 2001), and also that drivers prefer an auditory to a visual presentation at least for some in-vehicle messages (Dalton, Agarwal, Fraenkel, Baichoo, & Masry, 2013). We report the results from a driving simulation experiment aimed at testing whether drivers could benefit from a bimodal presentation of the messages displayed on traffic signs posted on the road. Participants were asked to identify the type of message presented on variable message signs (VMS) encountered along the route as soon as possible while maintaining driving performance. In the standard condition, no auditory messages were given. In the bimodal condition, the participant listened to the message just before it was legible. There was also a baseline condition with blank VMS. Accuracy and latency of the responses to the messages, and cognitive load from heart rate measures, were analyzed. Results supported the use of bimodal messages in the particular case of VMS.

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### 52. The Heartbeat-Evoked Brain Potential as a Measure of Interoception in Trained Athletes and Sedentary Young Adults

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How does physical exercise improve cognitive function? Although there is ample evidence that people who exercise regularly perform better in academic activities and laboratory cognitive tasks, the exact mechanistic pathways by which intense physical activity influences brain and cognition remain unclear. We present recent evidence from our lab indicating that, compared to their sedentary counterparts, young adults who train regularly demonstrate significant differences in heartbeat-evoked brain responses both at rest and during a vigilance cognitive task. Employing a data-driven analysis approach using cluster-based non-parametric permutation testing, we uncover a previously unrecognized occipitoparietal area of interest, in addition to the frontocentral region that is commonly reported in heartbeat-evoked potential studies. Our findings provide initial evidence in support of the hypothesis that physical exercise may enhance cognitive function by modulating the cortical processing of internal body signals. In this talk, we discuss our novel findings in relation to previous research on interoception and the brain, and review methodological considerations and available tools to facilitate the analysis and interpretation of heartbeat-evoked potentials in any suitable context.

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### 53. An Analysis of Developmental Trajectories in Preschoolers' Memory and Acceptance of Suggestion

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In this study, we investigated how two socio-cognitive developments - Theory of Mind (ToM) and Suggestionability Level (SL) - in participants of 3 to 6 years influenced their performance in tasks of memory (free recall and recognition) and in the acceptance of suggestive information. We used an analysis of development trajectories (Thomas, Annaz, Ansari, et al., 2009) to analyze to what extent the performance in our study tasks could be explained by the qualitative changes in socio-cognitive developments, instead of

changes exclusively due to the age of individuals. Results showed that ToM did not contribute to the explanation of participants' performance because its predictive value was annulled when age was introduced as a covariate of performance. However, the SL contributed to explain the acceptance of the information that an interviewer had suggested to the preschoolers, since children with a higher LS were more vulnerable to that information suggested, beyond the age of those children.

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### 54. Functional Connectivity Changes in Multiple Sclerosis Patients after a Working Memory Training

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In Multiple Sclerosis (MS) patients, unspecific cognitive training improves cognitive performance and increase functional connectivity (FC). In this study, we sought to investigate the efficacy of a specific working memory (WM) training in relapsing-remitting (RR) MS-patients, examining FC changes during Resting State (RS). 24 RR-MS patients were enrolled in the study. The "trained group" (n=10) underwent an adaptive n-back training (2-back and 3-back task) for 60min x 4days. The "non-trained" (n=14) was a "waiting list" control group. FC was assessed in both groups before (baseline) and after (+7days) completing the training program. fMRI statistical analyses were performed using DPARSFA. Between-group differences as well as correlations between FC and WM performance were assessed. After cognitive training, FC between the right inferior frontal gyrus and right supramarginal gyrus ( $t=-3.42$ , FWE=0.05) was stronger in the "trained group" than in the "non-trained" group. FC changes correlated with a reduction of reaction time during 2-back ( $r=-.598$ , FWE=0.05) and 3-back ( $r=-.611$ , FWE=0.05). This study demonstrates significant FC and WM performance changes as a result of a specific neuropsychological WM training program.

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### 55. Task-Irrelevant Novel Sounds Facilitate Continuous Motor Tracking Performance

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## POSTER SESSIONS

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In discrete tasks where target stimuli are preceded by a task-irrelevant sound, unexpected changes in a train of otherwise repeated sound sequence (novel among standard sounds) consistently lengthen response times to the targets (novelty distraction). Here we report the first study measuring the impact of novel sounds on a continuous motor tracking task and contrast two recent and opposite hypotheses. The global motor inhibition hypothesis argues that novel sounds trigger a temporary but general inhibition of motor activities. In contrast, some have argued that novel sounds facilitate action due to a temporary increase in arousal. The results from our tracking task support the latter and not the former: We observed that tracking performance improved significantly following the onset of novel sounds relative to that of the standard sound. However, when an irrelevant discrete color change was included in the tracking task, the facilitation disappeared. We suggest the presence of discrete stimulus changes in the tracking task modifies the processing of the auditory stimuli, thereby eliciting distraction by novel sounds.

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### **56. Aging and Semantic Interference During Face Naming**

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Aging has traditionally been related to an increasing difficulty during face naming. This impairment has been explained by a phonological transmission deficit or by an inhibitory deficit. This study analyzed the possible role of these two approaches in explaining naming difficulties by means of the semantic blocking paradigm. Thus, face naming latencies in a homogeneous (interfering) or heterogeneous (non-interfering) context were compared with a control condition where objects were named. A group of older adults, (age range 61-79) and young adults, (age range 18-24) participated in this study. Event-related brain potentials and naming latencies were collected. Results showed slower naming times in face naming when compared to object naming, and in the homogenous context compared with the heterogeneous context. In addition, older adults were slower naming faces when

compared to younger adults, while they did not differ when naming objects. Both groups of participants showed a modulation in the ERP waveforms in the time windows between 200-450 ms and 500-600 post-target presentation. These findings were discussed according to current theories of naming difficulties during aging.

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### **57. Occipital Alpha modulates the processing of suppressed visual stimuli during binocular rivalry**

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We addressed the relationship between EEG Alpha oscillations from occipital electrodes and Binocular Rivalry (BR) dynamics. We focused on BR perceptual switch times between a checkerboard and a Gabor grating after visual events, at threshold, were presented to the suppressed percept. Based on prior findings, we hypothesized that switch times after a suppressed visual flash would vary as a function of occipital Alpha power prior to flash presentation. We were also interested in individual variability in BR dynamics as a function of Individual Alpha Frequency (IAF) peak, which has been recently linked to inter-subject variability in other perceptual tasks. In line with the first hypothesis, we found that Alpha power in the fast switch trials was significantly lower than in the slow switch trials. We also found a near-significant correlation between IAF peak and alternation rate: individuals with faster Alpha had faster alternations rates in BR. Our findings highlight the consequences of Alpha neural oscillations for the processing depth of visual stimuli and, highlight the importance of BR alternation rate as a possible biomarker.

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### **58. Smile Connect, an international videoconferences program between generations: Emotional benefits and reduction of negative stereotypes about aging**

N. Carcavilla, J.J. García Meilán, I. Martínez Nicolás, & T.E. Llorente Llorente

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Moving to a nursing home often entails a decline in the emotional well-being and interpersonal relations of the elderly. It thus becomes a risk factor for dependency, comorbidity, cognitive impairment or even dementia. There is a need for specific psychological programs,

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which would prevent elderly from deficits in emotional well-being and, specifically, in their affective state. The aim of this study is to monitor the effectiveness of the intergenerational program Smile Connect in improving emotional well-being of the elderly, as well as its effectiveness in reducing negative stereotypes about aging among youth. A total of 46 Spanish healthy older adults from nursing home were randomly assigned to either the group participating in the Smile Connect program (n=21) or the control group participating in other programs of social relationship (n=25). A total of 48 Italian students of Spanish Foreign Language were randomly assigned to either the experimental group (n=24) or the control group participating in watching videos about Spanish culture (n=24). Smile Connect consists of twelve chat sessions by Skype between target study groups over the course of a month and a half. A pre and post evaluation was made to assess the level of self-esteem and emotional state for the elderly, and the level of stereotypes about aging and emotional state for young people. Elders from experimental group showed significantly improved scores on self-esteem and global state of mind when compared with the control group of elders. Young people from experimental group reduced their negative stereotypes about old age when compared with the control group of youth.

Conclusion. The present study suggests that involvement in the program Smile Connect contributes to the improvement of the emotional well-being of the elderly from nursing homes and to the overcome of negative stereotypes about aging in the young.

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### **59. Speech involution in Alzheimer's disease: A prototype for the Voice Analysis Diagnosis of Alzheimer's Disease (VAD-AD)**

J.J. Garcia Meilán, J. Carro, F. Martínez-Sánchez, & O. Ivanova

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Background. Speech variations enable us to map the performance of cognitive processes of syntactic, semantic, phonological and articulatory planning and execution. Speaking is one of the first functions to be affected by neurodegenerative complaints such as Alzheimers disease (AD), which makes the voice a highly promising biomarker for detecting the illness before the first preclinical symptoms appear. Objective. This paper has sought to develop and validate a technological prototype that adopts an automated approach to speech analysis among older people.

Methods. It uses a mathematical algorithm based on certain discriminatory variables to estimate the probability of developing AD. Results and Conclusion. This device may be used at a preclinical stage by non-expert health professionals to determine the likelihood of the onset of AD.

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### **60. Perceiving the height and side of penalty kicks from the perspective of the goalkeeper**

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Penalty kick performance as a paradigmatic case of perceptual anticipation has been subject of extensive research. To defend a penalty, goalkeepers need to decide where to move before the opponent kicks the ball. It is well established that the biomechanics of the penalty taker can be predictive of the lateral direction of the kick (left or right), however, it remains unclear which information goalkeepers use to anticipate penalty kick height. Statistical analyses show that the probability of a goalkeeper saving a penalty shot to the upper third of the goal is almost null (Bar-Eli & Azar, 2009). Moreover, goalkeepers are less successful at anticipating the height of a penalty kick than its lateral direction, and specific perceptual training programs have produced no significant improvement on height anticipation performance (Savelsbergh, Williams, Van, & Ward, 2002). Finally, although a few studies showed a weak correlation between the biomechanics of penalty takers and the height of their kick, a possible role for ball flight on goalkeeper performance has not been investigated. We analysed 71 penalty kicks from three penalty takers and tracked the hand positions of the goalkeepers defending these penalties. Correlational analyses between the kinematic variables of the penalty takers and the goalkeepers, as well as with the height of the ball, were also computed. Our results indicate that there is a weak correlation between the kinematics of the penalty taker and ball height. However, we found that the goalkeepers decide where to move the hands in the vertical direction after the opponent kicks the ball, approximately 240ms after diving laterally. These results suggest that while goalkeepers anticipate the lateral direction of a penalty kick before the opponent kicks the ball, they decide where to place their hands vertically afterwards. We propose that goalkeepers use ball flight information to decide where to move their hands in the vertical direction.

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**POSTER SESSION 4**

**17:30 - 19:00, Psychology Hall**

**1. Form and motion perception in Schizophrenia and Bipolar Disorder**

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Former literature demonstrated that Schizophrenia (SZ) and Bipolar Disorder (BD) patients exhibit poor motion perception. However, few studies compared the two types of psychiatric patients considering motion and form perception.

The aim of the present study is to analyze motion and form perception in SZ and BD.

Thirty-two SZ, forty-nine BD and sixty-eight controls participated in the study (mean age = 43 years). Motion Coherence Test (MCT) and Form Coherence Test (FCT) were used to evaluate motion and form perception respectively. In MCT the subject has to recognize the direction of coherent moving luminance dots. In FCT the subject has to recognize a shape obtained by luminance aligned static dots. Accuracy in motion and form perception is evaluated for each subject. The MANOVA for repeated measures showed that both SZ and BD were significantly impaired in motion and form perception as compared to controls. No differences were found between SZ and BD. The results are in accordance with previous literature confirming global reduced visual performances in SZ and BD patients.

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**2. Individual differences in mental imagery are predicted by the intrinsic functional architecture of scene-selective regions**

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Mental imagery plays a crucial role in several cognitive processes, including navigation. It has been found that cortical regions encoding navigational-relevant information are also active during mental imagery of navigational scenes. However, it remains unknown

whether their activity reflects the individuals' ability to imagine a scene. Here we used resting state functional connectivity based on functional magnetic resonance imaging and self-reported questionnaires assessing the preference in using mental imagery (over linguistic) representations to examine whether the pattern of reciprocal connections between scene-selective and hippocampal regions reflected individual differences in mental imagery. We found that the functional coupling between the left parahippocampal place area and the left retrosplenial cortex significantly predicted the individual cognitive style, i.e., these regions were more connected in people showing a preference in processing visual information about spatial attributes of the scene versus verbal information. This suggests that the spontaneous brain activity in navigationally relevant regions may account for individual differences in using spatial imagery strategies.

