

# INTERNATIONAL **APPE-SEPEX** MEETING

**5 > 7 MAIO** MAY 2022

15º Encontro Nacional APPE  
e 13º CONGRESO SEPEX

**Universidade do Algarve**  
Campus of Gambelas  
Faro, Portugal

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# **INTERNATIONAL APPE-SEPEX MEETING**

Faro / Algarve / Portugal

5 to 7 May, 2022

## **Ebook of Abstracts**



# EBOOK OF ABSTRACTS

## International APPE – SEPEX Meeting 2022

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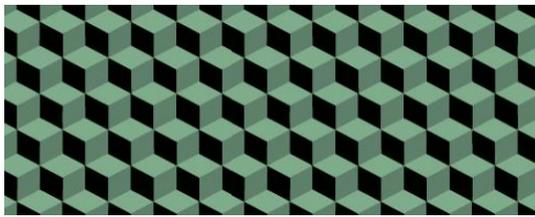
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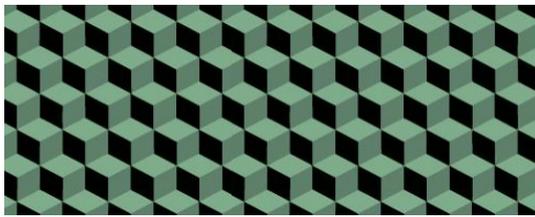
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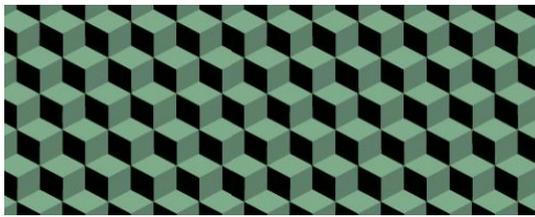
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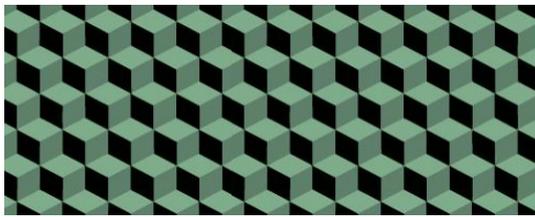


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## Opening note APPE

The Portuguese Association for Experimental Psychology (APPE) is a national scientific society formed on July 25, 2005 and represents today around 200 active researchers. The idea of creating this association came from a group of university professors at the first Experimental Psychology Forum held at the University of Minho in October 2004 (FoPEX). What motivated this idea was above all the success of the meeting in Minho – the number of participants exceeded all expectations; the enthusiasm shown by the undergraduate, master's, and Ph.D. students was enormous; the communications presented were also of great quality. Although APPE's members are spread across several institutions – from Minho to the Algarve, and from Madeira to the Azores – we are already a numerous and active group that intends to contribute to disseminating Experimental Psychology in Portugal. Thus, the Portuguese Association for Experimental Psychology has two fundamental goals: to bring together researchers in Portugal interested in Experimental Psychology and to organize an annual meeting where these same researchers share their work and experiences. In 2022, the annual meeting brought together the two Iberian Experimental Psychology societies, APPE and SEPEX.

Join us as we work to advance the field and serve our community. Please visit [www.appe.pt](http://www.appe.pt) for more information.



## Opening note SEPEX

The Spanish Society of Experimental Psychology (SEPEX) was born from an agreement of 16 researchers from different Spanish universities, gathered in Almería on July 1st 1997 for its foundation. In that first meeting, the first statutes of SEPEX were drafted and the first Board of Directors was elected, whose composition partially changes every 2 years. The objectives of the Society are to promote the development of scientific knowledge in all fields of Psychology; promote research and the dissemination of its results among researchers and promote the relationship with national and international homologous societies and organizations; organize and promote scientific meetings; periodically inform members of the Society about activities related to Experimental Psychology. From its foundations in 1997 where 16 pioneering researchers of Experimental Psychology in Spain created it until today, SEPEX has grown to more than 400 members and has become the referent in the field for the exchange of scientific research in Spain. You can find further information about our SEPEX in <https://websepex.com/>



# 5 May

## Room 1 - Grande Auditório

### Oral Session 1

**Moderator:** Ana Chica



# No evidence for a causal role of the left intraparietal sulcus in the temporal orienting of attention: A Transcranial Magnetic Stimulation study

Mariagrazia Capizzi\* <sup>a)</sup>, Ana B. Chica <sup>a)</sup>, Pom Charras <sup>b)</sup>

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The ability to orient attention in time using symbolic cues, i.e., temporal orienting of attention, has been consistently associated with activation of the left intraparietal sulcus (LIPS) in prior fMRI studies (e.g., Coull & Nobre, 1998; Cotti et al., 2011; Coull et al., 2016). However, a direct test of its causal involvement is still missing. The present investigation tackled this issue by transiently perturbing the LIPS with either online or offline transcranial magnetic stimulation (TMS) during (or before) performance of a temporal orienting task. The right IPS and/or the vertex were also stimulated as active control regions. While, behaviorally, we replicated the canonical pattern of temporal orienting effects, with faster responses for temporal valid as compared to neutral trials, these effects were not modulated by TMS over the LIPS regardless of the (online or offline) protocol used. Overall, the present findings challenge the causal role of the LIPS in temporal orienting of attention calling for further research on the underlying neural substrates.

## Keywords

Attention, temporal orienting, foreperiod

## Acknowledgments

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## The spotlight of attention: is its spatio-temporal dynamics modified by expectations?

María Melcón <sup>a)</sup>, Yolanda Sánchez-Carro <sup>b)</sup>, Sander van Bree <sup>c,d)</sup>, Simon Hanslmayr <sup>c,d)</sup>, Maria Wimber <sup>c,d)</sup>, Luca Kolibius <sup>c,d)</sup>, Enrique Stern <sup>a)</sup>, Lydia Arana <sup>a)</sup>, Laura Barreiro-Fernández <sup>a)</sup>, Elisabet Alzueta <sup>e)</sup>, Almudena Capilla <sup>a)</sup>

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Informative cues draw attention to its location. However, the neural behaviour during this orienting period is still under study. To shed light on this issue, we investigated whether the spotlight of attention (SA) remains on the cued location, or it fluctuates at a specific rate while exploring the visual field. We addressed these questions combining high-density electroencephalographic recordings with time-sensitive decoding methods. Our results showed the cue triggers a sampling response between left/right hemifields at 10 Hz for 250 ms (exploration state). Then, the SA remains relatively stable at the cued hemifield until 650 ms (exploitation state). Therefore, the attentional system might initially avoid missing out any potentially important information in the visual field, striking a balance between exploration and exploitation. However, for attention to be effective, it ultimately needs to sample the cued location, settling in an exploitation state. In a second study, we used the same procedure to investigate whether these dynamics are affected by cue expectations. We not only replicated the results of informative cues, but we also concluded dynamics triggered by non-informative cues is not identical.

### Keywords

EEG, multivariate pattern analysis, neural decoding, rhythmic cognition, spatial attention.



## Baseline EEG is related to infants' ability to disengage attention

Josué Rico-Picó\* <sup>a)</sup>, Sebastián Moyano <sup>a)</sup>, Ángela Conejero <sup>b)</sup>, Ángela Hoyo <sup>a)</sup>, María de los Ángeles Ballesteros-Duperón <sup>c)</sup>, M. Rosario Rueda Cuerva <sup>a)</sup>

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Attention rapidly evolves throughout infancy. From about 4 months of age, babies become more able to disengage attention from particular stimuli to explore the environment. Additionally, baseline electrophysiological (EEG) brain activity changes during this period. The power at low-frequency bands (theta) declines with age, whereas high-frequency bands (alpha) power increases, which has been related to general cognitive abilities in infants. For this reason, our study explored whether the ability to disengage evaluated with the Gap-Overlap task in combination with the eye-tracking system is related to 6-month-old (final  $n = 90$ ) infants EEG in theta and alpha frequency bands. We evaluated the disengagement cost, considered as the differences (Overlap RT – Gap RT) to explore a novel lateral stimulus from a previous central one that remained all the trail (Overlap) or disappeared (Gap). Our results showed that greater disengagement cost was related to high power in parietal-central clusters in the theta band and inversely related to alpha power. These findings suggest that individual differences in early attentional control are related to functional maturation of parietal (and frontal) cortical regions.

### Keywords

attention, infants, development, EEG

### Acknowledgments

We would like to thank all the families that participated in the study. This work was supported by the National Research Agency of Spain awarded to MRR (PSI2017-82670-P) as well as a predoc fellowship sponsored by the Tatiana PGB Foundation awarded to JRP (neuroscience field the year 2019) and predoc fellowship PRE2018-083592 awarded to SM.



# Perceptual load as a function of distractor type: Distraction vs. Interference

*Greta Manini, Fabiano Botta, Elisa Martín-Arévalo, Juan Lupiáñez*

*Mind, Brain and Behavior Research Center (CIMCYC) and Department of Experimental Psychology,  
University of Granada, Granada, Spain*

In a previous study (Manini et al.2021) we investigated the effect of potentially relevant vs. fully irrelevant distractors as a function of perceptual load. The interference from relevant distractors was consistently higher for high vs. low task demands, while the irrelevant distractors presented no interaction with the load. These results contradict the typical perceptual load theory observations: lower distraction in high load. To better understand this pattern of results, we conducted a new study using the procedure of Forster and Lavie (2016) and the same manipulations and hypothesis than in our previous study. Results showed that while the irrelevant distractor did now replicate the typical perceptual load pattern, i.e., larger effect for low perceptual load, the relevant distractor again presented the opposite pattern. These results, besides being consistent with our hypothesis, allow us to propose a new conceptualization of attentional capture. The opposite patterns could indicate different mechanisms underlying the effect of each distractor type. While irrelevant distractors cause distraction, easier to avoid with high load, the relevant distractor creates interference with our task, larger with high load.

## **Keywords**

attentional capture, perceptual load, attentional focus, distractor interference, distractor relevance.



# Preparation history effects on selective attention in a two-target method

*Ben Sclodnick\*, Bruce Milliken, David Shore, Ellen MacLellan*

*Department of Psychology, Neuroscience & Behavior, McMaster University, Hamilton, Canada*

We report a unique form of experience-based control over selective attention using a two-target method. In our two-target method, two targets are presented in rapid succession and selective attention associated with the first target is manipulated. When identification of the first target requires selective attention, a stark identification deficit (an attentional blink) is produced for the second target (MacLellan, Shore & Milliken, 2015). In the present study, we inserted a stimulus immediately prior to each two-target trial to measure the influence of an immediate prior experience on the selective attention processes responsible for this two-target effect. Selection efficiency (and the two-target effect) was not influenced by the stimulus that preceded each two-target trial, but was influenced by the response instructions for that stimulus—pointing to a preparatory state influence on selective attention efficiency. Follow-up experiments suggest this preparatory state effect cannot be switched on and off voluntarily on a trial-to-trial basis, and instead requires a series of trials with consistent preparation demands; hence we refer to it as a *preparation history effect*.

## **Keywords**

selective attention, cognitive control, selection history, attentional blink, experience-based control



## Room 1 - Grande Auditório

**Invited Speaker - Giuliana Mazzoni**



# The malleability of autobiographical memory: research, applications and some puzzling results

*Giuliana Mazzoni*

*Professore ordinario, University of Roma La Sapienza, Roma, Italy*

*Emeritus Professor, University of Hull*

For several decades research has shown that human memory is both basically reliable but also highly malleable. Here in the first part, I will review the data on the malleability of autobiographical memory (ABM), and outline its implications for applied situations (e.g., eyewitness testimony), providing some examples from court cases. In the second part I will shift gear, and critically discuss the reconstructive approach to memory retrieval in ABM in light of three sets of studies. I will examine whether studies comparing generative and direct retrieval might pose a challenge for the reconstructive idea, and what the apparent predominance of involuntary memories can tell us about retrieval processes in ABM. The results of a few studies on people who have a truly exceptional form of autobiographical memories will also be reported and discussed considering the reconstructive approach, examining if they, along with some additional neuroimaging evidence, might tell a rather very different story about how autobiographical memory works.



## Room 1 - Grande Auditório

### Oral Session 3

**Moderator:** Ana Paula Soares



# Is the motor system functionally involved in action language understanding? A $p$ -curve analysis of neurostimulation studies

*Pablo Solana\**, *Julio Santiago*

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According to the embodied cognition view, retrieving the meaning of action-related language requires the participation of sensorimotor processes. In consequence, an increasing number of neurostimulation studies (i.e., TMS and tDCS) have tried to test this idea. The aim of the present study was to evaluate, for the first time, the evidential value of this body of research. We first identified all the published studies suited for our purpose ( $N=43$ ). Then, we meta-analyzed them by means of a novel tool called  $p$ -curve analysis. Our results suggest that the published studies so far do not yet allow to establish if they explore real effects beyond reasonable doubt. We also found that these studies are quite underpowered (estimated underlying power  $< 30\%$ ), which suggests that a large percentage of these findings are in fact false-positive results. In sum, our study suggests that the findings derived from neurostimulation studies of embodied semantics are not as reliable as it would be desirable. Implementing practices like preregistration, direct replication and using well-powered designs will be particularly important for future research on this topic.

## **Keywords**

embodied cognition, language comprehension, motor system, neurostimulation, meta-analysis



# Beyond the Conservative Hypothesis: A Meta-Analysis of Lexical-Semantic Processing in Williams Syndrome

Carlos Romero-Rivas \*<sup>a)</sup>, Sara Rodríguez-Cuadrado<sup>a)</sup>, Lucía Sabater<sup>a,b)</sup>, Pablo Rodríguez-Gómez<sup>b)</sup>, Irene Hidalgo de la Guía<sup>a)</sup>, Eva M. Moreno<sup>b)</sup>, Elena Garayzábal Heinze<sup>a)</sup>

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Williams syndrome (WS) is a rare genetically based neurodevelopmental disorder, traditionally described as being characterized by relatively spared, but deviant, linguistic abilities, despite serious deficits in other cognitive domains. The aim of the present study was to conduct a systematic review and meta-analysis to explore whether people diagnosed with WS have unusual lexical-semantic skills. We found 42 studies matching our criteria, in which 747 WS participants and 1444 controls were recruited. In total, 180 effect sizes were included in our multilevel meta-analysis. Results showed that participants with WS have worse lexical-semantic skills than controls (both chronological and mental age-matched) with typical development, but we observed the opposite pattern when comparing WS with people diagnosed with other disabilities (e.g., Down syndrome or ASD). Our results are incongruent with the conservative hypothesis, which suggests that language development is simply delayed in WS; but support, at least partially, the modular and neuroconstructivism approaches: the cognitive structures underlying lexical-semantic processes may be relatively spared in WS, allowing them to use a more complex language than would be expected given their cognitive disability.

## Keywords

Williams syndrome, lexical-semantic processing, modularity, neuroconstructivism, meta-analysis



# Relative clause production and relativizer frequency: A sentence recall study in Spanish

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Relative clauses (RCs) vary widely across languages, both in structural layout and semantic properties. Spanish RCs are rich in both respects, since they express a wide variety of modification types and referential functions, and allow for different structural configurations with diverse relativizers. The current study was intended to test the accessibility of RCs in Spanish with different relativizers in a sentence recall task with an interference paradigm, depending on the relative frequency of the relativizer. Participants were given a target sentence with a subordinate RC to recall followed by two distractor sentences, one of which contained an RC with a different relativizer, either higher or lower in frequency than that of the target RC. Two restrictive RC types were used, each with a relativizer contrast, *que* vs *el cual* ('that' vs 'which') and *donde* vs *en el que* ('where' vs 'in which'). Results showed a higher proportion of responses with more frequent relativizers (*que* and *donde*), and a priming effect from distractor RCs. These results square with Spanish corpus data and are discussed with regard to current sentence production models.

## Keywords

language production, relative clauses, relativizer types, recall paradigm



# On elephants and tables: The role of animacy on grammatical gender processing

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The representation and processing of grammatical gender is classically studied through a picture-word interference paradigm (PWIP, participants have to name a target picture [“table”] while ignoring a superimposed written distractor noun). A gender congruency effect (GCE, faster responses to same gender target-distractor pairs) is usually obtained. However, despite evidence showing that animate and inanimate nouns are differently processed (1), the role of animacy has been neglected in the literature. Indeed, most studies developed insofar have included a 3-to-33% percentage of animate words in the experimental lists (2, 3).

In this PWIP study with native speakers of European Portuguese, the percentage of animate target nouns was manipulated creating four lists (0%, 25%, 50%, and 100%). Analyses were conducted with the factors “list” and “gender congruency”. Results revealed a GCE restricted to the list featuring 0% of animate targets, showing that the presence of animate nouns prevented gender effects from emerging. Support is hence given to a differential processing of animate and inanimate nouns as predicted by the Animate Monitoring Hypothesis (4) and the theories on the semantic prioritization of animacy.

## Keywords

animacy, gender congruency, grammatical gender, picture-word interference paradigm

## Acknowledgments

Trabajo premiado con las Becas Sepex a la Difusión de Trabajos de Investigación en la anterior convocatoria (APPE-SEPEX 2020). En términos de autoría (segundo autor), una investigadora ha dejado el trabajo (Helena Oliveira) y ha sido sustituida por otro investigador (Juan Haro).



# The role of familiarity and iconicity in the LSE lexicon

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Very few studies have investigated the role of lexical factors such as frequency and iconicity on lexical processing in sign languages. We collected familiarity and iconicity ratings from 30 deaf native and 30 deaf non-native signers for 300 lexical signs of Spanish Sign Language (LSE). Based on previous studies of British and Catalan Sign Languages (Vinson et al., 2008; Baus & Costa, 2015), we expected a weak positive correlation between familiarity and iconicity but found a weak negative correlation between these variables.

We also collected lexical decision data from 21 deaf native, 21 non-native LSE signers and 21 hearing nonsigners for a subset of 200 (imageable) signs included in the rating study, to investigate effects of familiarity and iconicity on the speed and accuracy of sign recognition. In line with the spoken language literature, we found a clear lexicality effect and a facilitatory effect of familiarity for signers, with no such effects for nonsigners. Iconicity showed a facilitatory effect for signers but an inhibitory effect for nonsigners. This study yields new insights into effects of familiarity and iconicity on sign processing.

## **Keywords**

sign language processing, Spanish Sign Language, lexical indices, familiarity, iconicity, lexicality, lexical decision



## Room 1 - Grande Auditório

### Oral Session 4

**Moderator:** Sara Rodríguez-Cuadrado



# Prospective Memory in bilinguals and monolinguals: ERP and behavioural correlates of prospective processing in bilinguals

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Prospective memory (PM) allows us to form intentions and execute them in the future. Successful retrieval of prospective intentions depends on adequate context monitoring and disengagement from the ongoing task. These processes are also central in predicting incoming language information and guiding language production in bilinguals. We investigated if different bilingual experiences (early/late bilinguals, monolinguals) modulate performance in PM tasks that varied in attentional requirements (focal vs. non-focal). Behavioural and event-related potential (ERP) results indicated that early bilinguals differed from late bilinguals and monolinguals in how they performed the prospective task. Specifically, they showed larger differences between the ongoing activity and the prospective task in the N300 and P3b components when performing the more difficult non-focal PM task, indicating that they engaged in monitoring/updating to adapt to the task's demands. These differences were not observed in late bilinguals and monolinguals, suggesting that prospective processing is dependent on the bilingual experience.

## **Keywords**

prospective memory, focality, monitoring, ERP, bilingualism, language control, bilingual experience, N300, P3b



# Examining cross-linguistic gender effects in European Portuguese-German bilinguals: The role of language balance and age of acquisition

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The cross-linguistic gender congruency effect (GCE) obtained mainly through naming and translation tasks shows that bilinguals share a gender system across languages and facilitation on gender retrieval is experienced for translations of the same gender. However, this effect has been analysed exclusively with late bilinguals, and the possible impact of language proficiency has yet to be considered. In this work, we analysed 74 early and late bilinguals of European Portuguese and German in a forward and backward translation task. A measure of proficiency balance between languages was calculated through the Dialang test. This factor along with the gender congruency between translations, and the age of acquisition (AoA) of both languages was included in the linear mixed model analysis. The results showed a cross-linguistic GCE for both languages that was greater the higher the unbalance between languages. AoA showed no impact on the effect. We followed the BIA developmental and the Multilink models to explain the possible mechanisms underlying bilingual gender selection. Shortly, proficiency would alter the strength of the links between gender nodes and lemmas creating situations of cross-linguistic interference.

## Keywords

age of acquisition, bilingualism, gender congruency effect, grammatical gender, proficiency



# How we solve a mistaken interpretation? Differences between monolingual and bilingual children and adults during text comprehension

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Successful text comprehension depends on the interaction among multiple high-level cognitive processes, such as when we have to solve a mistaken interpretation. To do so, we first need to detect the information that mismatches our interpretation (monitoring), and then resolve the inconsistency by replacing the previous idea with an alternative one (revision). Adequate monitoring is usually found in children and adults during native comprehension (Holcomb et al., 1992), whereas revision seems to depend on cognitive control in both monolingual (Pérez et al., 2015) and bilingual (Pérez et al., 2018) adults. However, no study has compared revision across development (children vs adults) and language status (monolinguals vs bilinguals). In the present study, monolingual and bilingual children and adults were presented with short narratives in the native language. Each text biased an inference (e.g., “saxophone”) and then demanded the revision of this interpretation (e.g., “...playing the black and white keys” → “piano”). Reading times and accuracy suggested developmental and language status differences. Specifically, monolingual children underperformed bilingual children and (monolingual and bilingual) adults, especially when they had to revise a mistaken interpretation.

## Keywords

text comprehension, development, bilingualism, inferential monitoring, inferential revision

## Acknowledgments

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# The How and the When of Semantic Illusions in Native and Non-native Languages

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When you ask someone “How many animals of each kind did Moses take on the Ark?”, most people answer “two” and fail to notice that it was Noah and not Moses who took the animals, i.e., they fall into a semantic Illusion (SI). The representational nature and processing of SIs have been largely studied during native language comprehension. Overall, findings sustain The Node Structure Theory (NST, Shafto & Mackay, 2000), according to which SIs are priming effects which occur due to phonological and/or semantic links existing between the correct word and the wrong word. However, the question as to whether the same underlying mechanisms can be found during second language processing remains unexplored. The aim of this research was to examine SIs on European Portuguese-German bilinguals (and their respective monolingual control groups) using a self-paced reading paradigm. Type of language (first vs. second), Age of acquisition (AoA: early vs. late), and Type of target word (correct vs. wrong) were manipulated. Results support the NST, although when considering bilinguals more SIs were observed in the less used language regardless of AoA.

## Keywords

Semantic Illusions, native and non-native languages, self-paced reading paradigm

## Acknowledgments

4710-057



## Room 1 - Grande Auditório

Invited Speaker - Óscar Gonçalves



# The Experimental Study of Consciousness: Back to the Future

*Óscar F. Gonçalves*

*CO&MA Team – Proaction Lab, CINEICC, Faculty of Psychology and Educational Sciences, University of Coimbra, Coimbra, Portugal*

It was with the promise of rendering an experimental approach to consciousness that psychology started its trajectory as an independent science more than 150 years ago. In this presentation, I'll posit that the neurosciences were instrumental in resuming the study of consciousness and projecting an empirical agenda for the future. I'll start by showing how we could venture into the consciousness of supposedly unconscious patients, opening the door for the identification of important neurophysiological markers of distinct consciousness states. Then I'll show how different elegant experimental paradigms were fundamental in establishing distinct signatures of perceptual and selfconsciousness. In closing, I will illustrate how these developments brought some tools and insights to understand complex consciousness experiences.



## Room 2 - Anfiteatro A

### Thematic Session 1

#### The role of predictions across neurocognitive processes



## The role of predictions across neurocognitive processes

*Carlos González-García\* <sup>a)</sup>, Javier Ortiz-Tudela <sup>b)</sup>, Ruth de Diego-Balaguer <sup>c)</sup>, José M. G. Peñalver <sup>a)</sup>, María Ruz <sup>a)</sup>*

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The conceptualization of cognition within a predictive processing view has been rapidly gaining support in the last decade. The dynamic interaction between anticipatory neural or cognitive states and actual evidence experienced is thought to be a core mechanism so deeply rooted in the nervous system that its functioning can be traced along the entire hierarchy of cognitive processing. As a consequence, current research goes beyond the initial ideas ascribed solely to the domain of visual perception reaching far into cognitive control and memory. The aim of this symposium is to bring together researchers from different fields of cognition that make use of the predictive processing view either as a basis for study design or for data interpretation.



# Characterizing the neural signatures of prior-guided perception across the cortical hierarchy

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A fundamental question in cognitive neuroscience is how prior knowledge shapes perceptual processing. To date, research on this question has focused on early visual regions, revealing a consistent suppression of predicted stimulus information. However, how prior knowledge modulates processing higher up in the cortical hierarchy remains poorly understood. In addition, the mechanism leading to suppression of predicted sensory information remains unclear, and studies thus far have revealed a mixed pattern of results in support of either a “sharpening” or “dampening” model. Here, we used fMRI while participants performed a one-shot perceptual learning paradigm. We observed that prior knowledge results in sharper neural representations across the cortical hierarchy of the human brain through a gradient of mechanisms. In visual regions, neural responses tuned away from internal predictions are suppressed. In contrast, the frontoparietal and default mode networks exhibit similar sharpening of content-specific neural representation, but in the context of unchanged and enhanced activity magnitudes, respectively: a pattern we label “selective enhancement”. Together, these results reveal a macroscopic gradient of prior knowledge's sharpening effect on neural representations across the cortical hierarchy.

## Keywords

prediction, priors, perception, fMRI, neural representation



# Decoding memory-specific feedback signals from early visual areas.

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One of the core assumptions of Predictive Processing is that the brain makes use of some form of past information from which predictions can be drawn. In this project we aim at characterizing the nature of predictions by examining its components. Our participants studied images depicting real-world locations and objects; on the following day, they performed a retrieval task from partially occluded images while we recorded brain activity. Using multivariate pattern analysis, we quantified the amount of contextual and mnemonic information present in visual areas (i.e., V1 and V2) during episodic and semantic retrievals. Our results reveal that both types of information are constituents of prediction signals but that the extent to which mnemonic content is replayed in visual areas depends on whether memories are retrieved through an episodic or a semantic route. We discuss these results highlighting the crucial role that memory plays in informing predictions and framing vision as a constructive process that relies, not only on direct inputs from the outside world, but also on contextual information and on memory-based content internally generated in the brain.

## **Keywords**

prediction, episodic memory, semantic memory, fMRI, neural representation



## Attention Boosts Audio-motor Synchronization

Joan Orpella <sup>a)</sup>, Florencia Assaneo <sup>b)</sup>, Pablo Ripollés-Vidal <sup>a,c,d,h)</sup>, Laura Noejovich <sup>a)</sup>, Diana López-Barroso <sup>e,f)</sup>, David Poeppel <sup>a,d,h,i)</sup>, Ruth de Diego-Balaguer\* <sup>j,k,i)</sup>

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In the context of speech, predictive mechanisms are applied for word segmentation through statistical learning. This ability relies on both the temporal lobe and on the synchronization between temporal auditory and frontal motor regions. Indeed, an enhanced auditory-motor synchronization, reflected in a phase alignment between brain oscillatory activity and speech rhythm has been proven to enhance SL segmentation abilities. Since phase alignment can be shifted by attention, we hypothesize that a better auditory-motor synchronization boosting learning should be accompanied by the engagement of a fronto-parietal system, classically related to attention. Combining established behavioral and neuroimaging methods with a novel test of auditory-motor synchronization (the spontaneous speech synchronization test, SSS test), we show that only individuals exhibiting higher auditory-motor synchronization engage a fronto-parietal brain network while performing a statistical learning task. Such a network is compatible with the recruitment of attention mechanisms. Critically, interfering with the motor system by means of articulatory suppression (i.e., articulation of an irrelevant syllable during learning) precluding attention to enhance auditory-motor synchronization reduces performance only in high synchronizers.

### Keywords

speech, language, attention, audio-motor synchronisation, fMRI, statistical learning



# Probability vs selection. Neural coding in expectation and selective attention during preparation.

*José M. G. Peñalver, David López-García, Blanca Aguado-López, Carlos González-García, María Ruz\**

*Mind, Brain and Behaviour Research Centre (CIMCYC), University of Granada, Granada, Spain*

Preparation improves performance. Neuroimage research shows the importance of preparatory activity in different cognitive domains. Two of such domains, often confounded in the literature, are selective attention (selection of task-relevant information) and perceptual expectation (probability of encountering certain stimuli). However, the specificity of the mechanisms linked to preparation in attention and expectation is unclear. We used Multivariate Pattern Analysis (MVPA) on EEG data to characterize the mechanisms that support preparation in both contexts. Participants were cued to select or to expect a target, a name or a face, in a gender discrimination task. MVPA analyses during the preparation window showed that both manipulations led to a significant prediction of the selected or expected target. This classification progressively increased throughout the time window. Moreover, a classifier trained on data from one condition did not generalize to the other, pointing to the existence of different anticipatory brain patterns. Relatedly, further analyses showed the differential involvement of specific frequency bands in each condition. Overall, our results suggest that preparation during attention and expectation acts through different mechanisms.

## **Keywords**

preparation, selective attention, expectation, EEG, MVPA



## Room 2 - Anfiteatro A

### Thematic Session 2

**Executive and Arousal Vigilance components: underlying mechanisms  
and modulations**



## Executive and Arousal Vigilance components: underlying mechanisms and modulations

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This thematic session brings together the five contributions on different aspects of executive and arousal vigilance. The different presentations will analyze the different underlying theoretical mechanisms, from a cognitive and brain perspective (oscillatory rhythms), together with the investigation of different modulators of the vigilance decrement: motivation, sleep deprivation, and tDCS.



# Psychometric-Curve Analysis of the Executive Vigilance Decrement: A Three-Mechanism Account

*Rafael Román-Caballero, Elisa Martín-Arévalo, Juan Lupiáñez*

*Mind, Brain and Behavior Research Center (CIMCYC), and Department of Experimental Psychology, University of Granada, Granada, Spain*

Previous literature has shown that the probability to detect the appearance of rare but critical events wanes over time, known as vigilance decrement. This progressive decline in performance has been attributed to a decrement in observers' ability to distinguish signal from noise (i.e., sensitivity loss), which is tied to a resource depletion account. Alternatively, a temporal shift in response bias (becoming more conservative) has been suggested, rather consistent with the withdrawal of attention from the primary task to internal thoughts. In non-binary signal detection tasks, in which there is a continuum between the distributions of signal and noise, the use of psychometric curves offers four types of measures: the scale of the S-shaped curve (sensitivity), the shift of the horizontal position (response bias), and the heights of the negative and positive asymptotes (mind wandering). Across tasks, this analysis finds that the vigilance decrement is mainly produced by a shift in response bias and an increase in lapse rate. Sensitivity decreases can also be observed in some tasks, probably related to a decay of the memory representation of the reference stimulus.



## Oscillatory rhythms underlying failures in executive and arousal vigilance

*Fernando G. Luna <sup>a)</sup>, María Julieta Aguirre <sup>a)</sup>, Elisa Martín-Aréval <sup>b)</sup>, Mariano Sigman <sup>c)</sup>, Agustín Ibáñez <sup>d)</sup>, Juan Lupiáñez <sup>b)</sup>, Pablo Barttfeld <sup>a)</sup>*

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Vigilance has recently been considered as two dissociated components: executive and arousal vigilance. The goal of the present study was to investigate the brain oscillatory rhythms underlying the failures in both vigilance components. Participants were 37 young adults (age:  $M = 25.86$ ;  $SD = 4.99$ ), who completed two experimental sessions in which they performed the ANTI-Vea, a 38-minute task that simultaneously measures the executive and arousal vigilance components, while the electroencephalography signal was recorded. Changes in delta (1-4 Hz), theta (4-8 Hz), alpha (8-14 Hz), beta (14-30 Hz) and gamma (30-45 Hz) frequency rhythms were analyzed, overall, and during the time before the appearance of the response stimulus. The association between these oscillatory rhythms and performance in executive vigilance (hits vs. errors and first vs. last blocks) and arousal vigilance (fast vs. slow responses and first vs. last blocks) was investigated. Results show that, while a reduction in alpha power predicts hits in the executive vigilance component, a smaller increase in delta power predicts a faster response in arousal vigilance. The implications of these findings will be discussed.