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**3. The role of biographical context on facial expression recognition and mimicry**

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Observing emotional facial expressions is often associated with a spontaneous and rapid simulation of the emotion on the reader's face. It has been recently proposed that mimicry is not a simple reflex-like response, but rather a context-specific response influenced by contingent factors regarding the observer's knowledge about the expresser (Seibt et al., 2015). According to this hypothesis, facial mimicry is a supplementary aid that might contribute to facial expressions' understanding when it is not straightforward (e.g. with ambiguous expressions, or when the context does not provide enough information; see Wood et al., 2016 for review). We investigated whether the knowledge of recent past's facts about the expresser influences the observer's performance at a valence rating task, and how it modulates mimicry intensity. Subtle angry and happy facial expressions were presented after congruent, incongruent or neutral stories. Participants rated the faces as happier or angrier after reading emotionally-congruent stories. Preliminary analyses on mimicry suggest that, while mimicry was high in all conditions, it was not modulated by contextual information. Theoretical implications of the results are discussed.

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### **4. Artificial grammar learning can be deeply affected by superficial features: A study with alphabetic and non-alphabetic materials**

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Artificial grammar learning has been extensively used to investigate learners' ability to extract the structural regularities present in the input, similar to those observed in the acquisition of the rule-governed aspects of language. Many studies relied on the same finite-state grammar (e.g., Knowlton & Squire, 1996, K&S), using the very same specific grammatical and nongrammatical strings in training and test phases, although often replacing the letters of the original grammars with shapes or colors to assess learning in special populations as Dyslexic children (Pavlidou & Williams, 2014). Here, we replicated those conditions using letters and colors, and compared the results with those obtained using a simpler finite-state grammar that contained exclusively first-order information. Reliable learning was observed specifically in the letter conditions, and, in the original K&S grammar, it was restricted to the strings containing illegal first-order transitions, as well as to those starting with an illegal element. These results warned against "abstractionist" interpretations of these learning effects, and call attention to the special status of alphabetic material to learning fast about ordered sequences.

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### **5. Accuracy of a multi-sensor wristband during different physical and psychological conditions**

L. Menghini, E. Gianfranchi, N. Cellini, E. Patron, & M. Sarlo

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Wearable technologies are promising tools to collect psychophysiological data in real-world environments, overcoming laboratory external validity when measuring phenomena such as stress and sleep. However, employing new research tools means being aware of the conditions in which their measurement error is acceptable.

Here, we aimed to assess the E4 wristband accuracy in measuring heart rate (HR), electrodermal activity (EDA), skin temperature, and acceleration in different conditions. Specifically, the E4 was compared to FDA-approved sensors through a within-subjects design. Thirty healthy participants were equipped with both systems and underwent the following 3-min activities: rest, paced breathing, standing up, slow movements,

typing, Stroop test, Trier Social Stress test. Agreement was assessed through a range of analysis, including linear mixed models and Bland-Altman plots.

Our results suggest that accuracy is diminished by movement, with loss of HR and EDA signal due to motion artefacts. Skin temperature and acceleration signal was unaffected by any activity. This study suggests that the best accuracy is obtained in resting conditions, although measurement error is still acceptable in stationary tasks (e.g., Stroop test).

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### **6. Tonic and transient oscillatory brain activity during and after acute exercise**

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Despite our increasing understanding of the role of brain oscillations in monitoring our internal and external environments and coordinating optimal neurophysiological and behavioral responses, we know little about how brain oscillatory activity is modulated during and after physical exertion. Here, we report the results of two studies that explore tonic and transient brain oscillations during and following an acute bout of aerobic exercise at two different intensities. We find that high intensity exercise produces a tonic power increase in brain oscillations that is not specific to any concrete surface localization in slow frequencies, while in faster frequencies this effect is located in parieto-occipital sites. Interestingly, exercise-induced modulations disappear immediately after the end of the exercise bout. Transient oscillatory responses to a flanker task do not present significant between/intensity differences. The salient target in an oddball task, however, elicits a significantly lower increase in theta power in the high intensity condition. In addition, high intensity exercise also evokes a lower decrease in alpha and lower beta power in standard trials.

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### **7. The effect of insula stimulation on interoception: a tDCS study**

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Interoception consists in the perception and processing of internal body signals, such as heartbeat. Previous neuroimaging studies (Schulz, 2016) revealed that attention to heartbeat activated bilateral insula and premotor regions.

We aimed to test the role of insula in interoception interfering with its activity by means of transcranial direct current stimulation (tDCS).

Sixteen healthy participants responded to a questionnaire to evaluate interoceptive awareness and performed a heartbeat detection task before and after undergoing tDCS in three separate sessions (stimulation of left insula, right insula, and sham; order was counterbalanced across participants). Accuracy in heartbeat detection was computed recording real and reported heartbeat.

We observed a significant ( $F(2,28)=3.87$ ,  $p=.03$ ) interaction between stimulation condition and time (pre- and post-stimulation) as participants interoception accuracy significantly improved after sham stimulation only.

Our results demonstrated that interfering with the activity of either insular cortex hinders improvement in accuracy with which individuals detect their own internal signals. These findings strongly supported the key role of insula in interoception.

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### **8. Testing new strategies to reduce malnutrition in child and adolescent cancer patients under chemotherapy treatment**

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Chemotherapy treatments often induce flavour disorders (e.g., dysgeusia) and loss of appetite. This study explored the effects of multisensory modifications through meal presentations and gamification during the food intake of child and adolescent cancer patients undergoing chemotherapy. Meal trays with a fast food

appearance, including separately stored ingredients in closed cardboard containers, were presented. This allowed flavour exchange and avoided food rejection caused by the spread of odours. Additionally, different tablecloths including games related to different parts of the World were used to withdraw both the patients' and their parents' attention from the food. The control group was provided with the standard hospital meal. A malnutrition improvement index (MIM) was calculated, subtracting each daily prealbumin level, during hospitalization, from the measure of the following day. Results showed that the mean MIM in the experimental group was significantly higher than in the control group, reflecting an increase of food intake in the experimental group. Altogether, this suggests that certain multisensory variations in meal presentations reduce malnutrition in child and adolescent cancer patients undergoing chemotherapy.

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### **9. The role of incubation in insight problem solving**

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The present study proposes a comparison amongst the main assumptions in the current literature concerning the underlying processes involved in the incubation phase of insight problem solving. According to the hypothesis claimed in this paper, the act of restructuring required in insight problem solving implies an unconscious analytic thought, informed by relevance (Bagassi & Macchi, 2016). According to this approach, analytic thought is involved in the act of grasping the crucial characteristics of the problem's structure at both conscious and unconscious levels. This hypothesis is supported in the present paper by experimental evidence, focusing on what happens during incubation in insight problem solving. Different break lengths (long break vs. short break) were combined with two levels of activity during the break (routinary task of mathematical calculation vs. drawing task). The results showed the greater effectiveness of the "mathematical calculation" incubation task that involves an attentive focus on the task, but given its routine nature, it leaves unconscious resources available for the necessary analytic processing of restructuring. The main theories on the phenomenon of insight in problem solving will be reconsidered and discussed.

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### **10. Changes in brain activity oscillations associated to traineeship in conflict resolution**

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Through our lifespan we often face social conflicts which require to be solved. In occasions a mediator is necessary to teach children how to manage or, in a subtler manner, how to stake out with conflicts. In our group we work in teaching reformulation, a traineeship which consists in a language management technique to reduce the arousal associated to the processing of a conflict. The objective of this study is to explore changes in brain signal after incorporating the reformulation technique into personal skills in young children. To this end we record spontaneous brain activity, by means of EEG, from 10 children (5 boys, all aged between 12-14) before and after receiving 8 sessions of traineeship in reformulation. Additionally, EEG signals were recorded from a control group that did not receive any traineeship. During the recordings, children watched a 54-seconds video of a simulated conflict situation with a peer. We hypothesize changes on the oscillation of the beta frequency band (13-30 Hz) since this band had been associated to social conflicts (Díaz et al., 2016).

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### **11. Does perceptual grouping always benefit visuo-spatial working memory?**

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Visual working memory effectiveness is modulated by Gestalt grouping principles. The present study explores how the presence of grouped elements affects the recognition of non-grouped items in a change detection task. In this task, a valid retro-cue could appear at different delays from 100 ms to 1400 ms with a constant retention interval of 2000 ms until participants response to the probe item. Results showed that the recognition of the non-grouped items was influenced by the presence/absence of grouped items within the same array. This is evidenced by the different efficacy of the retro-cue depending on the latency in which it was presented and the presence of grouped items. These outcomes will discuss in relation to the exogenous attentional capture exerted by perceptual grouping and its influence on the encoding, maintenance and recovery of the non-grouped items in visual working memory.

Keywords: Visual working memory, Gestalt principles, grouping, similarity, retrocue, exogenous attention, endogenous attention, change detection task.

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### **12. How context dependent is the expression of implicit learning?**

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The expression of implicit learning has been characterized as inflexibly tied to the context in which it was acquired. To explore the extent of this claim, we examine whether implicit sequence learning can be transferred when stimulus features or the context display are changed but the sequence of responses is maintained. In the first two experiments participants were exposed to a sequence of four colors whereas in the transfer block the colors patches were replaced by the color names (Experiment 1) or by the numbers 1-2-3-4 (Experiment 2), maintaining the same sequence of responses in both cases. In Experiment 3, participants were trained with a sequence of four symbols (â, -? -Â£-#) placed in the center of the screen and they were transferred to a context in which the symbols location was unpredictable along a vertical axis. Transfer of sequence learning was only observed in Experiment 1, showing that its expression is not tied to the physical characteristics of the stimuli. In contrast, changes that affected the identity of the stimuli or the context display impaired transfer.

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### **13. A behavioral and ERP study of the gender congruency effect in Catalan-Spanish bilinguals**

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The role of grammatical gender in language production in bilinguals has been examined by means of different paradigms and distinct populations. However, the evidence is scarce and less robust in language comprehension. The present study examined whether processing a word in one language is affected by the grammatical gender of its translation in a second language. To this end, a group of Catalan-Spanish bilinguals performed a translation-recognition task while the EEG was registered. Participants were presented with Catalan and Spanish pairs of words and had to decide if they were translation equivalents. Correct translations included Catalan and Spanish words that were gender congruent or gender incongruent. The behavioral results showed that participants were faster and more accurate in the gender congruent condition



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relative to the incongruent condition. The ERP data showed a reduced N400 for the congruent condition. The facilitative effect of gender congruency observed in this study suggests that the bilingual's two gender systems interact, even in highly proficient bilinguals. The gender congruency effect is discussed in terms of current models of bilingual memory.

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### **14. Identification of informative brain regions in fMRI studies employing pattern analysis**

J.E. Arco, P. Díaz, J. Ramírez, & M. Ruz  
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Multi-voxel pattern analysis (MVPA) has been successfully applied to neuroimaging data due to its larger sensitivity compared with univariate traditional techniques. In the neuroscience context, the main aim is to identify the regions that encode information in a certain cognitive process, which usually involves overlapping neurons in the same brain regions. Searchlight analysis is one of the most appealing techniques because it addresses both the localization goal and the coactivation of adjacent voxels in functional Magnetic Resonance Imaging (fMRI) studies. However, the locally multivariate nature of Searchlight can lead to limitations identifying the different informative regions. In this work, we propose an alternative based on Multiple Kernel Learning (MKL). This method relies on a whole-brain analysis from an anatomical/functional parcellation provided by an atlas, so that all brain regions are analysed simultaneously while taking into account the differences between these regions. Our results show a large similarity between Searchlight and MKL, but the second one provides additional information apart from the significance of the voxel itself and a considerably faster computation.

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### **15. Functional connectivity between the ventromedial prefrontal and cingulate cortex is modulated by reward sensitivity in healthy adults: a resting-state fMRI study**

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The behavioral approach system (BAS) corresponds to a neurobehavioral system responsible for detecting and promoting behaviors towards appetitive stimuli. Anatomically, the BAS depends on the frontostriatal dopaminergic system (i. e. the striatum and the medial prefrontal cortex). Furthermore, BAS activity is linked to the personality trait of reward sensitivity, which can be measured with the Sensitivity to Reward (SR) scale from the SPSRQ. Here, we set out to investigate the modulatory effect of reward sensitivity in brain connectivity. For this purpose, we correlated the resting-state functional connectivity (rsFC) between key structures of the brain reward system with the scores on the SR scale. Results revealed a positive correlation between SR scores and the rsFC between the anterior cingulate (ACC) and ventromedial prefrontal cortex (vmPFC). This disruption could lead to deficits in emotional decision-making, as the vmPFC is crucial for emotion regulation and the ACC is responsible for stimuli detection and engaging motivated behaviors. Additionally, these deficits could be related to clinical symptomatology, thus postulating a relationship between personality and psychiatric disorders, as depression or addiction.

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### **16. Causal illusions persist after extended training**

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Several studies have shown that, given certain conditions, people are easily induced to believe that non-contingent events are causally connected. However, most experiments on causal illusions involve a relatively short amount of training with the potential cause and the outcome. We present an experiment in which this standard training is markedly lengthened. As in a typical causal-learning task, participants were asked to investigate the effectiveness of a medicine in producing relief from a disease. They were sequentially presented with 288 fictitious patients suffering from the disease that had or had not taken the medicine and they were informed whether each patient subsequently experienced relief or not. One group of participants evaluated the effectiveness of the medicine after observing 48 patients, whereas the other evaluated its effectiveness after observing all 288 patients. Our results suggest that initially formed causal illusions remain intact after extensive training and have important implications for formal theories of causal learning (e.g.,

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associative error-correction models), which usually anticipate that biases should disappear and eventually vanish as people are exposed to more information.

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### **17. A BCI driven by EEG Alpha power from shifts in covert visuospatial attention**

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Hemispheric lateralization of Alpha neural oscillations (8-14 Hz) correlates with the direction of covert visuospatial attention (CVSA). We harnessed on these modulations as a control signal for brain-computer interface (BCI). Our goal was to build a pipeline to read ongoing EEG activity during a CVSA task, and use a classifier to output a binary control signal in real-time. This classifier uses as input data the inter-hemispheric Alpha power imbalance occurring naturally due to the direction of subjects' attention. First, we acquired a dataset of inter-hemispheric power imbalance in posterior Alpha during a CVSA task (Posner paradigm), to train the classifier offline. In the online stage, participants (N=3) were asked to orient their attention, and the output of the classifier was used to modulate the size of a vertical bar on the screen. Overall, offline and online classification confirmed that it is possible to discern attention shifts to the left and right locations based on modulations of power over the posterior alpha rhythm from single EEG traces. Nonetheless, the performance of the classifier in real-time was lower than expected, and possible improvements are proposed.

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### **18. Cognitive reappraisal & resting heart rate variability (hrv): divergences on eyeblink startle reflex and electrodermal responses**

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Cognitive reappraisal has been associated with affective, cognitive, and social benefits. Moreover, resting HRV is considered a potential biomarker of adaptive emotion regulation but few studies investigated reappraisal using psychophysiological correlates. Our study aimed to explore differences in reappraisal between two groups (high vs. low resting HF-HRV) by measuring startle

reflex and electrodermal responses during unpleasant and neutral pictures (8s), preceded by 2s cues signaling whether participants had to maintain, or up-/down-regulate their negative emotions. Tonic HRV was measured during 5-minutes prior to this task. Results showed a main effect of instructions either in blink magnitude or electrodermal changes. Interestingly, Low HF-HRV group showed enhanced blinks when increasing their feelings during unpleasant stimuli, whereas no differences were found for High HF-HRV group. For electrodermal reactivity, however, no group differences were found. Our findings suggest that low HF-HRV people might increase negative emotions more effortlessly compared to high HF-HRV. These results have clinical implications on the development of disorders involving emotion dysregulation. Future research should evaluate psychological factors that may be involved in non-adaptive up-regulation strategies.

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### **19. Proactive preparation for selective attention and expectation**

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Preparatory states have been studied by means of either selective attention or prediction establishment with both processes rendering similar behavioral results; namely, attended and predicted stimuli are responded to faster and more accurately than unattended or unpredicted ones. In spite of certain similarities, it was not until very recently that researchers have started studying both processes jointly. Interestingly, when these processes have been explored with neuroimaging techniques, different neural signatures have been found for attended and predicted stimuli. Will these differences in processing the target stimulus be present on pre-target preparatory stages? In this pilot study we aim at developing an experimental paradigm that would allow the measurement of differences in attentional and predictive preparatory states while keeping target features constant. We presented our participants with a gender categorization task in which eight different cues anticipated the nature of the target stimulus (i.e., words or faces) and the designated preparatory state (i.e., attentional or predictive). Preliminary results show the expected validity effects and support the

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appropriateness of this paradigm for measuring the desired neural effects.

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### **20. Il fenomeno del Quiet Eye nella disciplina di tiro nella specialità del “Laser Run”**

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Il Quiet Eye (QE) è una “strategia di fissazione oculare” di un oggetto bersaglio (fisso o in movimento), della durata di almeno 100 ms, che precede la fase finale del compito motorio preso in esame.

L’obiettivo è stato quello di analizzare le caratteristiche del fenomeno (QE relativo ed onset) nel Pentathlon Moderno, in due gruppi di atleti (“@lite” vs “novizi”) durante la specialità di tiro con la pistola (“Laser Run”). Attraverso la strumentazione “Eye-Tracker” -SMI, sono state registrate 5 gare di tiro di 18 atleti “@lite” e 18 atleti “novizi”. Al fine di effettuare le analisi statistiche, sono stati selezionati i 25 colpi più accurati (“best”) e i 25 colpi meno accurati (“worst”), per ciascun partecipante.

I risultati delle analisi effettuate hanno mostrato come le caratteristiche considerate dallo studio (QE relativo e onset) sembrano predire una migliore prestazione. Inoltre, l’inizio anticipato della fissazione oculare differenzia significativamente gli atleti con maggiore expertise. Tali risultati sono in linea con la letteratura, che mostra come tali caratteristiche siano indici di prestazioni migliori (Vickers, 2009).

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### **21. Speak your mind and I will make it right: How to improve performance in the “Wason Selection Task”**

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The “Wason selection task” is one of the most studied tasks in cognitive psychology. Yet, the reasons for its difficulty are still a matter of debate. We argue that the low performance originally obtained by Wason (1966) as well as the improvements in performance that have been later registered are caused by the information that

participants were implicitly inferring from the task instruction via pragmatic implicatures. By systematically manipulating the task instructions, explicating the information that participants are usually required to implicitly infer, in accordance with the logical interpretation of the conditional “if...then” we found a substantial improvement in performance. We conclude that, even if we engage in communicative interactions showing highly developed communicative abilities every day, when it comes to being psychology researchers in a lab, we often formulate the task instructions neglecting the conversational rules of communication, and this greatly reduces the possibility for participants to succeed in the task.

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### **22. Hippocampus: reading beyond the reading network**

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Evidence from a growing body of studies links hippocampus to language generally, but it is currently unknown if hippocampus is also involved in reading. Here we explore reading-induced regional hippocampal activation and functional connectivity across three single-word reading and sentence processing studies. Results revealed overall greater left than right hippocampal activation during reading processes, in line with the strong left-lateralization of the reading and language networks. Moreover, tighter left hippocampal connectivity was observed with nodes from the ventral than the dorsal reading route. The latter observation suggests that hippocampal involvement in reading is linked to semantic processes underlying skilled reading. Building on previous work, we speculate that the hippocampus serves as a situation modeler: Independent of the modality of cortical input, it flexibly and incrementally generates a situation model - an integrated representation of current state of affairs. Such situation models drive global comprehension, and may “smoothen” the core reading process itself - which is independent of hippocampus - i.e. predictive processing that anticipates next steps in terms of meaning and context.

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### 23. Toes in pies: Using interlingual homographs to explore the challenges of bilingualism

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The consensus in bilingualism literature is that words from both languages are stored in a single lexicon, and accessed non-selectively 1. Interlingual homographs (IHs; words with identical spelling in two languages but different meanings: e.g., PIE means foot in Spanish) can be used to investigate the extent to which a native language can influence second language processing<sup>2</sup>. The current experiment's novelty is the usage of both identical and similar-IHs (e.g., CARPET-CARPETA, the latter meaning folder in Spanish). English monolinguals and Spanish-English bilinguals completed a written sentence priming and lexical decision task in English. Experimental sentences ended in an IH followed by lexical decision targets either related to the English meaning of the IH, the Spanish meaning or were unrelated. Overall bilinguals responded significantly slower than monolinguals. Compared to unrelated targets, responses to English-related targets were significantly faster for all participants; however, responses to Spanish-related targets were slower for bilinguals only. The degree of IH orthographic overlap did not alter these effects. Findings will be discussed in relation to current models of the bilingual lexicon.

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### 24. Hazard perception among Spanish drivers: a pilot study based on gaze behavior

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The correct identification of hazardous situations while driving is one of the most relevant factors associated with road safety. Here, we studied how traffic hazards

affect driver's visual behavior. Forty Spanish active drivers (mean age  $\pm$  SD = 25  $\pm$  3.55 years, range: 18-36 years; 12 men) examined 140 pictures of real traffic scenarios that represent three different levels of hazard (low, medium, and high) while their eye movements were recorded. Visual saliency was similar across the pictures. We analyzed driver's perceived level of hazard and gaze entropy. We found that driver's perceived level of hazard increased as the level of hazard represented in the picture increased, confirming the correct categorization of the stimuli. At the same time, visual behavior showed an inverse relationship with hazard perception: the drivers gaze entropy decreased as the level of hazard represented in the pictures increased. Overall, our results suggest that gaze entropy is related to hazard perception, and could represent a useful tool to study road safety.

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### 25. An ex post facto study of differences in motor planning and problem solving strategies between expert video gamers and non-gamers

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Research suggests that playing video games positively impacts on cognitive abilities. In this study, we compared motor planning and problem solving strategies between expert video gamers and non-gamers. Fifty-one expert video gamers (39 men, mean age: 22.6  $\pm$  3.4 years, with at least, one year of regular experience) of the multiplayer online battle arena real-time strategy game, League of Legends, and 51 non-gamers (20 men, men age: 22.6  $\pm$  4.7 years) performed an adapted computerized version of the Tower of London (TOL) planning task. The task required participants to solve nine problems of increasing complexity. Expert gamers exhibited significant better TOL performance (faster preplanning time and faster total movement time) for the same total number of moves. Moreover, the interaction of group and task complexity was also significant: expert gamers were especially faster during the more complex problems. Our results seem to support the idea that there is a relationship between playing video games and improvements in cognitive abilities, including successful planning, execution, monitoring, and revision of a series of actions using working memory.

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### 26. Using conditional reading aloud to examine acronym processing

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Acronyms are an idiosyncratic part of language - they often have familiar meanings but they are made up of letter patterns that are unusual or illegal in English, and most acronyms are pronounced in a way that is unlike any other word. This makes them an interesting stimulus set for examining reading processes. In this study we examined how the characteristics of acronyms influence responding in the conditional reading aloud paradigm. Participants were presented with 146 acronyms and 146 non-words. The participants had to read aloud only the acronyms, hence combining a lexical decision with a spoken response. Hierarchical regression analyses indicated that RTs were affected by imageability and familiarity. Of particular interest, though, responses were also influenced by N and by age of acquisition - the direction of the effect was altered by the spelling-to-sound pattern of the acronym (e.g. DVD vs HIV vs NATO). We tentatively suggest that there is a letter naming route that acts alongside the lexical and grapheme-phoneme correspondence routes described in dual route models of reading.

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### 27. First evidence for the role of facial expressions on kinship detection

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Vision represents a crucial channel for perceiving genetic relatedness in humans. Indeed, both vertical (i.e., parent-offspring) and horizontal (i.e., siblings) relatedness can be estimated from the observation of faces. Observers' ratings of relatedness between pairs of faces correlate with independent observers' ratings of similarity between those same pairs of faces, suggesting that similarity acts as a robust predictor of relatedness (and vice versa). Research investigating kinship cues in faces has shown that the eye region is more important than the mouth region, and that the upper half of faces provides even more information than the eyes alone. Another factor fostering kinship recognition might be facial expression, muscle shape and muscle insertions on bones being under genetic control. This hypothesis was tested by asking participants to indicate whether

pairs of photographed faces (shown with neutral or happy expression in two different sessions) depicted siblings or unrelated individuals. Siblings were judged as such more often in the "happy" session, whereas no effect was observed for unrelated individuals. Future studies should address the role of other facial expressions.

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### 28. Egomotion-related visual areas show fMRI responses to active leg movements

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Optic flow provides visual cues for guiding our movement in the environment. Since several visual egomotion-related areas with different functional properties and anatomical position have been described, we hypothesized that some of them may have a motor role in guiding locomotion.

To test this hypothesis in fMRI, we localized six visual egomotion-related areas (V6+, V3A, VIP, CSv, pCi, PIC) by using an optic flow stimulus and then, we tested their response to a motor task implying active leg movements. Among these visually defined areas CSv, pCi and PIC (unlike V6+, V3A and VIP) responded to leg movements. Additionally, functional connectivity analysis showed that CSv, pCi and PIC, differently to V6+, VIP and V3A, are massively connected with the cingulate motor areas, the supplementary motor area (SMA) and the medial portion of the primary somatosensory cortex, which represents the leg and the foot. Taken together present results suggest that these egomotion-related areas are differently involved in visual motion processing, with CSv, pCi and PIC providing a pivotal link between perception and action aimed at locomotion control.