# HD-tDCS over the right posterior parietal cortex modulates the executive vigilance decrement: effects on behaviour and neural oscillations

Klara Hemmerich\* <sup>a)</sup>, Juan Lupiáñez <sup>a)</sup>, Fernando G. Luna <sup>b)</sup>, Elisa Martín-Arévalo <sup>a)</sup>

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To study vigilance—maintaining a prolonged state of preparation to detect and respond to specific, yet unpredictable environmental changes—and its inevitable decrement across time, a more nuanced conceptualization of the phenomenon seems fundamental; distinguishing arousal vigilance, as a general maintenance of a basic state of activation to respond rapidly and relatively automatically, from executive vigilance, where monitoring information is necessary and responses are more specific to critical targets. Based on previous findings of a specific effect of tDCS on executive vigilance (Luna et al., 2020), for the current study, sixty participants were randomly assigned to receive either anodal HD-tDCS or sham stimulation over the right posterior parietal cortex (rPPC), while performing the ANTI-Vea Task. EEG signal was registered and compared during pre/post stimulations blocks of the attentional task. HD-tDCS: i) reduced the executive vigilance decrement, in absence of an effect on arousal vigilance; ii) reduced the alpha power increment observed across time-on-task; iii) and incremented the gamma power increment with time-on-task. Interestingly, the parietal-alpha-power/frontal-gamma-power ratio seems to underlie the behavioral effect, although future research should replicate this novel outcome.

## Keywords

neuromodulation, vigilance, EEG, tDCS

## Acknowledgments

The work presented here, was already submitted for the cancelled meeting in 2020. The project in which this study is embedded was granted with the SEPEX scholarship (Becas SEPEX a la Difusión de Trabajos de Investigación Convocatoria 2019-2020).



# Dissociating the Effects of Task Demands and Non-Invasive Brain Stimulation on both Vigilance Decrement and Propensity to Mind Wandering in Sustained Attention Tasks

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When people perform sustained attention tasks, two processes usually occur across time-on-task: performance is affected by decrement in vigilance, and task-unrelated thoughts divert attention from the ongoing task, a process that is referred to as mind-wandering (MW). Recent theories about MW point to a reduction in executive control as the cause of the increment in task-unrelated thoughts, and it has been shown that MW rate may be increased through anodal tDCS over I-DLPFC. Here we addressed that contention in one single experiment in which we used two versions of the Sustained Attention to Response Task (SART) to vary cognitive control demands, and also applied HD-tDCS over I-DLPFC to promote MW. Contrary to our expectations, task demands affected decrement in performance across time-on task, being greater in the low-demanding than in the high-demanding SART, however, it did not affect MW. In contrast, tDCS increased MW compared with sham, irrespective of task demands.

The double dissociation argues against a common mechanism underlying both vigilance decrement functions and propensity to MW. The implications of such findings regarding current theories of MW are discussed.

## **Keywords**

vigilance decrement, mind-wandering, HD-tDCS



## Modulations of sleep deprivation and motivation on Executive / Arousal vigilance and executive control: An on-line sleep deprivation study with the ANTI-Vea task.

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Sleep deprivation has been shown to impair attention. However, not all attentional components are similarly affected. In the present study we investigated the effects of sleep deprivation, across a whole night without sleep, on Alertness, Attentional Orienting, Executive Control and Executive / Arousal Vigilance. Participants (N=60) performed the ANTI-Vea task every 4 hours starting at 8:00 AM until midnight, and then every two hours until 8:00 AM of the next day. Participants performed the task at home while being constantly on-line monitored by experimenters with their mobile phone camera. At 6:00 AM half of participants were motivated by being given extra money if they performed above 80% of all participants. Results showed important decrements along the night in Cognitive Control and Executive/Arousal Vigilance, with some compensation due to motivation at 6:00 AM. However, no effect on Alertness and Attentional Orienting were observed. Results are discussed in reference to overload and underload resources theories of Vigilance.



## Room 2 - Anfiteatro A

### Oral Session 5

**Moderator:** Julio Santiago



# Meta-analytic evidence for accuracy differences in the recognition of facial emotion expressions in ADHD

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Impairments in emotional processing have been consistently reported in Attention Deficit/Hyperactivity Disorder (ADHD) research. However, evidence regarding the recognition of emotional facial expressions in ADHD is still inconclusive. To shed light in this question, we conducted a meta-analysis on both reaction time (RT) and accuracy measures from studies that compared the identification of facial expressions in individuals with ADHD and controls. Inclusion criteria were as follow: (a) a clinical diagnosis of ADHD based on DSM or ICD criteria, (b) accuracy or RT measures in a facial emotional recognition task, (c) empirical research, (d) published since 1998 in English. Twenty-three articles met these criteria. The results show larger effect sizes for accuracy (angry and fear  $d' = 0.48$ ,  $p < 0.001$ ; happy  $d' = 0.37$ ,  $p < 0.001$ , and sad  $d' = 0.28$ ,  $p = 0.008$ ), than for RT (0.17, 0.21, 0.25 and 0.13 respectively, none of them were statistically significant). These findings suggest that RTs show greater heterogeneity across studies, while accuracy seems to be a reliable indicator of impairment in facial emotional recognition in ADHD.

## Keywords

emotion recognition, emotional processing, ADHD, meta-analysis



# What drives object preference? Visual and conceptual differences related to gaze behaviour

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In general, we prefer curved contours more than angular contours. In this study, we examined to what extent this preference is moderated by the interaction between visual and conceptual features. We conducted two preregistered experiments in which we used an image set of chairs and tables to examine the effects of Category (chair vs. table) and Contour (angular vs. curved) on preference and gaze behaviour. The stimuli shared similar gist statistics within categories. In Experiment 1, participants rated their liking of the chairs and tables while their eye movements were recorded. In Experiment 2, different participants judged the objects regarding their familiarity, contour, complexity, weight, and interest. Liking ratings were not significantly different between the curved and angular stimuli. Moreover, the number of fixations and average duration of fixations also did not show differences between the two versions. The curved objects were judged as more familiar, simpler, and interesting than the angular objects. We discuss the variability in preference for curvature, and the relationship between gaze behaviour and that preference.

## **Keywords**

object preference, curvature, category, contour, gaze behaviour

## **Acknowledgments**

This research was funded by the project PSI2016-77327-P (MINECO/AEI/ERDF, EU) granted by the Ministerio de Ciencia, Innovación y Universidades, the Agencia Estatal de Investigación (AEI) and the European Regional Development Funds (ERDF). E.G.C. acknowledges the predoctoral contract FPU18/00365 granted by the Ministerio de Ciencia, Innovación y Universidades.



# The contribution of features to recognize manipulable objects

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Features generation tasks figure centrally in our efforts to study how knowledge is organized in semantic memory. Our goal was to test the importance of different features for object recognition by creating a feature database of manipulable objects. One-hundred thirty participants freely generated features of eighty small manipulable objects, and another 32 participants generated action features for those objects. We then asked other participants to perform a feature verification task while we manipulated production frequency (Exp.2), and the relation between production frequency and distinctiveness (Exp.3). Participants had to answer if the feature belonged to the object as fast as possible, while their reaction times and accuracy were measured. Our results showed that participants were faster and more accurate when features had been more frequently associated with the target objects. Plus, participants were faster at verifying distinctive features when those were also high-frequent features, whereas the opposite occurred for distinctive features that were less frequent. Our experiment provides important insights into how object features may interact with object recognition as well as how distinctive features may be important for object recognition.

## **Keywords**

manipulable objects, features, property verification task, production frequency



# Exploring how spatial distance affects object construal in the mind's eye of blind and deaf people

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Hearing and visual loss change experience in important and different ways. Does thought change accordingly? Prelinguistic deafness turns visual hand signals into the natural communication modality. Their visual nature endows Sign Languages (SL) with a high degree of iconicity. This may result in SL users representing concepts more concretely (i.e., in a perceptually richer way). Blindness may also change how concepts are construed. As distance increases, sighted people conceptualize objects more abstractly. For blind people, objects beyond arm's reach lie at a distance which cannot be estimated (unless they make a sound), thus, very far away. Consequently, blind people may conceptualize objects within reach as concretely as sighted people do, but more abstractly at medium distances, as abstractly as for far distances. For testing these predictions, participants imagined objects at close, medium and far distances, and then choose between a perceptually and a non-perceptually based definition for these objects. Preliminary results from the deaf group support the hypotheses, while data from the blind group follow the expected pattern, but without reaching statistical significance when compared with the control group.

## Keywords

Construal Level Theory, linguistic relativity, bodily relativity, embodied cognition, language processing, visual and hearing loss

## Acknowledgments

The authors wish to extend their gratitude to all participants and to the personnel of the ONCE headquarters in Granada.



# Face name matching and memory complaints in Parkinson's disease

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**Objective.** The origin of memory impairment in Parkinson's disease (PD) remains unresolved. Also, little is known about these patients' subjective experience of memory difficulties and their relationship with memory performance. We adopt a neuropsychological and clinical approach to address these issues.

**Methods.** Fifteen individuals with PD and 15 healthy controls were assessed with an extended version of the Face-Name Associative Memory Exam (FNAME) and the Memory Failures of Everyday Questionnaire (MFE-28). We also explored which variable could best predict their memory complaints.

**Results.** Patients with PD exhibited lower performance in free recall, name recognition and matching, whereas face recognition was similar compared to the control group's. Importantly, when controlling for initial learning (i.e., encoding), group effects disappeared, except for matching. Associative memory was therefore significantly compromised in PD, and strongly predicted memory complaints.

**Conclusions.** The present study further clarifies the mnemonic profile in PD. Associative memory may constitute a sensitive measure to detect subtle memory deficits in PD. Thus, our study highlights the clinical value of including associative memory tests such as the FNAME in PD neuropsychological assessment.

## **Keywords**

FNAME, associative memory, Parkinson's disease, neuropsychology, neuropsychology



## **Room 3 - Anfiteatro B**

### **Oral Session 2**

**Moderator: Tânia Fernandes**



# Subjective Age of Acquisition norms for 1,604 words by Spanish-English bilinguals and their relationship with lexico-semantic, affective, sociolinguistic and proficiency variables.

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Subjective age of acquisition (AoA), the estimate of the age at which a word is acquired, is key when selecting the stimuli in psycholinguistic studies. AoA databases in English are used when testing a variety of phenomena in second language (L2) speakers of English. However, these have limitations, as the norms are not provided by the target population (L2 speakers) but rather by native English speakers. We asked native Spanish speakers L2 speakers of English to provide subjective AoA ratings for 1604 English words. We also gathered sociolinguistic and proficiency information and examined the relationship between a total of 14 lexico-semantic and affective variables (both in Spanish and English) and their L2 AoA ratings. We used Boosted Regression Trees, an advanced form of regression analysis based on machine learning and boosting algorithms. These variables explained 58.75% of the variability in our L2 AoA ratings, being English AoA the strongest predictor, followed by English familiarity, and the age at which participants started learning English. Our database is a useful tool to the research community running psycholinguistic studies in L2 English speakers.

## Keywords

subjective age of acquisition, database, second language speakers

## Acknowledgments

We would like to thank all the participants that took part in our study. We thank Lynn K. Perry and Bodo Winter for their assistance in accessing iconicity ratings in English.



## Remembering potential mates in a second language

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Human memory evolved to maximize our chances of survival and reproduction. For instance, recent studies have shown that faces are better recognized after being encoded in a mating (vs. a working) condition. The current study extended these findings and explored the role of emotionality as a proximal mechanism for this memory advantage through the manipulation of the language [native(L1) vs. second language(L2)] used in the task. Given the lower emotionality involved in L2, the effect should be mitigated in this condition.

Female participants assessed how desirable male candidates would be for a potential long-term romantic vs. work relationship based on facial pictures and associated descriptions. Afterward, they performed a face recognition (yes/no) task and recalled the descriptors presented during encoding. Condition (mating vs. work) was manipulated within-participants, and Language (L1 vs. L2), between-participants.

As expected, memory for faces was better in the mating condition, replicating the effect. However, the effect was observed in L1 but not in L2, suggesting emotionality might play a role in this memory advantage. Like in the original study, no differences occurred for the descriptors.



## Bilinguals may not see it coming in a second language: Event-Related Potentials to fortunate outcomes for antisocial agents

Andrea Aldariz <sup>a)</sup>, Pablo Rodríguez-Gómez <sup>b)</sup>, Carlos Romero Rivas <sup>c)</sup>, Sara Rodríguez Cuadrado <sup>c)</sup>, Eva M. Moreno <sup>b)</sup>, Alice Foucart\* <sup>a)</sup>

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Social factors have been shown to impact sentence comprehension in first language (L1), suggesting that language processing cannot be dissociated from social and moral feelings (e.g., empathy, compassion envy, schadenfreude) and our preference for prosocial over antisocial individuals (Rodríguez-Gómez et al., 2020). Given that processing emotion-laden pragmatic information is costlier in a second language (L2) than in an L1, we investigate whether language comprehension would be similarly impacted by these social factors in L2. We replicated Rodríguez-Gómez et al.'s study by presenting L2 speakers of Spanish (upper-intermediate level) with sentences comprising a fortunate or unfortunate outcome to social agents previously profiled as prosocial or antisocial individuals. Based on Rodríguez-Gómez et al.'s results, the P2, N400 and LPP time windows, showed similarities in L1 processing in that L2 speakers pay more attention to socially accepted characters (P2), regardless of the final outcome. They also tend to significantly reconsider unfortunate outcomes at a later time-window (LPP). Contrarily to L1, L2 speakers show costlier semantic processing in scenarios describing fortunate outcomes to antisocial characters. Social factors impact sentence comprehension differently in L2.

### Keywords

Event-Related Potentials, language, bilinguals, prosociality, N400, P2, LPP

### Acknowledgments

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## Room 3 - Anfiteatro B

### Thematic Session 5

**Current research in psychology of thinking: reasoning and cognitive biases**



## Current research in psychology of thinking: reasoning and cognitive biases

*Isabel Orenes\**

*Departamento de Psicología Básica I, Universidad Nacional de Educación a Distancia, Madrid, Spain*

The main goal of the present thematic session is to visualize the discipline of Psychology of Thinking within the Experimental Psychology. This discipline is mainly focused on analytical processes that ensure rational and critical thinking. This is the best tool to detect misinformation or wrongly constructed arguments. But, in addition, this discipline focuses on more intuitive, automatic and fast processes that despite being very useful in our daily life lead us to errors (biases, fallacies, illusions) in our thinking. We propose four talks about the research that we are doing in Spain. The first talk focuses on counterfactual thinking in children of different ages. The second talk presents how the grade of credibility of the premises consistently determines the acceptability of conclusions. The second part of this thematic session focused on how cognitive biases affect our reason. The third talk studies how a foreign language modulates reasoning (conditionals and the Wason task), and the last talk works on how repetitions of statements shift truth judgments.



# Conterfactual thinking and Responsibility attribution by children with mechanical devices

*Cristina Gordo, Jesica Gómez-Sánchez, Sergio Moreno-Ríos*

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In two experiments, we tested the reasoning of children and adults about the functioning of mechanical devices, using the structural model of outcome responsibility. We created a task in which participants were informed about the functioning of four wires in a battery. They had to decide whether a wire was critical in order for it to function and pivotal for the outcome. The structural model establishes that responsibility is computed by two independent factors related to forward and counterfactual inferences, respectively. In Experiment 1, we replicated previous results for adults with the new task and in Experiment 2, the results showed that children used the same mechanism of attribution of responsibility as adults, with older children making better judgments than younger ones. We also obtained a correlation between the pivotality parameter and an independent measure for counterfactual thinking. The results established that older children improved their judgment in the parameters predicted by the structural model and that judgment is related to an improvement in counterfactual thinking.

## **Keywords**

development of counterfactual reasoning, causal attribution



# The role of consistency in the belief dynamics of argumentative processes

Daniel Rivera Guajardo\* <sup>a)</sup>

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Consistency maintenance (i.e. contradiction avoidance) is considered a natural tendency of human belief system. This consistency works over degrees of belief, measured as subjective-probabilities (SP). From this, a model of belief dynamics through argumentation is proposed. It considers that, during argument processing, an epistemic monitoring process checks premises' contents against long-term memory ones, assessing so its SP. Then, premises' SP are combined resulting in conclusions' SP variations to preserve consistency with the premises.