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### 29. Ubiquity of the right bias for others' bodies: no effects of observed and observer's sex

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Ambiguous stimuli representing human bodies performing unimanual actions are perceived more often as right-handed. This bias could be due to a perceptual frequency effect, most social interactions occurring with right-handed individuals, and might reflect a preference to attend the region most likely coincident with others' dominant hand, possibly increasing efficiency in

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monitoring both communicative and aggressive acts. Given that men are involved in aggressive interactions more often than women, we hypothesized that the right-hand bias could be larger when observing male vs female individuals, and that it could be larger in male vs female observers. To test this prediction, we asked female and male participants to indicate the spinning direction of ambiguous human male and female silhouettes. The silhouettes rotated while standing on their legs with one arm extended, and the perceived spinning direction revealed the perceived extended arm. Regardless of participants' and stimulus sex, silhouettes were perceived more often as performing right- rather than left-handed movements. Possible gender differences are not strong enough to modulate the preference to interpret ambiguous human bodies as right-handed.

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### **30. Evidence for a relationship between egocentric navigation ability and episodic memory**

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The hippocampus-entorhinal system supports both navigation and declarative memory. It has been recently proposed that the distinction between the neural mechanisms for egocentric (e.g. path integration) and allocentric (e.g. map-based) navigation in the physical world represent the bases for the evolution of distinct higher-level mechanisms supporting episodic and semantic memory, respectively (Buzsaki & Moser, 2013). Here we tested the hypothesis of a specific relationship between path integration (PI) abilities and episodic memory (EM) in a sample of 30 healthy young volunteers. PI was investigated through the execution of the Triangle Completion Task in an ecological setting while blindfolded, whereas EM was evaluated through a picture recognition paradigm with different levels of difficulty. Semantic memory (SM) was evaluated as a memory control measure. Following the predictions, we found a significant positive correlation ( $p=.013$ ) between EM and PI, whereas SM did not correlate with PI ( $p=.44$ ). This behavioural evidence of a relationship between the two abilities paves the way to the assessment of the causal role of egocentric navigation ability on multiple forms of episodic memory.

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### **31. The inhibitory P3 component is associated to sustained attentional control processes but not with response cancellation**

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Proactive response inhibition is defined as the process by which a conventional response is deliberately withheld and sustained over time. Response inhibition is often examined using the Stop-Signal or the Go/Nogo paradigm. A prevailing limitation of these tasks resides in confounding sustained inhibitory control with the detection of a cue to stop. Here we characterized the N2 and P3 electrophysiological correlates of inhibitory processes linked to an attentional task control. We recorded scalp electroencephalography (EEG) in a Eriksen Flanker task that incorporates switch trials with dynamic tracking procedure, while in separate blocks, participants were either encouraged or forbade to correct switch errors. We identified a modulated frontocentral P3 wave in both correct and error switch responses only in the Correction-forbidden condition, whereas the frontocentral N2 was not modulated either by condition or performance. Our findings reinforce the association of P3 - but not the N2 - with response inhibition processes both in erroneous and successful performances when correction is forbidden. These findings suggest that the inhibitory P3 component is related with proactive rather than reactive inhibition.

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### **32. When falsity is harder to judge: An ERP study of repetition effects on truth judgments**

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Repeated statements are easier to process, and subsequently perceived to be more truthful than new, non-repeated statements. This effect is explained by a tendency to judge truth value on the basis of fluency “the feeling of easiness” when knowledge about the statement is lacking. In the present ERP study, we extend the repetition effect to statements on which participants had demonstrated knowledge “measured by a prior normative study on the same population. So, rather than expecting increments in true judgments for false sentences, we predicted that both ERP (N400 component) and sentence verification latencies would reflect an increased difficulty to judge false statements, which paradoxically would originate in the facilitation of statement processing by repetition. Results confirmed this prediction. Repetitions equaled N400 amplitudes for true and false statements, but increased their differences in verification latency. Thus, repetition facilitated the processing of false statements, as reflected by reductions in N400 amplitudes, and thereby induced an experience of fluency that delayed false judgments.

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### 33. Schizotypy and spatial working memory

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Previous studies have found impaired spatial working memory (SWM) in relatives of individuals with schizophrenia who exhibited schizophrenia spectrum personality disorder symptoms (e.g., Saperstein et al., 2006). This suggests that such a type of memory could be a cognitive endophenotypic marker of genetic liability for schizophrenia. In the present experiment we aim to further explore this issue by investigating whether a SWM performance deficit might also be associated with the presence of schizotypal traits in the general population, as previous research has suggested (e.g., Hazlett et al., 2014). First, participants (undergraduate students from the University of Almería)

were assessed using the Schizotypal Personality Questionnaire (SPQ; Raine, 1991). Later on, they performed a new SWM task involving the rotation of the stimulus to be remembered. Differences in SWM performance are discussed in relation to the participants' SPQ scores.

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### 34. Validation of a set of pictures for measuring subjective emotional reactions to illegal immigration

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We aimed to validate a set of pictures for future research on the emotional impact of illegal immigration. We explored the affective reactions to fifty pictures representing real illegal immigration-related scenarios (fences and walls; dead; rescue; encampments). Students from the University of Granada (N=122, mean age=21.00 years, Melilla and Granada campuses) reported a list of adjectives describing their affective reactions to each picture. Furthermore, using the Self-Assessment Manikin technique, they rated the evoked affective valence, dominance, and arousal. As expected, all pictures evoked adjectives as “sad” (triste), “pity” (pena), or “sorrow” (dolor). Based on the rest of adjectives, we were able to categorize two subsets: pictures (23) that, somehow, also evoked positive affective experiences (happiness, hope, peace) and the rest (27) that only evoked negative affective experiences (despair, fear, anger). Affective valence and dominance were larger for positive pictures, and arousal was larger for negative pictures. The experimental study of the emotional impact of illegal immigration requires validated stimuli, and therefore, our set of pictures would be a valuable tool for understanding this complex phenomenon.

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### 35. Mild cognitive impairment: Complexity and synchronization at sensor and source levels

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Mild Cognitive Impairment (MCI) is a prodromic stage of Alzheimer's disease, with a conversion rate of 10% per year. Although from a behavioral perspective, diagnosis is more or less clear, the dynamical profile underlying such condition is not well known yet. A good characterization of the statistical properties of the signals as recorded by Electroencephalography (EEG) or Magnetoencephalography (MEG) could lead to accurate models able to predict not only the clinical state of the patients, but also the evolution rate of the disease, several years before its onset. In this work we present a deep statistical analysis of the complexity and synchronization of resting-state MEG recordings from 46 patients suffering from MCI and 48 healthy subjects. A common procedure in EEG/MEG analysis is source reconstruction, which estimates the dynamical activity at subcortical areas, departing from cortical-level obtained time series. We carry our study both at the sensor and source levels, in order to identify the differences between both approaches. Our analysis are based on synchronization estimation through Mutual Information, Phase Locking Value, Pearson Correlation and Spectral Coherence for every pair of MEG sensors and regions of interest (ROI) estimations, as well as complexity analysis of time series (sensors/ROIs). We find significant differences: a) between groups in time series' complexity, b) but not in synchronization, for any measure, although c) synchronization is significantly different depending on how data is represented (sensors/ROIs).

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### **36. Induced beta-band oscillations during selective stopping**

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Prior evidence has shown that participants use different strategies to perform stimulus-selective stop signal task, even if they receive similar task instructions. Some subjects discriminate first between ignore and stop cues and only give stop responses when necessary (selective stopping strategy), whereas other participants stop whenever they see a new stimulus (non-selective

stopping strategy). Some recent neuroimaging data suggest the existence of different neural mechanisms linked to each particular strategy, but neural oscillations underlying selective inhibition remains less understood. In the present study we examined this issue while 54 adults performed a stimulus-selective stop signal task. The results of non-parametrical permutation analyses showed reduced high-beta desynchronization only for the selective response stopping strategy in the time range of stop signal reaction time. Beamforming analysis localized these effects in the left pre-SMA. These data provide neural support for behavioural distinct strategies in selective stopping. They also point to a role of beta-band oscillations and left pre-SMA in response inhibition.

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### **37. Gender processing of European Portuguese nominal phrases: Examining an early-determiner selection in a Romance language**

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Studies on gender processing with Germanic/Slavic languages using a Picture-Word Interference Paradigm (PWIP), in which participants are asked to name pictures by producing a Definite Determiner [DD] + a noun while ignoring a superimposed distractor word, found faster responses for pictures gender-congruent with distractors than for incongruent ones (a gender-congruency [GC] effect). Romance languages, however, have systematically failed to find this effect. The difference between the two language groups was explained by the Late Selection Hypothesis (LSH, Miozzo & Caramazza, 1997), according to which DD selection takes more time in Romance than in Germanic/Slavic languages because they have multiple DD per gender. This delay masks the interference observed in Germanic/Slavic languages with gender-incongruent distractors. The best way to prove this hypothesis is analysing a Romance language that behaves as a Germanic/Slavic one. This is the case of European Portuguese (EP), since it only has one DD per gender. The aim of the present research was to test the LSH using a PWIP with 80 EP participants. Results revealed a GC effect, thus confirming the LSH.

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### 38. Developmental differences in first and second language processing: an ERP study

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Text comprehension relies on multiple high-level cognitive processes as it is the ability to revise a previous mistaken inference. When comprehenders encounter information that mismatch a prior interpretation (comprehension monitoring), they also need to solve the interference between the new information and the previous inference (inferential revision) to build an accurate mental representation. Previous evidence in early sequential bilinguals has shown developmental differences at resisting linguistic interference, with 14-16 years-old adolescents performing better than 11-13 years-old children (Kohnert, Bates, & Hernández, 1999). In the present study, twenty-nine primary school children (M age= 11.52) and twenty-six secondary school adolescents (M age= 16.17) early sequential bilinguals were presented with short narratives in L1-Spanish and L2-English. Each text biased an inference (e.g., idea of “fight”) and then demanded the revision of this initial interpretation (e.g., “school theatre group”). Reading times and N400 amplitude suggested developmental and language differences in both comprehension monitoring and inferential revision processes, with less efficient performance in children compared to adolescents, especially when they were required to comprehend in their L2.

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### 39. A study on the spatial representation of time in different cultures and religions

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How does culture influence the spatialization of time? De la Fuente et al. (2014) proposed that temporal spatialization in the front-back axis depends on the

degree of attention paid to the past versus the future (Temporal Focus Hypothesis, TFH): people from cultures with traditionalist values tend to locate the past in front to a greater degree than people with progress-oriented values. In the present study, we investigated the robustness of the TFH by measuring traditionalism, religiosity and religion itself across a set of selected cultures and religions and assessing their ability to predict temporal spatialization. We collected samples from seven cultural groups (Spaniards, Americans, Moroccans, Turks, Bosniaks, Serbs and Croats) which vary widely in their degree of traditionalism and religiosity, and are overall divided in two religions: Christianity and Islam. Our results show religiosity is a better predictor of time spatialization than traditionality: more religious peoples are more likely to place the past in front. Religion itself does not seem to change this pattern.

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### 40. Neurophysiology of the cognitive cycle.

#### Attention and prediction

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Starting from experimental data obtained by our group using the Central Cue Posner’s Paradigm, we have obtained, apart from the already known cost-benefit effect, a series of behavioral sequential effects that demonstrate that the performance in the current trial is a product not only of the validity or invalidity in the current trial, but also of the validity or invalidity of the previous trials, that is to say, of the previous stimular history. The sequential behavioral effects are accompanied by associated neurophysiological changes in components such as Contingent Negative Variation (CNV), P3a and P3b (Arjona & Gomez; 2014). The CNV amplitude increased after valid trials, and the P3 increases in invalidly cued targets and in invalid targets preceded by valid targets (when compared with invalid targets preceded by invalid targets). As a conclusion, any purposive act would present a preparatory, perceptual, action and outcome phases that would represent a basic sketch for cognition, and has been defined as a cognitive cycle. This approach is embedded into the modern predictive coding hypothesis.

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### **41. Age-related redistribution of processing resources influences visual working memory content**

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The present EEG study tested whether numerical similarity between relevant and distracting information can generate distractibility in a visual working-memory (vWM) task, both in young and in older adults. We used a change detection paradigm with relevant and irrelevant salient stimuli presented simultaneously in opposite hemifields and manipulated their numerosity orthogonally. Behavioral results indicated that numerical similarity did not influence distractibility of both groups, although younger adults outperformed older participants. In contrast, an EEG measure of memory retention (CDA) was differentially modulated by the numerical similarity between targets and distracters in older participants. In addition, alpha-band lateralization measures revealed that older adults lacked a selective deployment of attentional resources towards the relevant hemifield, from cue presentation to the retention interval. Considering the different pattern of ERP and oscillatory results observed in the two groups, we propose that age-related spontaneous fluctuations in the spatial deployment of processing resources accidentally produced a redistribution of vWM resources across the two visual fields (encompassing the irrelevant hemifield), which in turn substantially affected task performance of older adults.