Two experiments were done to test the effects of consistency on both conclusions' SP and online nature of arguments' SP assessment. First, argument premises' SP was manipulated in a 2 (major-premise: High/Low) x 2 (minor-premise: High/Low) fully factorial design, expecting systematic variations in the judged conclusions' SP reflecting consistency. Second, arguments so manipulated were presented for a reading comprehension task registering self-paced reading-times (RT). Effects of SP on RT due to epistemic monitoring process were expected.

Results showed that conclusion's SP vary as predicted by the model, and that believability assessment is done on-line. Believability varies obeying systematic adjustments to keep consistency during comprehension in argumentation.

## Keywords

belief, consistency, reasoning and argumentation, subjective probability, epistemic monitoring



## Deductive reasoning: are we less intuitive or more rational in our foreign language?

*Isabel Orenes\*, Iván Villanueva*

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The foreign-language effect has been found in many psychological processes. For moral problems, the effect reflects a tendency to make more utilitarian (rational) decisions in a foreign language than in their own native language, at least for low self-reported reading proficiency (see, Stankovic, Biedermann, & Hamamura, 2022). For reasoning, the tendency seems to go in the opposite direction, since a worse logical evaluation of syllogism has recently been found in the foreign language than in the native language. The purpose of this research is to investigate the foreign-language effect on further logical reasoning problems (conditionals, and the Wason selection task), taking into account reading proficiency. Two separated groups of Spanish-speaker participants solved the same set of reasoning problems but under different languages (foreign: English, or native: Spanish). Three well-known reasoning biases were examined: the negation of the antecedent and the affirmation of the consequent for the conditional problems, and the matching bias for the Wason selection task. We will discuss the results in terms of dual-process theory (System 1, intuitive reasoning, and System 2, deliberative reasoning).



# Illusion of falseness for the repetition of non-contradictory information

*David Beltrán*

*Psychology Department, Universidad Nacional de Educación a Distancia, Madrid, Spain*

Repetition is known to increase belief in repeated information. Yet, it can also produce illusions of falseness for non-verbatim repetitions that involve contradiction (e.g., “Barnaul is a mid-sized Russian city” after reading first “Barnaul is mid-sized Hungarian city”). This behavior seems at first semi-logical, rather than purely illusory. When a truth judgment is demanded, it reflects the capability to detect “formal” contradictions between statements about which we are unlikely to know the truth. However, I will show that we perceive “contradictions” even when, logically, there is none. Specifically, I will describe a novel illusion of falseness in which unknown statements (e.g., “Barnaul is a mid-sized Russian city”) are more likely judged to be false when they involve the repetition of compatible and well-known true statement (e.g., “Moscow is a mid-sized Russian city”). Importantly, this increase in false judgments is not observed when the unknown statement repeats false information (e.g., “Chicago is a mid-sized Russian city”). I will discuss these results in terms of basic, and illogical, mechanisms of semantic coherence.

## **Keywords**

repetition, illusion, truth, falseness, contradiction



## Room 3 - Anfiteatro B

### Oral Session 6

**Moderator:** Gonzalo de la Casa



# Temporal Control of Pigeons' Behavior in the Midsession Reversal Task

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In the Midsession Reversal Task (MSR), animals have to choose between two stimuli (S1 and S2): choices of S1 are reinforced in the first half of the trials whereas, choices of S2 are reinforced during the second half. At steady state, pigeons produce errors around the reversal suggesting that timing is controlling behavior. In a previous experiment, we trained two groups of pigeons in a MSR: one group with a 5-s and the other with a 10-s intertrial interval (ITI). Then, the ITI was doubled and halved respectively, for the first (G5-10) and the second group (G10-5). Results from G5-10 were consistent with timing while from G10-5 were consistent with a joint control by timing and reinforcement contingencies. We believe that testing with a shorter ITI prevented the expression of temporal control. Hence, we conducted another similar experiment with the exception that, besides increasing or decreasing the ITI, the testing session lasted more trials and all responses were always reinforced to prevent changes in reinforcement cues. Results differed between subjects and suggested that the cue controlling behavior varied between pigeons.



## Trading food for useless information

*Marco Vasconcelos\*, Marilia Carvalho, Armando Machado*

*Universidade de Aveiro, Aveiro, Portugal*

When offered a choice between two alternatives, animals sometimes paradoxically prefer the option yielding less food. For instance, pigeons and starlings prefer an option that on 20% of the trials presents a stimulus always followed by food, and on the remaining 80% of the trials presents a stimulus never followed by food (the Informative Option), over an option that provides food on 50% of the trials regardless of the stimulus presented (the Noninformative Option). In a sense, animals trade food for useless information. To explain this suboptimal behavior, we have hypothesized that animals ignore (or do not engage with) the stimulus that is never followed by food in the Informative Option. This experiment tested this assumption in starlings by making the Informative Option richer or leaner depending on the animals' choices: the probability of reinforcement in the Informative option decreased whenever they preferred this option and increased whenever they preferred the Non-informative option. The results were consistent with our hypothesis: starlings continued to prefer the Informative option despite its progressively leaner schedule of reinforcement.

### **Keywords**

suboptimal choice, optimality, probability, starlings



# Serial reversal learning in Starlings: Temporal or situational control?

*Armando Machado\*, Marco Vasconcelos, Marília P. de Carvalho*

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When pigeons choose between two stimuli, S1 and S2, with S1 rewarded during trials 1 to 40, and S2 rewarded during trials 41 to 80, they show two types of errors around trial 40 (i.e., when the positive stimulus changes from S1 to S2): They choose S2 slightly before trial 41 (anticipation errors) and they choose S1 slightly after trial 40 (perseveration errors). These errors are inconsistent with the simple and optimal win-stay/lose-shift strategy, that is, repeat the last choice if it was rewarded, but change it if it was not. Anticipation errors, in particular, suggest that pigeons time the mid-session moment of the positive-stimulus reversal. Decreasing or increasing the inter trial interval after the task was learned, revealed complex effects that only partly accorded with the timing hypothesis. In this talk, we extend the study to a new species, starlings, and introduce a new test design to disentangle temporal and situational sources of control. Our studies will contribute to understand how a global cue (time) and a local cue (reward) affect choice in a serial reversal learning task.

## **Keywords**

serial reversal learning, choice, timing, win-stay/lose-shift strategy, starlings

## **Acknowledgments**

William James Center for Research



# A Context-Induced Anxiolytic Conditioned Response Reduces Flavor Neophobia

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Flavor neophobia appears when an animal consumes a new flavor. In this work, we analyzed the effect of testing flavor neophobia in rats in presence of a context that had previously been repeatedly paired with sodium valproate, an anticonvulsant drug that has showed an anxiolytic action. Since previous results revealed that valproate resulted in an attenuation of neophobia (Shepard, 1988), we predicted that presenting the new flavor in presence of the context associated with the drug would induce a conditioned response that would result in a reduction of neophobia. In our first experiment we observed reduced neophobia to a new flavor for those animals injected with a vehicle and tested in presence of the context associated with the drug. Experiment 2 revealed that the unconditioned effects of the drug include a deleterious effect on the animals' locomotor activity that probably interferes with drinking behavior. These results are interpreted considering that the observed reduced neophobia was mediated by a conditioned response induced by the context-CS that mimics the anxiolytic effect of valproate but was not intense enough to affect locomotor activity.

## **Keywords**

classical conditioning, flavor neophobia, context, sodium valproate

## **Acknowledgments**

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# 6 May

## Room 1 - Grande Auditório

### Oral Session 7

**Moderator:** Daniel Sanabria



# Lay theories about mind-body dualism and lay theories about science: The role of first-person subjective experience

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In this work, we explore the notion of intuitive dualism – the idea that humans intuitively parse the world into bodies and souls – applied to psychological phenomena. Participants associated psychological domains with immaterial parts of people (e.g., mind, spirit, soul) when these were high in first-person subjective experience (e.g., love), whereas low first-person subjective experience domains (e.g., visual perception) were more strongly associated with material basis (e.g., brain). Moreover, this effect was even more pronounced when participants were deprived of resources (i.e., when responding under time constraints): their responses leaned even more towards the immaterial end of the scale, particularly for high introspection domains, suggesting intuitive dualism. Furthermore, participants reported experiencing conflict when rating the (im)material basis for psychological phenomena, suggesting that intuitive dualist beliefs are automatically recruited, and weighed even when individuals express their deliberate dualist beliefs. Exploring people’s dualist beliefs is important when considering the acceptance or rejection of scientific knowledge, as our studies show that individuals are more prone to rejecting the possibility of scientific explanation for phenomena that are associated with immaterial parts of people.

## **Keywords**

first-person subjective experience, intuitive dualism, folk epistemology, lay beliefs, intuitive theories



# A socio-metacognitive model of pluralistic ignorance: The case of prejudice

*Cristina Mendonça\*, André Mata*

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There is a gap between private opinion and public perception concerning prejudice: Even though most people profess not to be prejudiced, they believe most others are. We propose that people who do not manifest prejudiced attitudes may experience an intra-psychic conflict, such that, upon encountering members of certain stigmatized groups, first they feel compelled towards a prejudiced reaction but then control it. Because they felt how compelling their prejudiced gut reaction was, they infer that others' attitudes might be prejudiced. In several studies we test this hypothesis, by assessing 1) participants' implicit/automatic attitudes towards certain groups, 2) their explicit/controlled attitudes towards those groups, and 3) their inferences of what other people's explicit/controlled attitudes are towards those same groups. Across studies, and for a variety of social groups, we find that the higher the mismatch between participants' own implicit and explicit attitudes, the higher the mismatch between their explicit attitude and their perception of other people's attitudes. This socio-metacognitive model explains the negative beliefs that people have about others: People see in others the implicit biases that they themselves possess.

## **Keywords**

prejudice, pluralistic ignorance, metacognition, dualist models

## **Acknowledgments**

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# Components of causal illusion as a mediator of pseudoscientific beliefs.

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Believers in pseudoscience have been shown to develop stronger causal illusions in contingency learning tasks, suggesting that this cognitive bias could play a role in the development of pseudoscientific beliefs. This association has appeared regardless the nature of the conceptual scenario of the task (i.e., pseudoscientific, medical, and neutral). In active contingency learning tasks, where volunteers can manipulate the presence of a potential cause to explore its association with the outcome, performance reflects both their information search strategies and their information interpretation strategies. In a previous study, framed in a neutral scenario, the volunteers' search strategy was not associated with their endorsement of pseudoscience. The aim of the present study was to further analyse the possible influence of information search strategies in the association between causal illusion and pseudoscientific beliefs through an active contingency learning task framed in a medical scenario. Our results suggest that both information interpretation and search strategies could be significantly associated to the development of pseudoscientific beliefs.

## Keywords

causal illusion, pseudoscientific beliefs, contingency learning task, information interpretation and search strategies, conceptual scenario

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## Are we ready to prescribe physical exercise to boost brain and cognitive functioning?

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The practice of regular exercise has been associated with enhanced cognitive and brain functioning, based on correlational studies and the results of randomized controlled trials, which appear to support a cause-effect relationship. This evidence has fuelled the belief, both in the scientific realm and in the lay population, of physical exercise as an effective tool to enhance brain and cognition in healthy individuals and to prevent cognitive decline in the elderly. In this talk, we will critically review the evidence to date (including the results of a recent umbrella review), in order to weigh the claims regarding physical exercise in this context. We will also address what, in our opinion, are critical issues that need further consideration before implementing intervention programs to boost cognition at the population level: 1) quantification of the magnitude of the effect, 2) assessment of the robustness of the effect, 3) identification of moderator variables, and 4) identification of underlying mechanisms. These issues would in turn determine the messages in media reports and the implications of these interventions beyond the claimed effect on brain and cognition.

### Keywords

physical activity, cognitive enhancement, brain training, cognitive training



# Body weight distortions in an auditory-driven body illusion in subclinical and clinical eating disorders

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Previous studies suggest stronger influences of external visual signals on the body-representations of individuals with eating disorders (EDs) compared to healthy populations; however, the influence of other sensory signals remains unclear. Here we used an auditory-driven illusion to manipulate body size/weight perceptions and investigate whether body-representation mechanisms are altered in subclinical and clinical EDs using self-report, body-visualization, and gait measures. Across two experiments, we tested healthy women assigned to three groups based on self-reported Symptomatology of EDs (SED) and women with Anorexia Nervosa (AN). Participants' footstep sounds were altered to seem produced by lighter ('High-frequency' condition) or heavier ('Low-frequency' condition) bodies. Assuming an overreliance on external signals, we predicted an enhanced body-weight illusion in High-SED and AN participants. Unexpectedly, those participants displayed a gait typical of heavier bodies, and a widest/heaviest visualized body in High-Frequency. In contrast, Low-SED participants showed these patterns in Low-Frequency. Our results suggest a disturbance in sensory integration, rather than purely visually-driven body distortions, in subclinical/clinical EDs, advancing our understanding of body-representation and opening opportunities for novel diagnostic tools/therapies for people with/at risk of EDs.

## Keywords

auditory feedback, body image distortions, eating disorders, multisensory body perception, multimodal interfaces



## Acknowledgments

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## Room 1 - Grande Auditório

Conference Frederico Marques



## Adaptive memory: The mnemonic value of contamination

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*William James Center for Research*

Prémio APPE 2021

Humans likely evolved an adaptive disease avoidance system, the Behavioral Immune System, to mitigate the fitness costs posed by pathogens. We investigated the cognitive aspect of this system, specifically if human memory preferentially retains potentially contaminated items. In a series of studies, participants were shown pictures of objects described to have been touched by sick or healthy people. Half of the objects were accompanied with a short description of a symptom of sickness or with a face containing signals of infectious diseases (contamination condition); the other half of the objects were presented with a description of a physical characteristic or with a healthy-looking face (non-contamination condition). During the encoding phase participants had to decide if the object had interacted with a sick or a healthy person. Then, after a short distractor task, participants were given a surprise free recall task for the objects. Objects "touched" by sick people were better remembered than those "touched" by healthy people. When the faces were described as being of actresses using make-up to represent the disease-connoting cues, the effect was no longer obtained. These results reinforce the idea of an adaptive memory functioning as it promotes the retention of potential life-threatening elements.



## Room 1 - Grande Auditório

### Oral Session 10

**Moderator:** Pedro Albuquerque



# Can we learn from errors? The benefits of retrieval on learning – In memory of Paula Carneiro

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Whether unsuccessful retrieval can enhance, or harm subsequent learning is still an unresolved debate. The errorful learning perspective suggests that, when perfect learning has not yet been attained, errors can enhance future learning if followed by corrective feedback. Research on memory updating has shown that after retrieval, memory becomes more malleable and prone to change, generating a rich context for the incorporation of feedback. We provide evidence for this hypothesis using sentences that include pragmatic implications, commonly used for the study of false memories. First, in experiments with young adults, we observed that retrieval not only improved correct recall (replicating the testing effect), but also promoted the correction of false memories. Corrective feedback was more effective when given after errors committed during retrieval rather than during the mere presentation of information. And second, we compared error correction using pragmatic inferences between young adults and adolescents, considering differences in source monitoring processes and metamemory. We highlight the importance of using active retrieval strategies in the educational practice, even in contexts where students might be prone to making mistakes.

## **Keywords**

memory, learning, retrieval, false memories, feedback, updating.

## **Acknowledgments**

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# Temporal contiguity determines competition or facilitation between events in Action-Outcome learning

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Action-Outcome (A-O) learning enables humans and other animals to control the environment to fulfill their needs. In three experiments, we explored the role of an intervening signal on A-O performance and causal attribution. Using a Free Operant Procedure, we manipulated the temporal contiguity (i.e., time elapsed between the Action and presentation of the Outcome) of A-O and assessed whether an intervening signal competed, facilitated, or had no effect on A-O learning. Across experiments, we observed competition between signal and A-O performance when contiguity was strong (2 sec) and facilitation of A-O performance by a signal when contiguity was weak (6 sec). In terms of causal judgements, these were facilitated by signals with weak contiguity but were not overshadowed by the signal when contiguity was strong (unlike A-O performance). Hence, depending on the temporal contiguity between A-O, an intervening signal overshadows or potentiates the instrumental performance of participants. These results are discussed in light of associative learning models and underscore the key role played by temporal contiguity in determining cue-interaction phenomena.

## Acknowledgments

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# Model-based vs model-free behaviour in the two-stage task with improved instructions

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Human behaviour is driven by two processes running in parallel: goal-directed and habitual, each learnt through different strategies, model-free and model-based respectively. In model-free strategies, stimulus-response associations are strengthened when actions are followed by a reward and become weakened otherwise. In model-based learning, previous to selecting an action, the current values of the different possible actions are computed based on a model of the environment. In this study (N=59) we replicate an essential experiment from da Silva & Hare, (2020) using the two-stage task, where, contrary to previous results reporting hybrid model-free/model-based strategies, subjects are seen to deploy a purely model-based behaviour when they have an accurate model of the task, given by improved instructions. However, our results do not suggest a sole model-based behaviour, but rather a hybrid one. Furthermore, we conduct an additional experiment (N=59) where state locations in the two-stage task do not swap across trials (they do in the previous experiment). This modification, which is intended to induce a model-free component, indeed, does so, with a slight model-free shift with respect to the previous experiment’s results.

## Keywords

two-stage task, reinforcement learning, model-based, model-free

## Acknowledgments

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# The Benefits of Musical Training Across the Lifespan: Meta-Analytic Evidence of Causality and Selection Bias

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The interest in the cognitive and academic benefits of musical training has increased markedly. Most of the evidence, however, is correlational. Previous meta-analyses have yielded inconsistent results, possibly due to their reliance on vague definitions of musical training. We investigated the impact of musical training, defined as learning to play an instrument, in two separate meta-analyses in childhood-adolescence, and in aging. In the former, 32 experimental studies showed small improvements in cognition and academic skills, both in randomized and non-randomized studies. In the latter, we included nine correlational studies comparing older musicians with non-musicians, and four experimental studies involving short-term programs. Again, we found improvements in both types of studies, although benefits were greater in correlational ones. Our results support that learning to play an instrument can enhance cognition and academic skills. Also, the observation of baseline advantages for children who selected musical training (non-randomized studies) points to the involvement of both nature and nurture, with high-functioning individuals showing a higher probability of persisting with musical training, and long-term involvement in this activity leading to several neurocognitive enhancements.

Keywords

musical training, aging, cognitive training, academic achievement, meta-analysis



## Room 1 - Grande Auditório

### Oral Session 12

**Moderator:** Armando Machado



# Neural signatures of feedback-guided learning under reduced arousal levels

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Previous studies have shown that reduced arousal levels lead to maladaptive decision-making patterns that affect the ability to generate stable evidence-based strategies, suggesting that participants might be processing negative feedback information differently depending on their arousal level. Here, we implemented a probabilistic reversal learning paradigm in 29 healthy participants as they transitioned towards sleep. We will show how reduced arousal levels (i.e., drowsiness) lead to increased post-error slowing (i.e., higher reaction time after committing an error) together with a higher error rate (i.e., impaired accuracy), relative to a baseline arousal state (i.e., wakefulness), reflecting poor feedback processing (worse performance compared with baseline awake state) but preserved reward-seeking behaviour (participants are still able to perform the task above chance), in line with our previous reports. In addition, we will show how univariate (i.e., midfrontal theta band power) and multivariate (i.e., EEG multivariate pattern analysis) neural markers of feedback information processing uncover changes in space and time of neural activity associated with outcome-based adjustment of decision-making during reduced arousal levels compared with a baseline arousal state.

## Keywords

sleep, cognition, drowsiness, arousal, decision-making, learning, feedback processing



## Using neuromodulation to dissociate overlapping networks

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In this study, we focused on left lateral occipitotemporal cortex (LOTC), a region that responds both to hand and tool stimuli. Applying transcranial direct current stimulation (tDCS) to left LOTC, while participants performed either a hand- or tool-related training task, we would be able to specifically target the trained category, and thereby dissociate the overlapping neural processing. Then we also wanted to determine if these effects were limited to the target area or if they spread to other regions that are functionally related. After each combined tDCS and training session, participants viewed images of tools, hands, and animals, in an fMRI scanner. Using multivoxel pattern analysis, we found that tDCS on LOTC improved the classification accuracy between tools vs. animals, but only when combined with a tool training task (not a hand training task). Unexpectedly, tDCS on LOTC also enhanced classification accuracy for hands vs. animals when paired with a tool, but not hand training task. The observed effects were found locally and distally in the tool and hand networks – replicating previous findings – but only partially disentangling them.

Keywords

hands, tools, overlap, tDCS, connectivity



# Why there can ever be a statistical test that works as the “smoking gun” for scientific fraud or data fabrication

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We have been witnessing a growing concern (e.g., Wicherts, Nature 597, 153 2021) with scientific error, replication and fraud (see projects like Retraction Watch, PubPeer or Open Science) and new concerns about research and publication during the Covid pandemic. This concern has transpired to the media (see <https://www.nytimes.com/2018/11/19/science/science-research-fraud-reproducibility.html>) and has inspired changes in our publication policies and research procedures (e.g., Lindzay, 2015). Also, a series of tests have been proposed to detect the presence of bias in published research based on excessive success in H0 (e.g., Francis, 2012) or on an asymmetrical concentration of effect sizes conveniently near conventional level of significance (e.g., Simonsohn, Nelson, & Simmons, 2014). And new software has been proposed to detect statistical errors (e.g., Statcheck). Some of these concerns are hardly new. Fischer, himself, had already pioneered similar techniques to detect apparently fraudulent studies that challenged Darwinism (Fischer, 1936). In this communication, I proposed nevertheless that to expect the development of a statistical test that automatically detects fraud is hopeless from several points of view: philosophy of science, statistical test theories and social theory.



## Performing masked priming experiments online

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Masked priming is one of the most important paradigms in the study of visual word recognition, but it is usually thought to require a laboratory setup with a known monitor and keyboard. To investigate if this technique can be used in an online setting, we conducted two online masked priming lexical decision task experiments using PsychoPy/PsychoJS (Peirce et al., 2019).

We found that our online data are very similar to the masked priming data reported by Gomez, Perea, and Ratcliff (2013). Additionally, we found a clear effect of prime duration, with the priming effect (measured in terms of response time and accuracy) being stronger at 50 ms than 33 ms and no priming effect at 16 ms prime duration. From these results, we can conclude that modern online browser-based experimental psychophysics packages (e.g., Psychopy) can present stimuli and collect responses on standard consumer devices with enough precision. In sum, these findings provide us with confidence that masked priming can be used online, thus allowing us to reach populations that are hard to test in a laboratory.

### Keywords

online experiments, masked priming



## Room 1 - Grande Auditório

Emerging talent award



## [Exogenous] Attention: From Space to Representation

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We usually measure exogenous (spatial) attention as two consecutive behavioral effects across time: Facilitation and Inhibition of Return. The current line of research challenges the traditional and well-known spatial orienting–reorienting hypothesis behind these two effects, leading to alternative explanations beyond the orienting-reorienting of attention in space. The presentation will summarize some critical manipulations in spatial attention paradigms such as task-set, temporal properties between cues and targets, or intervening events between cues and targets throughout behavioral, electrophysiological, and neuromodulation data that shall light toward more representational explanations. Combining these previous data with evidence from brain damage and other domains such as working memory adds evidence to (representational) event files theories and provides a more promising framework to comprehensively understand the underlying mechanisms of exogenous attention.



## Understanding the plasticity of the language system

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The process of perceiving, comprehending, and producing speech requires the seamless coordination of segregated brain areas functionally organized in networks. One of the fundamental principles of the neurobiology of language is the existence of two brain circuits that connect different areas of the perisylvian cortex: a dorsal stream that specializes on phonological processes, and a ventral stream that plays a role in lexico-semantic processes. In this talk, I will describe neuroimaging and behavioural evidence from a healthy and clinical population supporting that: i) few complex processes can be explained by a one-to-one structure-function dependency; ii) different brain networks can subservise the same function, explaining individual differences observed in language learning, and in language symptomatology and recovery after stroke; and iii) at least in some cases, learning at a later age may modify the language system at the same level as if learning had occurred during childhood.

Overall, the existing variability within and between individuals reflects the flexibility of the language system and provides key information with clinical translation.



## Room 2 - Anfiteatro A

### Oral Session 8

**Moderator:** Pilar Ferré



# The role of variable retrieval in effective learning

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The most effective learning strategy described in the memory literature involves repeated spaced retrieval attempts, followed by feedback presenting correct answers. Here we investigated whether such a learning strategy can be further augmented by providing variable cues at each retrieval attempt. Across five experiments, participants were asked to learn translations of Finnish words via retrieval practice and subsequent feedback. These words were embedded in sentences, which either remained the same (constant retrieval) or were changed (variable retrieval) across five practice trials. In a final test, participants were asked to translate Finnish words without the context of a sentence. In all five experiments, we documented augmented memory for the variable retrieval condition. This effect interacted both with the retrieval practice effect – benefits of variable encoding were eliminated when learning did not involve retrieval from memory – and the spacing effect – benefits of variable retrieval were reduced when retrieval attempts were massed. Finally, metacognitive measures revealed that participants were largely unaware of the benefits variable retrieval practice confers. Together, the results document a novel and powerful learning technique.

## Keywords

Learning, Memory, Testing, Metamemory



# The facilitatory role of cognates in second language syntax learning

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According to the Lexical Bottleneck Hypothesis (Hopp, 2018), difficulties in second language (L2) lexical processing hinder syntactic processing. As such, cognates —which are processed faster than non-cognates— ease L2 syntactic processing (e.g. Hopp 2017). This study investigated whether cognates additionally facilitate L2 syntax learning. Two groups of 30 Spanish natives with no knowledge of Basque learnt a Basque-based artificial language. Each group learnt five Basque non-cognate nouns and either four Spanish-Basque cognate or non-cognate verbs through pictures. Then, each group was exposed to picture-sentence pairs, with sentences containing either a cognate or a non-cognate verb and following a case-marking rule. Rule learning was tested in a picture-sentence congruency task and a written production task. The congruency task suggested that rule learning was comparable for cognate and non-cognate learners. The production task showed that learning was higher for cognate learners. This is attributed to non-cognates being more costly to process than cognates and causing non-cognate learners to have fewer resources for rule learning. These results align with the Lexical Bottleneck Hypothesis and extend its postulates from L2 syntax processing to learning.

## Keywords

second language learning, rule learning, cognates, artificial language

## Acknowledgments

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## Rapid neural changes of L2 sign learning.

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Neural correlates of L2 sign learning were explored during intensive Catalan Sign Language (LSC) training. In three laboratory learning-sessions (24-48 hours apart), twenty-four non-signers were asked to learn 150 signs (associative learning task). LSC learning-related changes to the N400 ERP component were explored in two priming tasks. First, a sign lexical decision task included a semantic priming manipulation (prime and target being semantically related or unrelated). Second, a written semantic decision task (in Catalan), included a manipulation of the LSC phonology of the signs corresponding to the presented words (overlap of LSC phonological parameters). Results from both tasks revealed clear language effects arising in the third session of learning. In the LSC lexical decision task, N400 effects were obtained both for lexicality and semantic priming. Learning-related effects were also revealed as covert activation of LSC phonology while processing Catalan words in the semantic decision task. Altogether, these results demonstrate fast linguistic effects in the early stages of intensive vocabulary training across different language modalities.

### **Keywords:**

Sign language, L2 language learning, N400, covert language activation.

### **Acknowledgments**

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# Manipulating exposure length significantly impacts adult mono-and bilinguals' word order preferences of an artificial language

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Endress and Bonatti (2007, Cognition) show that exposure length to an artificial language (AL) impacts the nature of the representations extracted by the listener, and argue that short exposures favor the projection of generalizations. We examine whether familiarization length impacts adults' parsing of an AL previously used to test adults' and infants' word order preferences (see de la Cruz-Pavía, Marino & Gervain 2021, TICS for a review). The AL comprised strictly alternating frequent and infrequent elements and was rendered structurally ambiguous, allowing two possible segmentations: "phrases" could begin or end with a frequent element. These two segmentations mirror the two possible distributions of functors and content words found in natural languages. We first exposed L1Basque-L2Spanish bilinguals—languages with opposite word orders—and Spanish monolinguals to the AL, for either 17 minutes or 2 minutes (4 groups, n=24 each), then tested them on their word order preferences. Results revealed that manipulating the amount of exposure to the AL significantly impacted the two populations' word order preferences, even reversing it in the case of Spanish monolinguals.

## Keywords

language learning, artificial languages, speech segmentation, bilingualism

## Acknowledgments

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# The influences of iconic gestures on word recall and recognition

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The main goal of the present experiments was to study if the dynamic and temporal properties of representative gestures (iconic gestures) facilitate word memory, or it is simply the semantic content shared with the words. Two analogous experiments were carried out presenting iconic gestures, pictures or null primes to target words (nouns and action verbs). In Experiment 1, participants performed a free recall task of words. In Experiment 2 the task was one of recognition: in a second phase, participants had to press one of the two keys if the words were presented in the first phase. The results showed that participants recalled (Experiment 1) an equivalent number of words preceded by gestures or pictures compared to the words alone, with no prime. However, a significantly higher number of words were recognized (Experiment 2) when they were primed by iconic gestures compared to the other two conditions, this effect being clearer in verbs. These findings are discussed regarding the differences between the processes of recall and recognition as well as the particular characteristics of representative gestures.

## **Keywords**

iconic gesture, pictures, word recognition, word memory, recall

## **Acknowledgments**

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## Room 2 - Anfiteatro A

### Thematic Session 3

**The complexity of orthographic processing: An assessment from  
different perspectives**



## The complexity of orthographic processing: An assessment from different perspectives

Manuel Perea <sup>a)</sup>, Joana Acha <sup>\* b)</sup>, Miguel Lázaro <sup>\* c)</sup>, Melanie Labusch <sup>a)</sup>, Stéphanie Massol <sup>d)</sup>, Ana Marcet <sup>a)</sup>, María Fernández-López <sup>a)</sup>, Marta Vergara-Martínez <sup>a)</sup>, Nuria Rodríguez <sup>b)</sup>, Víctor Illera <sup>c)</sup>, Lorena García <sup>c)</sup>, Ana García <sup>c)</sup>, Ana Baciero <sup>a)</sup>, Jon Andoni Duñabeitia <sup>e)</sup>, Pablo Gómez <sup>f)</sup>

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Orthographic knowledge is a key skill involved in efficient reading and a result of a long learning process. Its impact in our daily lives justifies the large body of research devoted to orthographic processing. In this thematic session we present five different approaches to this issue.

In one communication, the ability of 8-year-old Spanish children to learn orthographic structures in an artificial orthography is explored. This study reveals the impact of alphabetic knowledge in the consolidation of orthographic structures involved in children's decoding and word identification skills.

In a second communication, we present a masked priming experiment study exploring the impact of case mismatch in word and pseudoword recognition (cloud -> CLOUD vs. CLOUD-> CLOUD). Bayesian linear mixed effects models show a matched-case congruency advantage for pseudowords, supporting the view that masked priming effects in lexical decision involve the integration of abstract letter/word representations rather than the integration of low-level elements.

The third communication presents an experimental series to evaluate how flankers modulate word recognition employing several manipulations (transposed letters, changed letters, vowel plus consonant transpositions etc.). The results inform about how orthographic knowledge can be explored through parafoveal processing of flankers, and reveal a flexibility of the cognitive system to process learned orthographic representations.

In the fourth communication, the role of diacritical vowels in access to orthographic representations is assessed. Do the vowels é, è, and e in French word élève /e.lɛv/



[student] share their abstract letter units? Results show a reading cost for the words with added diacritical marks.

The final presentation explores whether letter coding processes are modality specific, by testing letter transposed and substitution effects in Braille. Results suggest that the sensory modality receiving the information modulates the letter position coding mechanism. All results are discussed in terms of the current models of visual-word recognition.