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### **42. Cross-modal semantic congruency in spatial orienting**

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Recent studies show that cross-modal semantic relationships can play a role in spatial orienting and visual search. Some authors even suggest that cross-modal semantic congruency automatically attracts attention. That is, a ringtone will immediately summon our attention toward the cellphone on the table. However uncontrolled variations in task-relevance of the cross-modal stimuli (from explicitly needed, to completely irrelevant) and visual perceptual load may account for the mixed results of previous studies. In the present

study, we address orienting toward audio-visual semantic congruent objects, across variations in task relevance and perceptual load. For all the experiments we used images of common objects and their characteristic sounds (e.g., guitar image and chord sound). We found that audio-visual semantic congruency speeded visual search times when the cross-modal objects are task relevant, or when irrelevant but presented under low perceptual load. In these cases, sounds seem to trigger orienting toward the semantically congruent image. Instead, when attention is engaged in another task and perceptual load is high, sounds fail to attract attention towards the congruent visual images.

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### **43. Audiovisual language: can the speakers face dynamics affect semantic speech processing? ERP evidence**

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Face-to-face interactions characterize communication in social contexts. These situations are typically multimodal, requiring the integration of linguistic auditory input with facial information from the speaker. Despite the importance of this context for an ecological study of language, research on audiovisual integration has left aside effects on semantic comprehension. Here we used event-related potentials (ERPs) to investigate the influence of facial dynamic information on semantic processing of connected speech. Participants were presented with either a video or a still picture of the speaker, concomitant to auditory sentences. Along three experiments we manipulated the presence or absence of the speaker's mouth and eyes, and compared the amplitudes of the semantic N400 elicited by unexpected words. Contrary to our predictions, the N400 was not modulated by dynamic facial information. Even though, during the processing of expected words, dynamic faces elicited a long-lasting late posterior positivity compared

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to the static condition. Our data confirm the importance of studying language in more natural contexts to encompass certain processes out of the scope of traditional laboratory experiments.

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### **44. Gestures and words: new perspectives on the relation between abstract language and action**

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Strong embodiment theories claim that action language representation is grounded in the sensorimotor system, which would be crucially to semantic understanding. However, there is a large disagreement in literature about the neural mechanisms involved in abstract (symbolic) language comprehension.

In a behavioural and TMS study, we demonstrated how context variability influenced motor cortex involvement in semantic processing of language related to symbolic gestures. Results showed that a prior presentation of a gestural context facilitated the comprehension of a semantically congruent word, involving the activation of hand motor cortex (M1) in lexical processing; Furthermore, M1 modulation was found as result of an associative-learning training, even in the absence of contextual prime. Interestingly, this effect was specific to gesture-related language.

Data are discussed in the framework of a multimodal representation of abstract concepts, where sensorimotor areas could be activated at different degrees depending on contextual variables and lexical flexibility; following this way, learning mechanism could have a central role in language development and representation, as in the gradual transition from transitive actions to speech.

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### **45. Cognate effect in noise**

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Bilinguals process cognates (translation equivalents sharing meaning and form; e.g., ‘flower’ and ‘flor’ in English and Spanish) faster and more accurately than non-cognates (translation equivalents sharing only meaning; e.g., ‘table’ and ‘mesa’), which is called the ‘cognate facilitation effect’. This effect is explained by a constant language co-activation in the bilingual’s brain: A simultaneous activation of the translation equivalent (in the unattended language) anytime a word

is processed in the target language leads to higher activation levels for cognates because of form similarity. Nevertheless, this constant language co-activation has been questioned recently. Here, we hypothesize that co-activation of the unattended language can be selectively suppressed under adverse conditions (e.g., noisy signal). We developed a 2x2 design (cognates/non-cognates; clear/noise) to test Spanish-English late proficient bilinguals in lexical decision tasks (in the visual and auditory modalities) and to measure the cognate effect in clear and noisy signal. Based on our selective co-activation account, we expect a reduction of the cognate effect in noise due to a reduced co-activation of the unattended language during cognate recognition.

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### **46. Effects of cognitive training with video games on measures of selective attention and working memory in young adults**

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The literature on the effects of video game training are mixed and some methodological concerns have appeared recently. To overcome previous limitations, we conducted a study with young adults (19 to 35 years of age) distributed into an experimental group and an active control group. The experimental group was trained with adaptive video games from Lumosity and the active control group with a simulation-strategy game (Electronic Arts Inc.) the same number of sessions in identical conditions for 3-4 weeks, 30-35 min per day. Transfer effects on selective attention, distraction, alertness, interference and visuo-spatial working memory were assessed using the Crossmodal Oddball Task, the Classical Stroop Color-Word Task and the Corsi Blocks Test. Moreover, placebo effects were controlled measuring motivation, engagement and expectations at several points of the intervention. Results showed improved performance across training sessions. Furthermore, video games cognitive benefits were obtained in visuo-spatial working memory, selective attention and distraction in both groups but no effects were observed in cognitive control and alertness.

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### **47. Moral Judgment in Violent Groups**

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Terrorism has devastating consequences for its victims and governments. In Colombia, terrorism by paramilitary groups had a shocking effect on society in the last few decades. We assessed the moral judgments and social-cognitive profiles of 66 ex-combatants from a paramilitary terrorist group, relative to a control group matched in age, gender, years of education, and verbal and fluid intellectual capacities. We found that moral judgment in terrorists was abnormally guided by outcomes rather than by the integration of intentions and outcomes. Such a pattern was partially related to emotion recognition abilities but independent from other cognitive domains such as fluid intelligence and executive functions. In addition, moral judgment was the measure that best discriminated between groups, even when compared with other cognitive-affective variables in which terrorists exhibited atypical or impaired performance. The unprecedented evidence that we found about the social-cognitive profiles of terrorists from paramilitary groups, suggest that moral judgment is the measure that best distinguished between terrorists and controls.

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### **48. Neural correlates of testing effect**

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There is robust evidence that testing while learning has a powerful effect in future retention. This phenomenon, called the testing effect, has been studied behaviorally but the neural bases related to better behavioral performance during the final test are not well established. In the present study participants were instructed to learn Swahili-English vocabulary word pairs. During the encoding phase they were randomly assigned to "study" group, which only studied the word pairs, or to the "test" group, which had study/test runs. After a week delay, all the participants performed a final cued recall test in the scanner. The "test" group showed greater activation of the left putamen and left supramarginal gyrus than the "study" group for correctly remembered words compared with words that were forgotten. In contrast, activity throughout the medial prefrontal cortex was greater for the "study" group than the "test" group for remembered versus forgotten word-pairs. These results may reflect a unique retrieval related network established by using retrieval practice during training that promotes enhanced memory performance.

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### **49. Efecto de la disonancia musical en la actividad electrodérmica**

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La capacidad de reconocer que los sonidos de una melodía están todos en una misma clave pone de manifiesto que el ser humano dispone de estructuras cerebrales que permiten detectar y reaccionar ante violaciones del tono (Polidpniak, 2016). Por ejemplo, Gorzelanczyk et al. (2017) observaron un incremento de la respuesta electrodérmica ante la presentación de notas de una melodía fuera de clave. Este efecto fue atribuido a la violación de las expectativas de una estructura tonal concreta como habilidad específicamente humana. Sin embargo, detectamos en aquel estudio una falta de control sobre la consciencia del oyente con respecto a estas alteraciones melódicas. Por tanto, replicamos el estudio anterior tratando de determinar si los cambios electrodérmicos asociados a las notas fuera de clave se producen únicamente cuando el sujeto es consciente de esa alteración o siempre que ésta se presenta, independientemente de la consciencia.

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### **50. Especificidad autonómica de la emoción discreta en el contexto de la emoción inducida mediante estímulos musicales**

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El estudio de la especificidad autonómica en la emoción es un tema en auge a la vista de trabajos recientes como McGinley & Friedman (2017), quienes centraron su interés en la variabilidad de la respuesta fisiológica generada como consecuencia del método de inducción de la emoción (v.g., Estímulos imaginados vs. visuales). Nuestro objetivo ha sido evaluar esta especificidad autonómica en estímulos musicales debido por un lado a que estos presentan una gran capacidad para inducir respuestas emocionales, y por otro nos permiten un elevado control del estímulo. Hemos observado

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patrones diferenciados de respuesta autónoma en función de la categoría emocional del estímulo. Estos resultados serán confrontados con los hallazgos de McGinley & Friedman (2017) y otros trabajos en esta área.

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### **51. Assessing non-genetic inheritance of flavour-preference learning in rats**

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In the present study, we attempted to assess whether different learning effects produced by repeated exposure to flavoured solutions may be dependent on non-genetic inheritance. Three groups of male rats differed in the schedule of access to fluids that they received for three daily 90-min experimental sessions over 28 days (for the remaining time on each day the rats had free access to the standard water bottle). On each of these sessions, Group SAC received exposure to a 0.4% (w/v) solution of saccharine, Group MULTI received a different novel flavoured solution (n1, n2,...), and Group CTRL received additional exposure to water. A test was conducted with the offspring of the subjects of these groups when they were 61-63 days old (an age close to young adulthood). It was observed that the F1-SAC group, whose parents were exposed to the saccharine, showed a higher consumption of saccharine than groups F1-MULTI and F1-CTRL, whose parents were exposed to either multiple flavours or water. These results suggest that flavour-preference learning may be subject to non-genetic inheritance.

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### **52. Communicative-pragmatic and cognitive assessment in healthy aging**

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The ability to use language and other expressive means, such as gestures and prosodic cues, allows people to communicate effectively in everyday life. Elderly adults, even when healthy, may exhibit a reduction in the ability to communicate efficiently, due to a generalised cognitive decline that can characterise old age. Aim of this study is to provide preliminary results concerning a wide assessment of communicative-pragmatic ability in 54 healthy aging (N = 18: age range 65-75 years; N = 18: age range 76-86 years) and 18 controls (age range

20-40 years) to investigate a possible decline of such ability. Furthermore, we evaluated the main cognitive functions, e.g. attention, working memory, shifting, inhibition, in order to investigate if and at what extent a decline of such functions may be related to the communicative-pragmatic one (as investigated by the Assessment Battery for Communication, ABaCo, Angelieri et al. 2015, Giunti OS). The results show a generalized communicative-pragmatic decline in both age groups of elderly, with respect to the control group (CG). The analysis of variance (ANOVA) revealed a main effect ( $F(2,49) = 12.45, p < .001$ ) of Group (three level: CG, old adults and senior-old adults) on pragmatic performance at the ABaCo; Bonferroni corrected paired-contrast showed as old adults ( $p < .001$ ) and senior-old adults ( $p < .001$ ) performed worse than CG, while no difference was found between the two groups of elderly ( $p = 1.0$ ). Regression analysis showed the role of Age ( $t = -2.75, p = .008$ ) and Reading Mind in the Eye test ( $t = 2.66, p = .010$ ) as predictors of participants' communicative pragmatic performance.

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### **53. Attention and emotional processing of female body shapes**

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Worries about healthier food, or ethical/environmental issues, or anxieties related to our bodily satisfaction, have promoted an increase in dysfunctional eating patterns. This problem is not limited to diagnosed eating disorders, but it affects many people who, although they do not meet the diagnostic criteria, show a very problematic way to cope with their food intake.

One way to approach this problem is to study the perception we have of food stimuli and of our body. In a series of experimental studies, we examined the attention directed towards different types of food images, and towards images of different body shapes (thinner or fatter).

The results showed that the participants with more symptoms of eating disorders had an attention bias towards high-calorie foods, and that women with higher body dissatisfaction looked more at the thin bodies than at the fatter ones.

In general, these results suggest interesting possibilities of using easy ocular tracking tests in the early detection of eating disorders, and perhaps possibilities of improving clinical and preventive interventions.

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### **54. Activation of frontoparietal attentional networks by gaze cueing task: Brain gender disparities**

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Eye gaze is an important stimulus in everyday life, because can signal the presence of threats outside our current focus of attention. Several studies have demonstrated adaptive characteristics that gaze cues are able to trigger, like automatic shifts of the focus of the viewers' visual attention. However, very few studies have examined the relationship between gaze cueing in emotional faces and gender differences. This study aims to investigate the brain areas involved in the attention reorientation triggered by an emotional gaze cueing task in female and male subjects. Functional imaging data showed that in females incongruent responses activate the dorsal attentional network, anterior cingulate cortex and insula in the right hemisphere. In addition, these results were evident only when gaze cueing is modulated with emotional load. No significant effect was found in the male group. This finding seems to demonstrate that females are more adept in emotional recognition that plays a fundamental role in reorientation of attention. However, in males the reorienting of attention seems to be independent of emotional face processing.