### **Keywords**

artificial orthography, flankers, masked priming

### **Acknowledgments**

This thematic chair is proposed by Joana Acha and Miguel Lázaro



# Are goats chèvres, chévres, chēvres, and chevres? Cracking the orthographic code of diacritical vowels

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A fundamental issue for any universal model of visual-word recognition is the specification of the mental representations of diacritical vowels: Do the vowels é, è, and e in the French word élève /e.lɛv/ [student] share their abstract letter units? Here we examined this issue in French, a language that contains a complex variety of diacritical vowels in both number and function. In Experiments 1-3, using semantic categorization tasks, we compared the response times to intact diacritical words (e.g., chèvre [goat]) with a condition with the diacritics omitted (chevre) or replaced with an existing diacritic (e.g., chévre) or a non-existing diacritic (chēvre). We only found a reading cost for chévre vs. chèvre. In Experiments 4-5, we compared the semantic categorization times to intact non-diacritical words (e.g., cheval [horse]) versus a condition with an added existing diacritic (chèval) or an added non-existing diacritic (chēval). We found a reading cost for the words with the added diacritical mark in both cases. We discuss how models of visual-word recognition can encode diacritical vowels.

## Keywords

word recognition, lexical access, diacritics

## Acknowledgments

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# Do low-level features modulate masked identity priming?

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*Universitat de València, Spain*

Neural models of visual-word recognition assume that parameters such as letter-case or color rapidly vanish when mapping the visual input onto abstract letter/word units (Dehaene et al., 2005). Consistently, a number of masked priming experiments have shown that the lowercase-prime cloud and the uppercase-prime CLOUD are equally effective for the target word CLOUD. Critically, the picture is different for pseudowords: there is a processing disadvantage of case-mismatched pairs (geub-GEUB slower than GEUB-GEUB), suggesting that, for words, lexical feedback helps override the visual differences for mismatched-case identity pairs. Here, we designed a masked priming experiment to scrutinize at what processing level occurs the dissociation of case-mismatch for words and pseudowords by using a lower-level perceptual element (color: red, green). We factorially manipulated prime-target color congruency and prime-target case congruency in identity pairs. Bayesian linear mixed effects models showed a matched-case congruency advantage only for pseudowords ( $b = -21$ ; 95% crl [-33.0, -9.7]), that was not modulated by prime-target color congruency. Thus, masked priming effects in lexical decision involve the integration of abstract letter/word representations rather than the integration of low-level elements.

## **Keywords**

masked-priming, lexical decision, word processing

## **Acknowledgments**

I am one of the receivers of the "Becas SEPEX a la Difusión de Trabajos de Investigación"



# A study of orthographic and morphological processing in a flanker task: the role of letter length in parafoveal processing

Miguel Lázaro\* <sup>a)</sup>, Lorena García <sup>a)</sup>, Ana García-Gutiérrez <sup>a)</sup>, Víctor Illera <sup>a)</sup> Joana Acha <sup>b)</sup>

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It was an experimental series replicating the procedure of Grainger et al. (2018, 2020), i.e., a flanker task within the lexical decision paradigm analyzing RT and errors. Based on previous studies (e.g., Hyönä & Bertram, 2004 proposing the visual acuity hypothesis) we defend that readers cannot process the flankers and targets with just one fixation, so parafovea can be argued to be responsible for flanker processing (short RTs observed do not support two fixations).

We apologize if letter altering was not clear. We referred to replaced letters as you suspected. We have tried now to be more concise but also clearer.

With different facilitative effects we meant that all experimental effects reached significance with respect of the control condition but with no differences each other. It is true that the text was not very clear. We have modified it.

With transparent words and opaque words, we referred to corner-like stimuli and hunter-like stimuli.

## Keywords

flankers, lexical decision task, morphological processing, orthographic processing



# The role of alphabetic learning abilities on children's decoding and word identification: Evidence from an artificial orthography

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This study explored the ability of 8-year-old Spanish children to learn an artificial orthography. In a first training phase, children learned the names corresponding to nine artificial letters. One consonant was a context-dependent letter and two were inconsistent letters that shared the same sound. In a second exposure phase children learned words made from those letters. The post-training test consisted of a reading aloud task and an orthographic-choice task in which the learned word was presented with a distracting pseudoword equal to the target except for a vowel or for a consonant. Results showed that the letter learning ability predicted reading and identification accuracy, except for words with inconsistent letters, which were problematic in the consonant substitution condition. These results mimicked the pattern observed in the same sample when the same abilities were evaluated in Spanish. This paradigm offers a new tool to explore the process of orthographic learning in transparent orthographies, and confirms the key role of alphabetic knowledge attainment in children's further decoding and word identification skills.

## Keywords

artificial orthography, learning, reading development, orthographic knowledge

## Acknowledgments

The authors acknowledge the invaluable help of all the children and families that willingly have taken part on this study.

We confirm that the study has been conducted under the guidelines of the ethical committee of the University of the Basque Country UPV/EHU, project approval reference project approval reference M10\_2017\_158, and has been partially supported by Grant Number PID2020-116740-GB100.



# Raeding with the fingres: Letter position coding in braille word recognition

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Letter position coding in word recognition has been widely investigated in the visual modality, but not as much in the tactile modality (braille), leading to an incomplete understanding of the degree to which the process is modality dependent. Unlike sighted readers, braille readers do not show a transposed-letter confusability effect with non-adjacent transpositions. However, it is still unknown whether such effects can be found for adjacent transpositions, as happens in the auditory modality. Here, we examined whether pseudowords created by transposing two adjacent letters of a word (e.g., laboartory) are more confusable with their base word (laboratory) than pseudowords created by replacing those letters (laboestory) in braille. We used a lexical decision task in which blind individuals had to indicate whether the stimulus was a word or not. We found transposed-letter confusability effects: the transposed-letter pseudowords were more confusable with their base word than the orthographic controls. Our results suggest the limitations of the sensory modality that receives the information modulates the letter position coding mechanism, making the signal less noisy for those modalities whose processing is more serial.

## Keywords

Letter position coding; word recognition; braille



## Room 2 - Anfiteatro A

### Thematic Session 4

**Unpacking the intersection between attention and memory: How and whether transient shifts in attention impact short- and long-term memory representations**



# Unpacking the intersection between attention and memory: How and whether transient shifts in attention impact short- and long-term memory representations

Maïka Telga <sup>a)</sup>, Javier Ortiz-Tudela\* <sup>b)</sup>

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*b) Goethe Universität, Frankfurt, Germany*

The way in which we attend to information influences how well we encode it. This intuitive idea received relatively little empirical study until a few decades ago, for the domains of attention and memory developed largely independent of each other. Recent research has explored and revealed potential links between transient shifts in attention and memory encoding. Shifts in attentional processing in accordance with task demands have effects on both short- and long-term memory. Specifically, increases in task demands are thought to upregulate attentional processing for task-relevant representations, which can in turn benefit memory encoding. However, increasing task demands has also been shown to have detrimental effects on memory in more traditional settings. Disparities between experimental paradigms used to trigger attentional shifts at study are likely responsible for the mixed pattern of findings. The aim of the present symposium is therefore to bring together researchers who examine a similar conceptual problem but through different approaches and methodologies in order to attempt to outline a theoretical consensus.



# Prediction errors as triggers for enhanced attention and subsequent remembering.

*Javier Ortiz-Tudela\**

*Goethe Universität, Frankfurt, Germany*

There is a large amount of evidence showing that prediction errors (PE) are responsible for a wide variety of immediate behavioral and electrophysiological responses. Most of these responses are compatible with enhanced selective attention towards the events causing the PEs. However, when it comes to the long-term memory consequences of encountering such events, evidence and theoretical proposals are mixed at best. Are unpredicted events better remembered than predicted ones? Or, conversely, are events that are compatible with our previous knowledge, and hence predictable, better remembered than those that mismatch our previous knowledge? In this talk I will review previous evidence on the topic, discuss some integrative proposals, and present our own data trying to address this conundrum through two different approaches: statistical learning and semantic schemas. Finally, I will argue that, in order to solve this ongoing debate, taking into account attentional mechanisms at encoding is going to be crucial.

## **Keywords**

Attention, prediction errors, episodic encoding



## Processing disfluency, transient shifts of attention, and recognition memory

*Bruce Milliken\*, Hanae Davis, Tamara Rosner*

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Rosner et al. (2015) reported a study in which an increase in selective attention demands in a study phase improved recognition memory in a later test phase. This finding aligns broadly with the conflict monitoring framework, according to which conflict during the study phase could upregulate cognitive control and in turn strengthen episodic encoding. However, results gathered subsequent to that initial study, both in our lab and other labs, have failed to support a conflict monitoring account of such results. Here we report results from additional experiments on this topic, and we introduce an alternative account of our findings. This alternative account hinges on the idea that processing disfluency often triggers analytical processes that heighten the encoding of conceptual information, which in turn can facilitate remembering. We discuss how our findings align with this alternative view, as well as possible links to other empirical areas of study (e.g., dual process accounts of recognition memory, dual process accounts of reasoning).



# Does inconsistency enhance attention? Assessing memory effect of attentional biases in social and settings.

*Maïka Telga\*<sup>a)</sup>, José A. Alcalá<sup>b)</sup>, Anabela Cantiani<sup>c)</sup>, Juan Lupiáñez<sup>c)</sup>*

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Humans possess a remarkable ability to group together stimuli sharing similar features into relevant categories. In both social and non-social domains, this process of categorization allows us to rely on previous knowledge to form expectations and behave accordingly. A large body of research suggests that when stimuli violate our expectations, they receive increased attention which may differentially impact learning and memory. In the present research, we used an adaptation of the trust game to present participants with expectation-consistent and expectation-inconsistent stimuli under different task demands. Participants' memory of those stimuli was later tested. Measures of recognition (i.e., determining whether a stimulus has previously been presented) and recall (i.e., retrieving what was the specific behavior of a stimulus) revealed different patterns of results. Participants recognized better the stimuli that were individually associated with greater rewards (attentional bias for learned value) but recalled better those that did not violate their expectations (attentional bias for certainty), independently of the demands of the task. We discuss these results along the current models of attention, learning, and memory.



# Prior semantic relations, but not conflict, modulate color-word contingency learning in a Stroop-like task

*David Gallego, Castor Méndez, Luis Jiménez*

*University of Santiago de Compostela, Spain*

Recent research regarding the relation between learning and cognitive control has stated that conflict level modulates learning. However, Jiménez et al. (2021) found no influence of conflict level in color-word contingency learning of diagnostic neutral words. In a recent study, we observed that episodic effects do not eliminate the contingency learning in a color word - color paradigm, as opposed to what has been found with neutral words. In this study we analyzed whether color-word contingency learning is modulated by prior semantic relations between their elements. Two groups of participants responded to the color of Stroop-like stimuli. We presented either color words or neutral words to each of these two groups (Color vs. Neutral words groups). We found contingency learning in both neutral and color word groups, with a higher contingency effect in the latter. In fact, we observed contingency learning in the color word group in both congruent and incongruent trials. These results suggest that color word contingency learning might not be modulated by conflict, but depends on the prior semantic relation existing between the elements of the pairing.

## **Keywords**

cognitive control, contingency learning, Stroop task



# Experts panel discussion. Unpacking the intersection between attention and memory: How and whether transient shifts in attention impact short- and long-term memory representations

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Most models of attention and memory still lack a comprehensive understanding of the relationship between transient attentional shifts and enhanced memory performance. The plethora of experimental paradigms and the scarce cross-talk between researchers makes it difficult to build a common framework. The aim of the present symposium is to discuss data coming from paradigms that are different on the surface but that address a similar conceptual question. This last slot of the symposium will gather well known experts in the fields of attention, learning and memory that will attempt to integrate the presented data into existing accounts of the interplay between attention and memory. Together with their insights on the topic, questions from researchers in the audience will be also welcome in this interactive panel discussion.

## Keywords

attention, episodic encoding, short-term memory, long-term memory



## Room 3 - Anfiteatro B

### Oral Session 9

**Moderator:** Teresa Garcia Marques



# Going with your gut or thinking it through? The role of context and individual differences on decision-making preferences.

Filipe Loureiro\* <sup>a)</sup>, Teresa Garcia-Marques <sup>a)</sup>, Duane T. Wegener <sup>b)</sup>

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Despite evidence of reliable trait-like differences in people's preferences to make decisions intuitively or analytically, research has recently highlighted the importance of context characteristics in such preferences. One of such characteristics is choice complexity. Whereas choices perceived as complex elicit a greater preference for analytical decision-making, choices perceived as simple elicit a greater preference for intuition (Inbar et al., 2010). Here, we tested the direct and interactive effects of choice complexity and decision-makers' cognitive styles on explicit preferences for intuition and analysis. Furthermore, we examined the role of perceived validity of intuition and analysis as mechanisms underlying such preferences. Results from two studies evidenced consistent preferences for intuition in simple choices (purchases of simple products) and analysis in complex choices (purchases of complex products). Additionally, preferences for intuition(/analysis) were higher among more intuitive(/analytic) participants. Furthermore, individual differences in perceived validity of intuition and analysis mediated the effects of cognitive styles on preferences, being this effect clearer for complex choices. These data suggest that both contextual features and cognitive styles influence decision-making preferences, which are partially guided by their perceived validity.

## Keywords

Intuition, analysis, decision-making, perceived validity



# The cognitive basis of cooperative decision-making: Experiments on uncertainty, frames, and time constraints

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Several research show that cooperation decreases under social and environmental uncertainty. Concurrently, the social heuristics hypothesis suggests that cooperation appears to be a default strategy in social interaction.

We performed three experiments testing the effect of intuition on cooperation in iterated loss frame prisoner's dilemma games involving uncertainty (experiment 1). This was followed by two more experiments investigating the effect of one-shot vs. iterated games combined with deterministic vs. outcome uncertainty; gains vs. losses; and with vs. without time pressure.

Participants start by cooperating and cooperate less as the experiment progresses, suggesting a learning process. However, the initial cooperation tendency is resilient, as when partners change, it resets to the same initial value. Results from the one-shot experiment showed increased cooperation when participants were forced to decide quickly. Both results support the social heuristics hypothesis. In the iterated version, participants under uncertainty conditions cooperated more than under deterministic conditions. Finally, a significant interaction was observed between the type of frame (gains or losses) and game type, suggesting that, in the deterministic version of the game, gains led to less cooperation.

## **Keywords**

cooperation, intuition, uncertainty, dual-process models, prisoner's dilemma



## Whom to trust? Remembering facts in a social context

Aleksandra Krogulska <sup>a)</sup>, Kinga Izdebska <sup>b)</sup>, Maciej Hanczakowski <sup>c)</sup>, Katarzyna Zawadzka\* <sup>d)</sup>

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We investigated whether people can discriminate between reliable and unreliable sources of information based only on the cues provided by these sources and their own knowledge. In Experiment 1, participants completed two recognition tests for well-known (test 1) and obscure facts (test 2). Some questions in both tests were displayed with “true” or “false” cues coming from two social sources, one reliable and the other unreliable. Participants were equally inclined to borrow responses from both sources, regardless of their accuracy. Experiments 2 and 3 kept only the test for obscure facts, and preceded it by a learning phase for the to-be-tested facts. Regardless of whether the test was immediate (Experiment 2) or delayed (Experiment 3), a subset of participants was then able to correctly identify the reliable source and modify their response borrowing accordingly, so that they mostly followed the cues from the more accurate source. These results provide evidence that selective use of external information requires a solid foundation in one’s knowledge base.



## Sequence knowledge in ADL - the case of tea-making: an fMRI study

Giorgia Ricchetti\* <sup>a)</sup>, Bogna Drozdowska <sup>b)</sup>, Rosanna Laverick <sup>c)</sup>, Winnie Chua <sup>c)</sup>, Emilie Jean-Baptiste <sup>c)</sup>, Alan Wing <sup>c)</sup>, M<sup>a</sup> Jesús Funes <sup>a)</sup>, Pia Rotshtein <sup>c)</sup>

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The current study aimed at identifying neural mechanisms involved in detecting errors and predicting the next step in activities of daily living (ADL). 20 young healthy participants were presented with different tea-making sequences. Sequences could be either correct or incorrect (including omission, repetition or violation errors) and participants had to judge sequence accuracy. Incorrect sequences elicited stronger responses bilaterally in inferior frontal and middle temporal gyri. Responses to repetition were stronger than omission in left inferior parietal and superior frontal. Stronger responses for violation than omissions were observed in bilateral prefrontal gyri. Regions in bilateral middle temporal, right inferior parietal and within anterior and posterior cingulate showed higher sensitivity to unpredictable than highly predictable steps. Data showed that multiple neural mechanisms are involved in monitoring the accuracy of ADL sequences, with different areas monitoring for different sequence events. Specifically neural responses are more sensitive to detecting an execution of erroneous step than an omission of step, which likely explain the prevalence of omission errors in ADL. Monitoring events based on sequence history involved middle temporal and medial prefrontal regions.



# Fluent processing leads to positive evaluations even when base rates suggest negative evaluations

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Fluency is the experienced ease of mental operations, which increases the subjective positivity of stimuli attributes, such as beauty or truth. This may happen because fluency is an inherently positive experience. Alternatively, the interpretation of fluency may be malleable and context-dependent. We test pseudocontingencies (PCs) as a mechanism through which fluency's meaning is learned. PCs are inferred correlations between two attributes due to the observation of their jointly, albeit uncorrelated, skewed base rates – people relate what is frequent in one attribute to what is frequent in the other. We used the context of online markets with seller evaluations as DV. We manipulated base rates of seller name-fluency and seller reputation, creating conditions where fluency aligned positively or negatively with reputation. However, we observed no PCs between fluency and seller reputation: participants evaluated high-fluency name sellers more positively across base-rate conditions. We discuss the implications for the debate regarding fluency's positive vs. malleable nature.

## Keywords

fluency, positivity, pseudocontingencies, pronounceability

## Acknowledgments

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## **Room 3 - Anfiteatro B**

### **Oral Session 11**

**Moderator:** Pedro M. Paz-Alonso



# Parieto-occipital connectivity during correct and incorrect feature integration

Pablo Rodríguez-San Esteban\* <sup>a)</sup>, Ana B. Chica <sup>a)</sup>, Pedro M. Paz-Alonso <sup>b)</sup>

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Our sensory system constantly receives information from the environment and our own body. Despite our impression to the contrary, we remain largely unaware of this information and often cannot report it correctly. While perceptual processing does not require conscious effort on the part of the observer, it is often complex, giving rise to errors such as incorrect integration of features (illusory conjunctions). In the present study, we use functional magnetic resonance imaging to study the neural bases of feature integration in a dual task that produced around 30% illusions. A distributed set of regions demonstrated increased activity for correct compared to incorrect (illusory) feature integration, with increased functional coupling between occipital and parietal regions. By contrast, incorrect feature integration (illusions) was associated with increased occipital (V1-V2) responses at early stages, reduced functional connectivity between right occipital regions and the FEF at later stages, and an overall decrease in coactivation between occipital and parietal regions. These results underscore the role of parietal regions in feature integration and highlight the relevance of functional occipito-frontal interactions in perceptual processing.

## Keywords

feature Integration, functional connectivity, illusory conjunctions



# A comparison of sound and vibration as stimulation sources for a sensory substitution glove

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Sensory substitution devices (SSDs) enable blind users to detect information traditionally accessed via the visual system using touch and/or hearing. It has been debated which would be the best sensory modality for the SSDs. We conducted an experiment with a sensory substitution glove providing vibrotactile and/or acoustic stimulation contingent on the exploration of the user. Participants were asked to grasp cylinders with different diameters (8, 6 and 4 cm), at three distances (30, 25 and 20 cm) and three directions (150, 120 and 90°). A total of 10 participants performed the experiment using vibration, another 10 using sound and finally 10 participants used sound and vibration together. The object was correctly grasped in 84% of the trials, independent of its diameter, distance and direction. Moreover, we did not observe significant differences among the three modality conditions. These results suggest that there is not a dominant sensory modality. Rather than the type of stimulation, the most important aspect of the SSD may be the contingency of the stimulation on the user's exploration.

## **Keywords**

sensory substitution, grasping, haptics, acoustics



# Is there a time to recognise faces? Early ERP correlates of chronotype and time-of-day effects on face recognition

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Although face recognition is a pervasive and important ability in daily life, recognition of unfamiliar faces is difficult and highly error prone. The present study aimed to understand how chronotype and time-of-day (TOD) influence early electrophysiological activity associated with the recognition of faces. Twenty-seven participants (15 morning-types and 12 evening-types) performed two modified sequential versions of the Glasgow Face Matching Task at their peak and non-peak times (7:30 am and 7:30 pm), while their EEG was recorded. The task consisted in the presentation of 80 sequential pairs of faces, and participants were required to indicate whether the second face of each pair was the same or different from the first face. Results indicated a significant chronotype x TOD interaction on the P100 component, with morning-types registering higher amplitudes in the evening session, compared to the morning session. A non-significant opposite pattern was observed in evening types. Response accuracy was strongly positively correlated with P100 amplitudes. No significant differences were observed for the N170 component, nor on behavioural performance. These results suggest an early visual attentional asynchrony effect.

## Keywords

chronotype, time-of-day, synchrony effect, asynchrony, face recognition, Glasgow face matching task, event-related potentials, P100, N170

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# Shapes contour affects visual preference in real paintings

*Enric Munar\* <sup>a)</sup>, Erick G. Chuquichambi <sup>a)</sup>, Carlos Rey <sup>a)</sup>, Alejandro Dorado <sup>a)</sup>, Robert Pepperell <sup>b)</sup>*

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Some specific aesthetic experiences owe fundamentally to the perceptual attributes of the stimuli. Several perceptual attributes affect preference both in objects in general and artworks in particular. In the last decade, a perceptual attribute considerably studied in the framework of visual preference has been the kind of contour, curved versus sharp-angled. The main objective of the two studies we show was to test whether the effect of contour on preference also appears in real paintings in cultural contexts, a gallery and a museum. We used 48 paintings created by Professor Robert Pepperell. The paintings were divided into 16 sets, each featuring three different versions of an artwork containing the same colours and similar shapes, with the exception that the contours of the shapes varied among the three versions: curved, sharp-angled, and mixed. In a liking task, participants preferred significantly more the curved versions in both studies. However, the significance of this difference was not clear in two wanting tasks. We discuss these and other results regarding the theoretical background of previous studies.

## **Keywords**

visual preference, experimental aesthetics, liking, wanting, art

## **Acknowledgments**

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## Room 3 - Anfiteatro B

Oral Session 13 - Isabel Fraga



## Rapid acquisition of new emotional language: Behavioral and oculomotor evidence

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The mechanisms of novel word representation have been extensively explored at surface levels. However, little is known about the formation of word-forms and corresponding modality-specific representations attributed via sensory-motor or emotional systems. We examined this question by training 12 novel visual-word forms in association (x10 exposures) with emotional (positive and negative) and neutral-valence sounds. Post-learning evaluation included free recall and letter categorization tasks. In the latter, trained words were presented together with familiar emotional words, each of them followed by a letter probe (e, з) in up or down screen position. Participants were asked to categorize probes pressing the corresponding key and behavioral and eye-movement data were recorded. Results revealed better retrieval for novel words trained in emotional than neutral condition. Furthermore, eye-tracking data showed faster first fixation onsets and saccade initiations for novel emotional words than neutral ones. Importantly, no differences were found between trained and familiar emotional words, indicating facilitated lexical processing for newly learned vocabulary. Interestingly, key-press latencies were delayed for probes presented in spatial locations incongruent with the emotional valence of the preceding word (e.g., positive-down).

### Keywords

word learning, emotional processing, embodiment, eye-tracking



# ERP evidence on how arousal accounts for the inconsistent effects of negative valence in word recognition

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While there is abundant literature on how the emotional content of words affects visual word recognition, there are many inconsistencies regarding the direction of the reported effects, especially in unpleasant words. Most of previous research in this area has only considered affective valence, and not arousal, as the indicative of word emotionality. Recent studies suggest that arousal might explain these inconsistencies (Hinojosa et al., 2020).

The present research aims to study the role of arousal in unpleasant word recognition. To do that, we carried out an ERP experiment in which participants performed a lexical decision task that included unpleasant words which could vary across three levels of arousal (intermediate, high, and very high) and words which were neutral in valence and had an intermediate level of arousal.

Results showed differences in EPN and LPC amplitudes between unpleasant and neutral words, but only when both had intermediate levels of arousal. Within unpleasant words, those intermediate in arousal evoked smaller LPC amplitudes than words that were high or very high in arousal, evidencing that arousal can affect unpleasant word recognition.

## Keywords

arousal, valence, lexical decision task, visual word recognition, Event-Related Potentials (ERPs)



# An ERP study on cognitive flexibility and our ability to integrate new evidence in reading contexts

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Cognitive flexibility allows individuals the integration of external evidence into previous expectancies. Individual differences in this ability were examined by using a Bias Against Disconfirmatory Evidence (BADE) test. Event-Related Potentials (ERPs) were also recorded while participants were exposed to new evidence that could sometimes disconfirm initial thoughts. Thus, the written scenarios prompted to make a prediction while either confirmatory or disconfirmatory evidence followed. The BADE test clustered participants into high and low cognitively flexible individuals. ERPs revealed that whereas both groups typically reacted to unexpected endings (a classical N400 effect) within the confirmatory evidence condition, this effect was reduced for the high relative to the low cognitively flexible group. Furthermore, ERP responses to initially (un)expected endings preceded by either confirmatory or disconfirmatory evidence qualitatively differed between these two groups. Low cognitively flexible individuals exhibited an N400, whereas high cognitively flexible ones showed a P600 effect for unexpected endings in the disconfirmatory condition. We take these electrophysiological results as clear evidence that cognitive flexibility is a modulator of new evidence integration. ERPs provide a useful tool to explore individual differences in the integration of new information.

## Keywords

cognitive flexibility, BADE, ERPs, N400, P600



# Spelling Errors by Spanish Children When Writing in English as a Second Language

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Spelling patterns of foreign language learners may not be similar to native speakers', especially if native and foreign language differ in terms of orthography. In this study, we explored spelling patterns of Spanish children learning English as a foreign language at school. Errors taken from free narrative samples in English provided by children attending 4th, 5th and 6th grades (n = 136) were analyzed. The classification consisted of a three levels procedure based on the triple-word-form theory (Phonology, Orthography and Morphology), the affected features (digraphs, doubling graphemes...) and the POMAS system. We also explored the cross-linguistic effects of Spanish on English spelling. Our results barely showed changes across grades, but they did evidence more errors related to orthography compared to phonology and morphology. This study broadens the knowledge about the spelling of foreign language learners, and the interference that native language may have when differing from the foreign language in terms of orthography. Educational implications to improve foreign language instruction at schools are provided.



# Modality effects in cross-language co-activation: Evidence from bimodal bilinguals

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This study investigated cross-language, cross-modal lexical access and the role of sub-lexical units. We ran two eye-tracking experiments on parallel activation in spoken Spanish and in Spanish Sign Language (LSE) in 56 hearing bimodal bilinguals using the visual world paradigm. Experiment 1 investigated parallel phonological competition in Spanish from words sharing onset or rhyme while seeing LSE signs. Experiment 2 investigated parallel competition in LSE from signs sharing handshape or location while hearing Spanish words.

The results showed co-activation of the spoken language by signs, and, vice versa, co-activation of the signed language by spoken words. In Experiment 1, this was shown through word onset competition (but no rhyme competition). Experiment 2 showed evidence of effects from both location and handshape competitors, with location competition preceding handshape competition. The timing of the sub-lexical effects suggests that location and handshape play a central role in the organization of the sign language mental lexicon. More generally, these findings demonstrate that cross-language co-activation can occur even between languages that have no phonological overlap.

## Keywords

sign language, bimodal bilingualism, modality, mental lexicon, cross-language co-activation, cross-modal co-activation, eye-tracking, visual world paradigm

## Acknowledgments

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# 7 May

## Room 1 - Grande Auditório

### Oral Session 14

**Moderator:** Karl Magnus Petersson



## Easy to process, hard to control: fluency driven challenges to cognitive control

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Recent research suggests that the monitoring system of control could be sensitive to changes in information processing fluency and use negative affect as a signal to initiate top-down regulation. Critically, if the activation of control relies on the detection of these affective cues related to information processing, feelings of ease-of-processing may mislead the monitoring system and relax control mechanisms instead of activating them. To test this hypothesis, we have built an interference task comprised of trials varying in perceptual fluency and congruence. To maximize discrepancy and elicit contrasting feelings of fluency, these trials were pseudorandomized within different proportion of congruence conditions. We have found that when the task was comprised mostly by congruent trials, participants committed more fast errors on incongruent trials when they were easy-to-read compared to when they are hard-to-read. Moreover, when incongruence was more frequent, the presentation of consecutive discrepant congruent trials led to more interference in the upcoming trial. These results support the hypothesis that ease-of-processing signals that control is not necessary and suggests a different impact for transient and sustained feelings of fluency.

### Keywords

control, fluency, conflict, incongruence



# Can the psychology of eyewitness testimony do better? In search of a method to simulate eyewitness experiences using VR elements.

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The psychology of eyewitness testimony has been one of the more prolific areas of interest for experimental psychologists in recent years. However, despite advances in research methods, many studies use stimulus manipulation procedures that raise methodological concerns. Traditionally, researchers have attempted to simulate "witnessing" a crime by presenting a short video, presentations, or narrated story, which are considered insufficiently ecologically valid. Thus, the aim of the research is to propose an alternative method of stimuli exposition that uses the elements of VR. An experiment was conducted in which subjects viewed the same scene presented through VR goggles ( $n = 53$ ) or on a screen ( $n = 52$ ). It was assumed that the goggles, while allowing for detachment from the current stimuli and simulating the real context well, would outperform the screen on three dimensions measuring the strength of stimulus manipulation: 1) immersion, 2) cognitive and 3) emotional engagement. This presentation will highlight the results that partially supports the hypotheses in terms of immersion and cognitive dimensions, however, at the same time, suggests a different direction of emotional reactions in the subjects' self-description.

## **Keywords**

eyewitness testimony, methodology, experimental manipulation, VR

## **Acknowledgments**

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The project was supported by HP Inc Poland, which provided free of charge VR equipment.



## Electrophysiological Mechanisms of Grit

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While scientific interest in the grit trait has grown exponentially in recent years, its neural substrates remain largely unknown. In the present study, we adopted a hypotheses-driven approach to investigate the electrophysiological correlates of grit both during rest and while performing a learning task. Based on previous work, we hypothesized that grit would be linked to lower frontal theta/beta ratio (which might indicate better control over subcortical information). Furthermore, we expected the perseverance of effort facet of grit to be linked to higher complexity (an index of effort) during task engagement. While no differences were found at rest as a function of grit scores, participants with high grit and high consistency of interest scores exhibited lower frontal theta/beta ratios during learning. Additionally, perseverance of effort was linked to entropy at task. Together, these results constitute a step toward understanding the neural bases of grit.

### Keywords

grit, impulsivity, EEG, Theta/Beta Ratio, q-EEG, entropy

### Acknowledgments

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# Changes in arousal levels under physical exertion affect the neurodynamics of cognitive control

Chiara Avancini\* <sup>a)</sup>, Luis Ciria <sup>a)</sup>, Ana Francisca Palenciano <sup>a)</sup>, Clara Alameda <sup>a)</sup>, Tristan Bekinschtein <sup>b)</sup>, Daniel Sanabria <sup>a)</sup>

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Fluctuations in alertness and physical arousal levels occur naturally throughout the day, spanning from sleep to intense physical exertion. These changes unfold in a nonlinear manner, affecting cognition and the processing of exogenous and endogenous stimuli. In this study we investigated how high physical arousal modulates alertness, ultimately affecting cognitive control. Specifically, we measured EEG neurodynamics of cognitive conflict resolution during physical exercise. Participants were presented with an auditory conflict task while pedalling on a stationary bike. Arousal levels were modulated by the intensity of the exercise determined as rest, low-intensity and high-intensity. We analysed the well-known conflict effect which shows that conflicting information produce slower responses compared to nonconflicting information. Furthermore, we also looked at conflict adaptation, which represents the modulation of the conflict effect in relation to previous conflict. Along with behavioural data, we analysed power changes in midfrontal theta-band as neural markers of cognitive control. A combination of univariate and multivariate methods was implemented to grasp the nonlinear relationship between changes in physical arousal and cognitive control.