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### **55. Multimodal characterization of ventro-occipito-temporal reading regions**

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The ventral occipito-temporal cortex (vOTC) significantly contributes to recognize different types of visual patterns, including rapidly identifying word-forms. Is this a uniquely identifiable functional region or it is comprised of several differentiated regions? How do these regions connect to other language areas? To answer these questions, we conducted a multimodal (functional, diffusion-weighted and quantitative) MRI study with a sample of 66 young adults aimed at

investigating the functional and structural connectivity patterns of the vOTC reading regions. Analyses were performed at the individual-subject level, and half of the subjects were scanned twice to check for test-retest reliability. Results revealed a functional segregation that goes along the anterior-posterior vOTC, and that was concurrently associated with differences in structural connectivity. Reading behavior was predicted by functional activation in these vOTC regions and by the structural properties of the white matter fiber tracts linking vOTC with other regions within the reading network. We propose a new subdivision of the vOTC reading regions, and a reproducible procedure of interest for researchers working in this area.

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### **56. Verbal mathematical problems, reading comprehension and reasoning in secondary school**

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Resolving verbal mathematical problems is a reasoning task where three relevant cognitive components are involved: depth verbal comprehension of statements, inhibition of superficial responses and operations, and the required mathematical calculation. The performance of these cognitive tasks demands to the subjects the whole activation of their working memory resources, thus as the right use of executive functions implicated. These three basic components that underlying the mathematical problems solving have a main influence on scholar learning and, consequently, on future employment. In this work, we present a study with 267 students of 2nd and 3rd degree of secondary school who resolved 5 verbal mathematical problems: 2 coherent, those where operations matched with the statements of verbal problem; and 3 no-coherent, those where the required operations are inverse to the suggested verbal term. In addition, we obtained measures of reading comprehension (EDICOLE-SE), fluid intelligence (KBIT) and deductive reasoning (DRT). Results show the relationship between reasoning, comprehension and intelligence, as well as their predictive capacity in mathematical problems performance.

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### **57. ¿Cómo entrenar la percepción de peligros desde distintas perspectivas del tráfico?**

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El objetivo de este estudio fue averiguar qué forma de entrenamiento en Percepción de Peligros del tráfico es más eficaz. Se utilizó un nuevo Test de Percepción de Peligros que contemplaba situaciones de peligro desde la perspectiva del peatón, ciclista y conductor. En la situación de evaluación, se presentaban 60 vídeos cortos grabados de forma naturalista en los que aparecía un peligro que requirió que se realizara una maniobra evasiva (frenar o cambiar de trayectoria). Cada vídeo se cortaba justo cuando el peligro comenzaba a desarrollarse. Entonces, se planteó a los participantes una pregunta con alternativas múltiples acerca de su consciencia situacional del peligro (i.e. ¿Cuál era el peligro?, ¿Dónde estaba? y ¿Qué iba a pasar después? Tras el Bloque 1 de Evaluación (1-30 vídeos), el efecto de las distintas formas de entrenamiento fue estudiado en la manipulación del Bloque 2 (vídeos 31-60): A). Solo Práctica; (Evaluación) B). Práctica + Feedback; y C). Práctica + Desenlace (Visualización del vídeo completo). Los resultados son discutidos para mejorar la capacidad de detectar los peligros sin exposición real.

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**58. Early audiovisual processing in infants at high and low risk for ASD**

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Infants are exposed to social information from different sensory modalities from birth. Audiovisual multimodal processing (AV MMP) allows them to integrate it. While it is impaired in individuals with Autism Spectrum Disorder (ASD), little is known about its origins. Infants who are siblings of older children with ASD (HR) are at increased heritable risk of developing the disorder, representing a chance to explore it. We explore if HR show atypicalities in AV MMP early in development. We registered visual attention towards audiovisual natural speech stimuli in 4-month-old HR (N=10) and their typically developing peers (LR, N=15). 10 clips of a female telling a story were presented in each, two simultaneous speaking faces (one synchronous vs. asynchronous) appeared at both sides of the screen. Data are still being collected. We hypothesized that while LR will show a preference to the synchronous condition (greater proportion of looking times), HR will not. This reduced sensitivity to integrate might suggest an early atypicality of HR in AV MMP.

**59. A Spanish lexical decision study from a massive online data collection**

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Megastudies in different fields have exponentially increased in the last decade, paving the way for the measurement of different constructs at a large scale. For psycholinguists, this is particularly important, as vocabulary can grow and change depending on different factors. Although multiple lexical megastudies have been carried out in different languages, no previous attempt has been made with Spanish, the second most used language in the world. Here, we present results of a massive lexical decision study across different Spanish speaking countries. Importantly, results indicate that vocabulary size increases with age and education level and varies depending on the location of the speaker and their gender. Additionally, with the use of neural networks, we predict participants characteristics based on their vocabulary size and other information. These results are discussed taking into account how individual differences can produce unreliable lexical decision responses. Finally, we propose a novel method to quantifying native and non-native Spanish vocabulary size through the use of adaptive testing.

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**60. Can sustained attention enhance visual processing of unseen stimuli in hemianopia?**

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Hemianopia is a visual field defect due to a unilateral post-chiasmatic lesion and characterized by a contralateral loss of vision in the visual hemifield of both eyes. Previous studies have shown that attention toward the blind hemifield could improve the

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discrimination of unseen stimuli. Here we assessed the behavioral and electroencephalographic (EEG) modulation produced by sustained spatial visual attention toward the blind hemifield of four hemianopic patients. The task employed a central endogenous cue to orient attention toward a field quadrant. Patients were asked to discriminate the orientation of a visual grating. Trials could be valid or invalid and attention could be oriented toward the upper or the lower quadrant within the same hemifield. Posterior P1 and N1 ERP components were analyzed. Reaction times were faster for the valid than the invalid condition. The most relevant EEG result was a significant attentional effect on the N1 component in the blind hemifield. This suggests an early sensory gain control of visual processing, likely preserved in extrastriate cortical areas for unseen stimuli in hemianopic patients.

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### **61. An analytic tool to symbols and embodiment debate about abstract concepts: Inbuilt Rubric, a non-Latent Semantic Analysis approach**

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There is a great controversy about symbols and embodiment debate, in which Latent Semantic Analysis (LSA) has been playing an important role in favor of amodal symbolic theories due to its high performance as a computational representation of semantic memory. Here, Inbuilt Rubric (IR) method is proposed as an appropriate model for embodied semantic representations because of its capacity to ground terms and endow semantic space coordinates with meaning in its artificially-generated semantic space. A total of 257 students summarized one from a total of three texts and a content-detection task was conducted using IR method coordinates. Evidences of convergent and divergent validity were found in favor of IR method as an appropriate computational procedure to embody semantic abstract concepts and its theoretical implications are discussed.

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### **62. Working memory: preliminary data from a behavioural, resting state and EEG study**

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Working memory (WM) represents the brains ability to store, manipulate and process information. This study

was carried out to investigate neurophysiological mechanisms related to WM. Thirty-five healthy young adults performed a visuo-spatial n-back task, formed by control condition (0-back), low (1-back) and high (2-back) WM load conditions. Behavioural data, EEG resting state and event-related potentials were collected. Results showed slower reaction times (RTs) in the 2-back compared to both 1-back and 0-back ( $p < .0001$ ). Target P3a amplitude and non-targets P3b latency increased as WM load increased ( $p < .0001$ ). P3b amplitude in the 1-back was higher compared to both 0-back and 2-back ( $p < .0001$ ), and its latency was positively correlated with RTs ( $p < .0001$ ). Regarding EEG resting state, central-frontally theta was negatively correlated with 2-back RTs ( $p < .05$ ) and parietal beta was negatively correlated with 0-back and 1-back RTs ( $p < .001$ ). EEG mean dominant frequency and central-frontally delta was negatively correlated with 1-back P3b amplitude and non-target P3b latency ( $p < .050$ ). Different WM loads correlates with different neurophysiological evoked and resting state mechanisms.

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### **63. Interoception and social interaction in major depressive disorder**

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The sense of the physiological condition of the body (i.e. interoception) is closely associated with motivated actions to regulate the internal state and social interactions, affecting human cognitive and emotional aspects. People with a better interoception, indeed, show higher emotional processing and greater autonomic regulation during social interactions along with less blurred self-other body boundaries. Although recent studies found autonomic and interoceptive deficits in Major Depressive Disorders (MDD), the role of interoception in social functioning has not been clearly assessed in a full blown major depressive episode. To answer this question, we measured interoceptive accuracy (i.e. the objective performance on a heartbeat detection task) and Respiratory Sinus Arrhythmia (RSA; a vagal index of social disposition) during both a social and a non-social task. Participants (20 MDD and 18 healthy controls) viewed a human hand or a metal sticks performing a caress-like movement at different distances from their dominant hand. Results showed interoceptive deficits along with an altered relationship between interoceptive accuracy and RSA in MDD,



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opening new perspectives in understanding the pathophysiology of mood disorders.

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### **64. Effect of target features in repeated visual search in crowded displays**

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In a previous study we found that searching for different targets in the same display did not facilitate search for other items within the same set. In this study we analyzed the effect of restricting the relevant items to a subset of the elements of the display. The search display was made of 72 colored letters (12 letters x 6 colors) and was the same for all searches (repeated visual search). In each trial participants had to find one specific target letter. The twelve letters used as targets were either all the orange letters or six Xs and Ks of different colors. Participants performed 72 trials, so that each target was searched for 6 times. RT and eye movements were registered in each trial. We found that RT and search fixations decreased significantly with target repetition, although the degree of facilitation differed among target letters, and also depending on the kind of target used. This suggests that participants could acquire information about target locations over repetitions and perform a more efficient visual search.

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### **65. La dimensione sessuale nel progetto generativo della coppia**

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La gravidanza rappresenta un momento centrale nella vita di una donna e determina intense modificazioni in senso globale, biologico, psicologico, sociale, culturale ed emozionale. Nel presente lavoro di ricerca viene analizzata la dimensione psicologica della gravidanza, il rapporto della donna gravida con il proprio corpo e il ruolo dell'uomo marito e futuro padre durante la gestazione ed il ruolo della sessualità nel progetto generativo della coppia. Il progetto di ricerca ha coinvolto 100 coppie. Sono stati somministrati il *Mesure du Stress Psychologique (MSP)*, il *Female Sexual Function Index (FSFI)* e un questionario di tipo self-report costruito da Cena L., Imbasciati A., Gambino A.,

Doneda C., per esplorare le dimensioni della progettualità generativa e genitoriale e della sessualità. I risultati ottenuti mostrano che durante la gestazione l'attività sessuale in gravidanza diminuisce in modo modesto nel primo trimestre, presenta una certa variabilità nel secondo e si riduce in modo marcato nel terzo. In conclusione potremmo affermare che sarebbe pertanto opportuno prevedere ed organizzare dei corsi di sensibilizzazione e informazione sulla sessualità in gravidanza.

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### **66. Food processing and emotion regulation in vegetarians and omnivores: an Event-Related potential investigation**

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This event-related potential (ERP) study investigated the neural correlates of emotion regulation in vegetarians and omnivores during the exposure to food cues. Twenty-four vegetarians and twenty-one omnivores viewed pictures of vegetarian and non-vegetarian food after an overnight fast. Participants were instructed to either passively look at the pictures (watch) or to change the appetitive value of the food (increase or decrease). Results showed that the amplitudes of early frontal ERP components (N100, N200) were larger for non-vegetarian than vegetarian food. The late positivity amplitudes (P300, LPP) were larger in the increase than in the watch and the decrease conditions independently of the group and the type of food. Overall, ERP data showed that under food deprivation early attentional processes help us to detect more nutritious and energetic food in the environment and that the appetitive value of food could be easily enhanced, but not reduced, via active emotion regulation. These results suggest that motivational processes involved in emotion regulation for food are stronger than individual differences related to food choices.

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### **67. Reading fluency and prosody in Alzheimer's disease**

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The expressive dimension of reading, or prosody, is important in order to read fluently. Prosodic patterns may vary, not being the same in children that are beginning to read, in adults, or in dyslexics, but little is

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known about their features in neurodegenerative diseases, such as Alzheimer's disease (AD). Reading ability is fairly preserved in these patients, but their fluency seems to decrease as the illness progresses. The aim of this work was to study reading fluency in patients with AD, analyzing prosodic features of their reading. The participants were 42 Spanish adults, 21 AD patients and 21 controls, with an age range from 64 to 88 years old. A narrative text was designed and presented to the participants on a piece of paper, and its reading was recorded and analyzed using Praat software. Reading times, changes in pitch and intensity, pauses, stresses and errors were measured. The results show longer reading times in these patients, as well as more frequent and longer pauses, and some disturbances in both tone and intensity in their reading.

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### **68. Ecological assessment of executive function in fMRI: evidence from the Computerised Multiple Elements Task**

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Background: The computerised multiple elements task (CMET) is a new executive task which requires switching between four simple games, with these having to be made voluntarily during a specified time period. It aims to capture the multitasking attributes of the six-elements task, a known neuropsychological test of executive function, but be suitable for use in conjunction with functional imaging. Aims: The study examined if self-motivated task switching during the CMET was associated with activation in prefrontal and other regions associated with goal management. Methods: Healthy participants (n=25) completed the CMET task during fMRI scanning. During each block participants were required to play four simple games, with the transition between games being made either voluntarily (experimental condition) or automatically (control condition). Results: Voluntary switching was associated with clusters of activation in the right lateral frontal cortex, the frontal pole, the anterior cingulate cortex and the inferior parietal cortex. Conclusions: The CMET task produces neural activations within regions implicated in executive function. The task could provide a method for studying the functional brain correlates of multitasking.

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### **69. A slight increase in inter-letter spacing helps drivers find a target word in traffic signs**

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Slight increases of inter-letter spacing relative to the default settings can have a positive impact on adult readers' recognition of visually presented words. The present work examined whether a slight increase in the standard spacing of the words displayed on traffic signs can have positive consequences on the search of a word (e.g., our destination). Twenty-two drivers participated in a driving simulation experiment. They completed a route in which 3-D models of direction traffic signs were embedded. Each model showed eight toponyms, using either the standard spacing or a 2.5 expanded spacing. Participants were instructed to use a right or a left lever behind the wheel to indicate whether or not the target was present, without neglecting the driving task. With the expanded inter-letter spacing, correct responses were given at a farther distance than with the standard spacing, i.e., they were able to find the word earlier. Vehicle control was not affected by the increase in inter-letter spacing. Therefore, drivers can benefit from a slight increase in inter-letter spacing relative to the standard setting.

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### **70. "Foreigners, rot in jail": Why do we punish foreign-accented speakers to more sentencing years than native speakers for the same crime?**

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In this study, we presented participants with one of two scenarios in which either a native or a foreign-accented speaker were being interrogated about an armed assault, in order to explore whether speakers' accents modulated participants' perceptions of culpability, probability of being re-accused, and fair amount of sentencing years. Participants also completed an implicit association test, responding to positive and negative words spoken by native and foreign-accented speakers. We found that there was a dramatic difference in participants' perception of fair amount of sentencing years for the two speakers (M native = 3.59, SE = 1.42; M foreign = 13.19, SE = 2.04). Also, participants showed a large negative implicit bias towards foreign-accented speakers (d = -0.88). Finally, we observed that

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participants with most negative biases towards foreigners were more prompted to give them a higher number of sentencing years because they thought that it was less probable that they would be re-accused. These results suggest that attributions of guilt are significantly associated with implicit biases towards foreign-accented speakers.

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### **71. Body ownership and proprioception are differently modulated by Rubber Hand Illusion in obesity**

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The Rubber Hand Illusion (RHI) enables to investigate the experience of body ownership. The illusion has been already studied in individuals with altered eating behavior (e.g., anorexic patients) but never in the obese population. We administered a modified version of the RHI, using a picture of participant's own hand, in 20 individuals affected by obesity, matched with 13 normal-weight participants. The illusion was assessed by means of explicit (i.e., questionnaire) and implicit (i.e., proprioceptive drift) measures, which might be originated by different multisensory processes.

Both individuals affected by obesity and healthy participants, after the synchronous stimulation but not the asynchronous one, experienced a subjective feeling of ownership towards the fake hand (i.e., questionnaire). However, the proprioceptive drift after the synchronous stimulation emerged in normal-weight participants but not in individuals with obesity. We speculate that the dissociation in the implicit measure of the illusion might be due to atypical multisensory integration processes in the obese population, which do not necessarily require the rubber hand to be felt as part of the body.

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### **72. Creative potential, attention, and associative learning: loss of learned predictiveness effect in individuals with high divergent thinking**

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Creative cognition has been related to defocused attention. According to this notion, learning about irrelevant stimuli must be fostered in individuals with high-divergent thinking (DT). We tested this hypothesis by assessing performance in a learned predictiveness (LP) task as a function of differences in DT. In the LP procedure half of the cues are established as accurate predictors of their outcomes, and the other half as poorer predictors, after which all of the cues are equally paired with novel outcomes. It is routinely found that new learning about novel outcomes is better expressed for accurate than for inaccurate predictors. This LP effect has been interpreted as an ability to learn to disattend irrelevant (inaccurate) stimuli. Consistent with this notion, and with the defocused attention hypothesis, we observed that LP was negatively correlated with DT. However, closer examination of the data showed that Low- and High-DT individuals differed in learning about the accurate (relevant) cues, but not in learning about the inaccurate (irrelevant) cues. This is inconsistent with the hypothesis of defocused attention. Alternative interpretations are discussed.

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### **73. Children's drawing style correlates with autistic traits**

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Perception is a fertile field to investigate Autism Spectrum Disorder's features. On the basis of Central Coherence Theory, we hypothesize that subjects with autistic traits present an unfocused detail-oriented cognitive style. Such a style would consist in paying attention to details distributed throughout the entire stimulus, rather than to its more salient aspects. We assume that this perceptual style can emerge also in children's drawing. The aim of this study was to investigate the relationship between this peculiar style and autistic traits in 54 typically developing children aged 5 to 8 years. Participants were administered the Faux Pas Test (FPT), the Reading the Mind in the Eyes Test (RMET) and an ad-hoc developed drawing. To evaluate the drawing, we created a detail-oriented style scale. Drawings' scores appeared to be negatively correlated with FPT and RMET scores, indicating that detail-oriented style in drawing is related to a poorer cognitive and affective theory of mind. These findings are discussed in relation to the usefulness of drawing as a possible tool for the early identification of autistic traits.

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### **74. Open Science in MEG**

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Large, open datasets and free open-source software are boosting neuroscience and in particular neuroimaging. In contrast with MRI, there is presently a scarcity of fully open resources for the magnetoencephalography (MEG) community. However, this has changed slowly over the past decade. Free open-source software tools for data analysis (e.g. Brainstorm, Fieldtrip, MNE, SPM, etc) have been developed and widely adopted by researchers and trainees. More recently, some large data-sharing initiatives for MEG have been initiated (e.g. Human Brain Project, Open MEG Archives - OMEGA, CamCan, etc). The—challenge for data harmonization and sharing efforts is also being tackled by the adoption of a common standard to describe the organization of multimodal neuroimaging data, such as the BIDS and its extension the MEG-BIDS. This presentation will review the present realizations and future opportunities for open MEG science and research practices.

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### **75. Fluctuations in Alpha/Theta phase in episodic memory encoding**

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Studies in perception and attention suggest behavioural fluctuations in the alpha/theta band (5-12 Hz). Here, we address memory encoding using an associated-pairs memory task (N=30). We used an auditory transient as a resetting signal to pace the presentation of each associated pair of images ( Cue to Target Onset Asynchrony, 0-500 ms). The experiment contained +2000 memory trials per participant, divided in encoding blocks pairs followed by recognition trials (participants judged whether a given image pair was present during encoding). We measured successful memory (hit rate) as a function of CTOA and analysed oscillations in performance. We found that recognition fluctuated at 4Hz and at 10 Hz. These results suggest Theta and Alpha periodicity on visual episodic memory performance, and that the phase at which relevant

information arrives for encoding might be determinant for successful recognition later on. However, because of the exploratory nature of this experiment and the strong multiple comparison correction, these oscillatory patterns did not reach a sufficiently high significance levels and must be considered cautiously and replicated in a hypothesis-driven manner.

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### **76. Causal role of the supplementary motor area (SMA) on executive control and conscious perception**

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The executive control network operates in situations that involve planning, novelty and error or conflict detection and resolution (Posner & Digirolamo, 1998). At the behavioral level, executive control elicited by conflict situations influences decision stages of conscious processing (Colás, Triviño, & Chica, 2017). At the neural level, an interaction between both processes was found in the functional connectivity of fronto-parietal regions (Martín-Signes, Paz-Alonso, & Chica, in preparation). We used transcranial magnetic stimulation (TMS) to explore the causal role of the supplementary motor area (SMA) in the interaction between executive control and consciousness. TMS was applied to the SMA or a control region while participants performed a Stroop task concurrent with a conscious detection task of near-threshold stimuli. Executive control triggered by conflict situations reduced perceptual sensitivity to detect near-threshold stimuli. While for the control TMS condition Stroop accuracy for incongruent trials was better when stimuli were unseen as compared to seen, TMS over the SMA eliminated this effect. Our results support the hypothesis of executive attention and consciousness share neural correlates on the frontal lobe.

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### **77. Blindness and social trust: The effect of early visual deprivation on judgments of trustworthiness**

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Investigating the impact of early visual deprivation on evaluations related to social trust has received little attention to date. This is despite consistent evidence

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suggesting that early onset blindness may interfere with the normal development of social skills. In this study, we investigated whether early blindness affects judgments of trustworthiness regarding the actions of an agent, with trustworthiness representing the fundamental dimension in the social evaluation. Specifically, we compared performance between a group of early blind individuals with that of sighted controls in their evaluation of trustworthiness of an agent after hearing a pair of two positive or two negative social behaviors (impression formation). Participants then repeated the same evaluation following the presentation of a third (consistent or inconsistent) behavior regarding the same agent (impression updating). Overall, blind individuals tended to give similar evaluations compared to their sighted counterparts. However, they also valued positive behaviors significantly more than sighted controls when forming their impression of an agent's trustworthiness. Moreover, when inconsistent information was provided, blind individuals were more prone to revise their initial evaluation compared to controls. These results suggest that early visual deprivation may have a dramatic effect on the evaluation of social factors such as trustworthiness.

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### **78. Psychological factors affecting physical activity engagement in the physically inactive population and consideration of technology support for its treatment**

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The increase of the physically inactive population is a serious socioeconomical problem, causing a 10% of the premature deaths in Europe annually. The aim of this study was twofold. First, to inform about the mediating variables of physical inactivity, including psychological needs and barriers, and approaching strategies. Second, to explore the inclusion of the aforementioned factors in the current design of technologies for the promotion of physical activity. With these aims, we conducted two literature reviews, using psychological and technological databases. Based on the results, we

developed and validated two novel questionnaires on barriers to and strategies for physical activity, which complement other existing related questionnaires. These questionnaires were included in a broader survey together with other validated questionnaires measuring factors relevant to physical activity. We will present the results of the survey and literature reviews, together with the two novel validated questionnaires on barriers to and strategies for physical activity. These outputs may guide future work on treatments and technology promoting physical activity, of which we highlight those involving one's body perception.

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### **79. Individuation vs. categorization strategies in social learning**

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In interpersonal contexts, social categorization, that is, classifying individuals into social categories, is a strategy that allows us to process social information and make decision about individuals in a quick way, according to our knowledge of the social groups they belong to. Despite this function of economizing mental resources, social categorization is also a source of social biases, which may lead to flawed decision making when individuals are different from our group-based expectations. In such contexts, switching to a more demanding individuation strategy may help avoid these biases. In the present study, we explore the differentiated used of categorization vs. individuation across repeated interactions with individuals (i.e., their face's images) in the trust game paradigm. Moreover, we include measures of eye movements in order to verify whether each of these strategies can be associated to a particular pattern of eye gaze to the face of the person with whom participants interacted.

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### **80. Food-related processing during a cognitive control task in obese patients seeking bariatric surgery: ERPs and behavioral measures**

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Obesity has been associated with poor cognitive control, especially in presence of food-related stimuli. Laparoscopic Sleeve Gastrectomy (LSG) is a surgical intervention which promotes weight-loss in severe obese by inducing physiological and behavioral changes. Initial evidences for cognitive improvement after surgery exist, however, neurophysiological correlates of these processes are poorly investigated. Twenty-four LSG candidates and 28 normal-weight individuals performed a Simon task with food and non-food distracting images during EEG recording. Obese patients were retested 12 months post-LSG. Before LSG food images interferes with cognitive control in obese individuals. A prefrontal N1 ERP, sensitive to food distracters in both the groups, was found to be greater in the higher cognitive control condition only in obese individuals. Furthermore, longer P2 latency for distracting images and longer overall P3 latency in obese before LSG suggest altered neural mechanisms related to selective attention and cognitive control. Post-LSG, a reduction of food-related interference was found in reaction times and P3 amplitude. The enhancement of overall P2 and N2 amplitudes may further suggest an improvement in executive functioning post-LSG.

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### **81. Searching for the bottom of the ego well: Failure to uncover ego depletion in Many Labs 3**

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According to a popular model of self-control, willpower depends on a limited resource that can be depleted when we perform a task demanding self-control. This theory has been put to the test in hundreds of experiments showing that completing a task that demands high self-control usually hinders performance in any secondary task that subsequently taxes self-control. Over the last five years, the reliability of the empirical evidence supporting this model has been questioned. In the present study, we reanalyzed data from a large-scale study to test whether performing a depleting task has any effect on a secondary task that also relies on self-control. Although we used a large sample, we did not find any significant evidence of ego depletion: Persistence on an anagram solving task (a typical measure of self-control) was not affected by previous completion of a Stroop task (a typical depleting task in this literature). Our results suggest that either ego depletion is not a real effect or,

alternatively, persistence in anagram solving may not be an optimal measure to test it.

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### **82. The efficacy of refutation texts to correct misconceptions among educators**

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Teachers around the world hold a considerable number of misconceptions about education. Consequently, schools can become breeding grounds for dubious practices that might jeopardize the quality of teaching and negatively influence students' wellbeing. The main objective of this study was to assess the efficacy of refutation texts in the correction of erroneous ideas among in-service teachers. Additionally, we tested the impact of supplementing refutation texts with information about the source and credibility of the misconceptions. We also tested whether the effectiveness of refutation texts depended on the pre-existing popularity of the target misconceptions. The results showed that refutation texts are an effective means to correct false ideas among educators. Contrary to our predictions, the addition of information about the source of information did not strengthen the effect of these texts and, similarly, their effect was not modulated by the popularity of the misconceptions addressed. The implications of these results for the training of pre-service and in-service teachers are discussed.

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### **83. Measuring attentional networks together with executive and arousal vigilance: the ANTI-Vea task**

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This study presents the development of the Attentional Networks Test for Interactions and Vigilance – executive and arousal components (ANTI-Vea), a new version of a widely used behavioral task for measuring simultaneously several attentional functions (alertness, orienting, and executive control). The main goal of the ANTI-Vea is to analyze the dissociation between two

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components of vigilance: executive vigilance, as the sustained goal-directed behavior for detecting unusual but critical events, and arousal vigilance, as the sustained tonic arousal level necessary to react quickly to stimuli from environment. We will present a large data collection (n=315), which leads us to conclude that the ANTI-Vea task improves the assessment of the different attentional functions, and it results suitable for observing the expected performance decrement across time in each vigilance component. Finally, we also looked to make this task available and easy to use in applied contexts. Therefore, we designed a publicly accessible website to run and collect data with the ANTI-Vea. We compare and discuss the results obtained with both the standard and the online version of the task.

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### **84. Perceiving the height and side of penalty kicks from the perspective of the goalkeeper**

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Penalty kick performance as a paradigmatic case of perceptual anticipation has been subject of extensive research. To defend a penalty, goalkeepers need to decide where to move before the opponent kicks the ball. It is well established that the biomechanics of the penalty taker can be predictive of the lateral direction of the kick (left or right), however, it remains unclear which information goalkeepers use to anticipate penalty kick height. Statistical analyses show that the probability of a goalkeeper saving a penalty shot to the upper third of the goal is almost null (Bar-Eli & Azar, 2009). Moreover, goalkeepers are less successful at anticipating the height of a penalty kick than its lateral direction, and specific perceptual training programs have produced no significant improvement on height anticipation performance (Savelsbergh, Williams, Van, & Ward, 2002). Finally, although a few studies showed a weak correlation between the biomechanics of penalty takers and the height of their kick, a possible role for ball flight on goalkeeper performance has not been investigated. We analysed 71 penalty kicks from three penalty takers and tracked the hand positions of the goalkeepers defending these penalties. Correlational analyses between the kinematic variables of the penalty takers and the goalkeepers, as well as with the height of the ball, were also computed. Our results indicate that there is a weak correlation between the kinematics of the

penalty taker and ball height. However, we found that the goalkeepers decide where to move the hands in the vertical direction after the opponent kicks the ball, approximately 240ms after diving laterally. These results suggest that while goalkeepers anticipate the lateral direction of a penalty kick before the opponent kicks the ball, they decide where to place their hands vertically afterwards. We propose that goalkeepers use ball flight information to decide where to move their hands in the vertical direction.

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### **85. Personal involvement and illusions of control in children**

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Illusions of control have been traditionally interpreted as self-serving biases that protect our self-esteem by increasing perceptions of control in uncontrollable situations. From these perspective, motivational factors such as personal involvement (the extent to which people are involved in obtaining the outcome) have been suggested to bias perceptions of control. However, recent research with adults has found that the effect of personal involvement on the illusion of control may not reflect a motivational bias but a general learning bias in contingency detection: When personal involvement translates into more active behavior, the increase in cause-outcome coincidences can account for illusions of control. Our experiment was designed to test the role of personal involvement in a situation in which active involvement cannot be confounded with increased activity. We selected a sample of children between six and eight years old (a group that has been reported to display larger self-serving biases in attributions than other age groups). Results are compatible with a motivational approach and showed that personal involvement effects may reflect a self-serving attributional bias in children.

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### **86. Are early spatial biases in number representation specific to numbers or manifestations of general biases in working memory?**

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## POSTER SESSIONS

People show spatial biases which suggest that the mental representation of number is analogous to a line flowing horizontally in their habitual reading and writing direction. A recent study has shown that such biases are present before children learn to read, probably induced by exposure to picture books. What are the underlying mechanisms of numeric spatial biases? We here propose that numeric spatial biases are a consequence of more general spatial biases in mental model construction in working memory. We put this hypothesis to test by assessing numeric and working memory biases in preliterate children and tracing their change both with age and as a result of a single experience with a mirror-printed picture book. The results of this work in progress will shed light on the underlying mechanisms of the mental number line.

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### **87. Analyzing metacomprehension in Primary education students: Comparing narrative, expository and discontinuous texts**

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There is a great controversy about symbols and embodiment debate, in which Latent Semantic Analysis (LSA) has been playing an important role in favor of amodal symbolic theories due to its high performance as a computational representation of semantic memory. Here, Inbuilt Rubric (IR) method is proposed as an appropriate model for embodied semantic representations because of its capacity to ground terms and endow semantic space coordinates with meaning in its artificially-generated semantic space. A total of 257 students summarized one from a total of three texts and a content-detection task was conducted using IR method coordinates. Evidences of convergent and divergent validity were found in favor of IR method as an appropriate computational procedure to embody semantic abstract concepts and its theoretical implications are discussed.

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### **88. "How does it end?" Children strategies of reading comprehension with texts and comics, using a coherence paradigm**

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Theories about visual narrative understanding accentuate the difference between patterns of reading comprehension in children when they read texts and

images (Leinenger & Rayner, 2017). This study was conducted to explore the differences in the eye movement patterns when children read different comic and text stories. A total of 31 children (10-12 years old) read 20 comic and text stories, each of them either with a coherent or an incoherent ending. Visual fixation durations, number of fixations and number of regressions were recorded by an eye-tracker Tobii x-120. A mixed effects ANOVA 2x2 was applied to three eye-tracking measures. Significant effects were found for the interaction "Type of text" and "Coherence" in fixation duration and number of fixations, as well as in the interaction "Type of text" and number of regressions. All these effects lead to the point that children may be using different searching and processing strategies until they figure out whether or not there is any incongruity in the story, even when the whole comprehension of it is a current goal.

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### **89. Comprehension assessment with word-based texts and wordless strip stories in adults with intellectual disability**

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The study of reading comprehension can be generalized to visual-graphic modality (including wordless strip stories) because evoked semantic contents and narrative structure can be maintained. Here, wordless strip stories comprehension was compared to other classical texts comprehension tasks in adults with intellectual disability. A total of fifty adults with intellectual disability showed a great equivalence between both types of task and similar sensitivity to individual characteristics. Given that there is a great importance in both the acquisition and the maintenance of functional skills such as comprehension, this is a first step to develop wordless comprehension assessments that are useful measures to evaluate comprehension in individuals that have severe reading problems (such as decoding difficulties or visual impairments).

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### **90. The involvement of executive functions in creativity**

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## POSTER SESSIONS

Creativity can be understood as the result of cognitive processes that lead to original and useful thoughts, behaviors and products. It is argued that executive functions (EFs) are required to generate creative products, insofar as they control and monitor cognitive processes in complex tasks. Given that EFs undergo substantial development during childhood and adolescence, they likely contribute toward explaining age-related differences in creativity. This study aimed to investigate the extent to which inhibition, switching, and updating are linked to creativity performance in children and adolescents. Two hundred and seventy-six primary and high school children were administered measures of creativity and reasoning, as well as inhibition, switching, and updating tasks. Results indicated that older students outperformed younger students on EF and some creativity measures. Mediation analyses showed updating to be the EF that accounts for a large amount of variance in creativity over and above age and individual differences in reasoning. Active maintenance and substitution of no-longer-relevant information may be a mechanism involved in the development of creativity.

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### **91. La influencia del estrés académico en el reconocimiento de estímulos emocionales**

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Diversos estudios previos han indicado que el estrés académico puede interferir en el reconocimiento. Además, esta relación podría estar modulada por el contenido emocional de los estímulos. El presente estudio se realizó en condiciones naturales de estrés (estrés académico): los participantes (N=74) realizaron la tarea Viejo-Nuevo empleando escenas emocionales y neutras como estímulos en dos momentos diferentes separados por 2 meses: estrés (periodo de exámenes) y no-estrés (periodo sin exámenes). Se recogieron medidas psicofisiológicas y conductuales. Los resultados psicofisiológicos confirmaron que el periodo de exámenes actuó como estresor agudo. Los datos conductuales mostraron que el estrés afecta negativamente al reconocimiento (los estímulos viejos se asociaron con mayores tiempos de reacción en el periodo de exámenes que en el de no exámenes), sin interactuar con la emoción. Estos resultados indican que el estrés académico altera el recuerdo, aparentemente de

forma independiente del contenido emocional del material que debe ser recordado.

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### **92. The effect of cue ordering in the temporal integration of informational integration of information**

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We investigate how the temporal position in which a piece of information appears affects the impact it has. According to the Bayesian inference framework information should be weighted according to its reliability. In contrast, the anchoring and adjustment bias implies that the first cues have a larger impact. Alternatively, the system may favour the most recent cue. We employed a Posner-line paradigm extending it with two cues. Participants viewed brief sequences with one or two arrows pointing left or right, followed by a square appearing in either side of the screen. Both arrows had the same validity ratio. Results from reaction times and error rates reveal a recency effect, in that a larger weight is assigned to the second cue. Furthermore, this effect was less noticeable in blocks with one and two cues, as compared to blocks where all trials had two cues, which indicates that time pressure favours anchoring. These results help understand how we temporally integrate information and which biases are induced as a function of context and task requirements.

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### **93. Attention to concurrent emotional targets and distracters: behavioral and electrophysiological correlates**

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## POSTER SESSIONS

Previous data show an advantage of emotional stimuli during endogenous and exogenous attention. However, there is little proof of how these attentional modalities modulate each other when they are both confronted with emotional stimuli (when both targets - receiving endogenous attention- and distracters - potentially capturing exogenous attention- are emotional). The present study explored this issue through behavioral and ERP measures. To this end, participants performed a target-distracter task employing negative, neutral, and positive pictures as both targets and distracters. Behavioral data showed an effect of the emotional content of targets. Neural results revealed a modulatory effect of emotional targets at early (N2a, 140 ms) and late (LPPa and LPPp, 600 ms) latencies; whereas the effect of the emotional content of distracters was reflected in between (N2p, 182 ms). This indicates that endogenous and exogenous attention seem to develop in a serial manner, suggesting a functional segregation of both modalities, at least under the present conditions.

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suggest that positive self-perception induces changes in peripersonal space boundaries and own body schema.

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### **94. Self-perception and Cortical Excitability: Recalling Positive Behavior Expands Body Schema Boundaries**

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Social psychology suggests that the experience of power induces people to perceive themselves taller. However, no prior study investigated the neurophysiological underpinnings of this phenomenon, nor whether such effect is specific to power, or can be more generally linked to positive self-perception. Here we investigated this hypothesis recording corticospinal excitability during the sight of an object whose distance was manipulated in the vertical space.

Participants (n=55) were randomly assigned to feel high-power, low-power, or positive emotions during the observation of an object either in the peripersonal or extrapersonal space. We measured Motor Evoked Potentials (MEPs) using Transcranial Magnetic Stimulation with Electromyography co-registration. Results show no difference between high-power and positive conditions, while in low-power condition, MEPs were higher in the extrapersonal versus peripersonal space, an opposite result when compared to literature. We then ran a control experiment (n=39) in which object's position was manipulated along horizontal versus vertical axis and found a dissociation between the two planes. Taken together, our findings