## Keywords

arousal, alertness, physical exertion, cognitive control, multivariate, theta-band



## Room 1 - Grande Auditório

Pío Tudela Conference



# Inhibitory Control Across Memory Domains

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Access to relevant information from memory is critical for learning, problem solving, word production, remembering past events, and planning the future. Although access to knowledge is critical for good performance on these tasks, successful performance also requires brain mechanisms that regulate activation to select the most context-appropriate information. Recent views suggest that the human cognitive system has evolved so that it includes goal-driven control mechanisms to regulate the level of activation of specific pieces of knowledge and make distracting or unwanted information in memory less accessible. However, these control processes may also have side effects on performance, even unwittingly, in a variety of situations as long as the task at hand partly relies on access to suppressed information. In the presentation, I will provide evidence that various types of information (concepts, facial features, personal attributes, lexical or grammatical information) may be the target of inhibitory control in different contexts (problem solving, decision making, or language production). I will also show that inhibitory control leaves behavioural and neural signatures across a variety of domains, and reshapes memory information during retrieval.



## Room 2 - Anfiteatro A

Oral Session 15

Moderator: Ana Raposo



# Semantic distinctiveness facilitates visual search for words and pictures

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Observers can rapidly acquire semantic information of visual objects in extra-foveal vision and use it to guide attentional allocation during visual search. We previously showed that participants were faster to detect and to look at a target object when it was semantically unrelated to other distractor objects in the array (e.g., a fruit among animals) compared to when it was related (e.g., an animal among animals). This semantic pop-out effect has been mostly observed using words as cues and pictures as search targets. Dual-coding theory, however, posits that verbal and pictorial material have different cognitive statuses, whereby it remains to be determined whether semantic pop-out is modulated by the modality of the stimuli used, which was the focus of the current study. Results show that items semantically unrelated to the array were detected faster and more accurately than were semantically related items, regardless of whether the cue and array were presented as pictures or words. This indicates that semantic pop-out occurs regardless of stimulus modality, which suggests that semantic processing of verbal and pictorial material may rely on similar mechanisms

## Keywords

visual search; semantic; attention

## Acknowledgments

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# Social presence effects in cognitive shifting

*Alexandre Fernandes, Teresa Garcia-Marques*

*ISPA-William James Center for Research, Lisboa, Portugal*

Performance on the control inhibition cognitive tasks, as the Stroop-Task, is enhanced by social-presence. These results have been interpreted in the light of different theories of social-facilitation that involve selective attentional processes at different moments of the processing. However, few data exist for other tasks that involve control inhibition. In this study, we tested the effect of the presence-of-others (versus alone) on the ability to shift processing between tasks or mental sets. Cognitive control in shifting tasks involves controlling attention to allocate attentional resources to perform the task-relevant to the current goal. We assess performance in 3 different shifting tasks requiring different attention processes: proactive, Color-Shape task (CST); and reactive attention, Number-Letter (NLT) and Local-Global tasks (LGT). Results show differences in how the presence of others impacts performance, measured as the switch-cost for accuracy, reaction times and temporal dynamics (delta-plots). Results show that in the presence-of-others, participants present a lower switch-cost in CST, as opposed to NLT; LGT results were mixed. We discuss results in light of different theories of social-facilitation and processing differences of these tasks.

## Keywords

social presence, social facilitation, executive control functions, shifting

## Acknowledgments

This research was supported and funded by the Fundação para a Ciência e Tecnologia under Grant PTDC/PSI-GER/28850/2017 and Grant UIDB/04810/2020



# A meta-analytic review of Stroop performance in Social Facilitation contexts.

*Teresa Garcia-Marques\*, Alexandre Fernandes*

*ISPA-William James Center for Research, Lisboa, Portugal*

To inform social facilitation (SF) effects over cognition, we run a meta-analysis of social presence effects over 32 studies of Stroop interference. Results show the effect is reliable; Stroop interference is lower in the presence of others than in isolated contexts ( $g = 0.30$ ,  $[0.17; 0.44]$ ,  $p < .001$ ). However, the analyses suggest that the specific experimental conditions defined by how social presence is manipulated, differ in how they favor the occurrence of such effect since the effect is likely stronger with an attentive than an inattentive audience and that it does not occur when individuals perceived the task as an evaluative one. The set of moderators analyzed shed further light on the processes by which the presence of others interferes with individuals' performance of a Stroop task. The effect size is stronger for the classic than the semantic task, for experiments with mixed within block trials than with homogenous blocks and establishes a negative relationship with the number of trials, suggesting that social presence led to an increase of late attentional processes, that characterize reactive control.

## **Keywords**

Stroop, social facilitation, meta-analysis

## **Acknowledgments**

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# The Internal Attentional Focus: Studies on the Impact on Destination Memory

*Raquel Pinto\*, Pedro B. Albuquerque*

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To remember to whom we transmit a piece of information, we rely on destination memory, with worse performance occurring when participants transmit personal facts (e.g., my age is ...) compared to interesting ones (e.g., a shrimp's heart is in its head). It seems that when reporting personal information, the internal attentional focus decreases the attentional resources available to associate those facts with recipients, resulting in worse destination memory. Experiment 1 compares the (1) transmission of personal facts with (2) proverbs, with the generation of personal facts hampering destination memory. However, perhaps the worst performance when transmitting personal facts may be due to the generation of the information, which is absent in the condition where the participants transmit proverbs. To clarify these results in Experiment 2, participants (1) transmitted and (2) generated and transmitted proverbs, and results showed no differences between the conditions on destination memory. In general, our two experiments support the assumption that transmitting personal information leads to worse destination memory, not because the information is generated, but because personal facts drive the attentional focus to the self.

## **Keywords**

destination memory, internal attentional focus, personal facts



# How do we remember past interactions? The impact of a choice component on destination memory

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Destination memory can be defined as the ability to monitor to whom we transmit a piece of information. This type of memory is measured by the association between the information we share and to whom we transmit it (i.e., a recipient). Previous research hinted that the focus of the participants' attentional resources is an important variable on destination memory. We designed two experiments to include a choice component in each encoding trial to shift the participants' attentional resources. In Experiment 1, the choice and consequently the focus of attention was on the recipient of the information and in Experiment 2 on the content of the information. Results showed that when the choice captured the attention to the content, destination memory performance worsened, and when the choice drove the attention to the recipient, destination memory improved. Our results further strengthen that the participants' attentional resources while encoding the stimuli are important for understanding destination memory. Their focus while performing the task should be considered whenever we analyze this type of memory.

## Keywords

destination memory, choice component, attentional focus



## **Room 3 - Anfiteatro B**

### **Oral Session 16**

**Moderator:** Maria de São Luís Castro



# The animacy effect in prospective memory: Evidence and contribution to the discussion of the proximate mechanisms

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The animacy effect (ANEF) refers to a memory tuning towards animates/living beings over inanimates/nonliving things and is overly established in retrospective memory [1]. In a series of studies, we explored if animate targets (vs. inanimate targets) also provide an advantage in prospective memory (PM) tasks. Using a non-focal PM procedure (color-matching task), animate targets were more effective in eliciting the PM response, as compared to inanimate targets [2,3]. However, an exploratory experiment using a focal PM procedure (anagram solving task) failed to replicate such advantage. These results are informative about one of the often-proposed explanations of the effect: the attention-capture hypothesis (i.e., the ANEF occurs because animates more effectively capture attention than inanimates). In focal PM tasks, a similar level of attention is required to all stimuli (thus mitigating the ANEF), whereas in non-focal tasks, room exists for the attention priority to animates exert its influence. Overall, this work extends the supremacy of animates (over inanimates) in some prospective memory tasks and favors the attention-capture proximate explanation of the effect.

## **Keywords**

animacy effect, prospective memory, adaptive memory, proximate mechanisms, attention

## **Acknowledgments**

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# Building up semantic interference in episodic memory for single objects: the effect of semantic similarity and set size

Emma Delhaye\* <sup>a)</sup>, Giorgia D'Innocenzo <sup>a)</sup>, Ana Raposo <sup>a)</sup>, Moreno I. Coco <sup>b)</sup>

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The semantic interference (SI) effect occurs when the fidelity of visual representations in memory decreases with an increased number of related items that are encoded from the same semantic category. Yet, it is not clear how semantically close items need to be for SI to emerge. This study explored SI by presenting participants with images of objects during an incidental encoding phase, in which we manipulated the number of images from the same category presented in a continuous stream (sets of 2 vs. 4), as well as semantic similarity between these items (high vs. low). We also included unrelated objects that disrupted the sets (e.g., set size 2: cow, dog, nail (unrelated object)). Recognition memory was tested subsequently. Preliminary results support evidence of SI, with greater set size, but also higher semantic similarity, leading to worse memory. Unrelated objects were better recognized than objects presented in sets. Taken together, this suggests that SI builds up with increased number of items within a stream, as well as with increased similarity among those items.

## Keywords

episodic memory, semantic memory, semantic similarity

## Acknowledgments

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# Exploring the relationship between confabulation and other types of memory distortions

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Confabulation is a particular symptom observable in some amnesic patients who are unaware of their memory deficit, which consists of actions or verbal statements that are unintentionally incongruous to the patient's history background, present and future situation.

The specific relationship between confabulation and other types of false memories, such as false recognitions and intrusions, remains largely unexplored. In this line our aim in this multiple case study is to investigate such relationship and to shed light on the relation between different types of confabulation as a function of their content and the severity of amnesic syndrome and executive dysfunction. Our findings show i) the production of false recognitions is related to the presence of confabulation and executive deficit ii) the production of intrusions is related to the severity of amnesic syndrome rather than to the production of confabulation, iii) the plausibility of the confabulation content is related to the type of executive dysfunction. These results are discussed within the framework of the principal theoretical accounts proposed in the literature to explain the cognitive mechanisms underlying confabulation.

## Keywords

episodic memory, memory distortions, confabulation, amnesia



# The pervasive effects of subjective and objective word frequency on JOLs

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When making judgments of learning (JOLs) – predictions of future memory performance – people attend to different cues. Research has shown that people have a remarkable ability to integrate multiple cues in JOLs. However, some cues can be more informative than others. Although word frequency is known to affect JOLs, it is unclear whether this is also true when there are multiple cues available. The current study aims to close this gap by testing whether objective and subjective word frequency affect JOLs in the presence of font size as an additional cue. Across three experiments, participants studied words varying in word frequency (Experiment 1: high and low objective frequency; Experiment 2: whole continuum from high to low objective frequency; Experiment 3: high and low subjective and objective frequency) and presented in large (48pt) or small (18pt) font size, made JOLs, and completed a memory test. Results showed that people based their JOLs on both word frequency and font size. We conclude that word frequency is an important cue for JOLs and found further evidence for cue integration in metamemory judgments.

## Keywords

metamemory, memory, word frequency, judgments of learning



# 5 May

## Room 1

### Poster Session 1



**P1-1 The role of working memory in probabilistic cuing of visual search**

Francisco Vicente Conesa, Tamara Gimenez-Fernández, David Luque, Miguel Ángel Vadillo

**P1-2 The role of working memory in contextual cueing of visual attention**

Francisco Vicente-Conesa, Tamara Giménez-Fernández, David Shanks, Miguel Ángel Vadillo Nistal

**P1-3 Bidialectal Exposure Modulates Neural Signatures to Conflicting Grammatical Properties: Norway as a Natural Laboratory**

Jorge González Alonso, Maki Kubota, Merete Anderssen, Isabel Nadine Jensen, Alicia Luque, Sergio Pereira Soares, Yanina Prystauka, Øystein A. Vangsnes, Jason Rothman

**P1-4 Transition to motherhood: How becoming a mother relies on gradually shaping the self-concept during pregnancy**

Josue Garcia Arch, Txell Andreu i Ginabreda, Marc Sabio Albert, Jessica Senra Lago, Francesc Fargas, Iñaki González-Foruria, Estela Càmara, Lluís Fuentemilla

**P1-5 Self-referential processing of emotional words in implicit conditions: A preliminary analysis with a masked priming task**

Diana R. Pereira, Francisco Gutiérrez-Domínguez, Helena M. Oliveira, Ana Paula Soares

**P1-6 Modelling early visual processes of illiterates with Deep Neural Networks**

Nicola Fottner, Luís Correia, Tânia Fernandes

**P1-7 Are adult dyslexic readers lost in the forest? Processing of hierarchical stimuli by typical and dyslexic readers**

Susana Araújo, Inês Bramão, Diana Dias, Tânia Fernandes

**P1-8 Oscillation patterns for naming retrieval: Examining differences between known Objects, People, and Places**

Cristiane Souza, Khaoula Ennahli, Joana C. Carmo, Sofia Frade, Margarida V. Garrido



**P1-9 Word segmentation in homogeneous vs. heterogeneous speech streams: behavioural and neural evidence**

Helena Mendes Oliveira, Dario Paiva, Rita Pereira, Natália Guerra, Francisco-Javier Gutiérrez-Domínguez, Ana Paula Soares

**P1-10 A possible association between global processing of 3D objects and visual word recognition**

Mariona Pascual, Julia Stolinska, Sofia Esteves, Inês Bramão, Susana Araújo, Tânia Fernandes

**P1-11 Effect of individual ethical attitudes towards development of social robots and robot appearance on cognition, motivation and volition towards working with a social robot**

Jean-Christophe Giger, Ana Filipa Costa, Nuno Piçarra, Ana Susana Almeida

**P1-12 Attitudinal reactions to social robots are associated with evolutionary disease avoidance needs**

Jean-Christophe Giger, Ana Filipa Costa, Nuno Piçarra, Ana Susana Almeida

**P1-13 Reduced caudate nucleus volume after mindfulness-based intervention**

Laura Mas-Cuesta, Sabina Baltruschat, Antonio Cándido, Carmen Verdejo-Lucas, Elvira Catena-Verdejo, Andrés Catena

**P1-14 Recognition of dynamic facial expressions of emotion: The interplay between chronotype and time-of-day**

Pedro Bem-Haja, Isabel M. Santos, André Silva, Catarina Rosa, Miguel Fradinho Alves, Talles G. C. Barroso, Luíza Q. Cerri, Diâner F. L. Queiroz, Carlos F. Silva

**P1-15 Chronotype and time-of-day effects on a famous face recognition task with dynamic stimuli**

Isabel M. Santos, André Silva, Pedro Bem-Haja, Catarina Rosa, Miguel Fradinho Alves, Talles G. C. Barroso, Luíza Q. Cerri, Diâner F. L. Queiroz, Carlos F. Silva



**P1-16 Studying Congruency Sequence Effects between social and non-social stimuli**

Cristina Narganes Pineda, Klara Hemmerich, Andrea Marotta, Elisa Martín-Arévalo, Luis Jiménez, Juan Lupiáñez

**P1-17 How emotional priming affects emotional response and the ability to discriminate sad faces**

Maya Pereira, Catarina Mendonça

**P1-18 Structuring Inferential Learning Through Temporal Sequences**

Francesca Giaiotti, Josue Garcia Arch, Lluís Fuentemilla

**P1-19 A VMAC online replication and multiverse reliability analysis**

Garre-Frutos, F, Irene Hinojosa-Aguayo, Felisa González, Miguel Vadillo, Juan Lupiáñez

**P1-20 Exposure to the training context facilitates the emergence of latent inhibition**

Luis M. Traverso Arcos, Luis Gonzalo De la Casa

**P1-21 Increasing the CS-US interval does not induce an overshadowing to potentiation shift with distal presentation of olfactory stimuli**

Luis M. Traverso Arcos, Gabriel Ruiz Ortiz, Luis Gonzalo De la Casa

**P1-22 Space-on-time interference, but not the time-on-space one, is magnified in an emotional context**

M.C. Castellanos, Kévin Vidaud-Laperrière, Arielle Syssau-Vaccarella, Juan Lupiáñez, Pom Charras

**P1-23 Visual search in developmental dyslexia using words and faces as stimuli**

P. Tejero, L. Royo, M. Pi-Ruano, P. Piris, J. Roca



**P1-24 Exploring the effects of font size and letter spacing on judgments of learning (JOLs)**

Sara Cadavid, Gabriela Aldana, Daniela Bermúdez, Inés Botía, Daniel Bueno, Anamaría Calderón, Emily Conde, María Fernanda Gutiérrez, María Alejandra León, Valentina Rodríguez, Karlos Luna

**P1-25 Environmental context variability and incidental word learning – A Virtual Reality approach**

Francisco Rocabado, Jose Luis Tapia, Jon Andoni Duñabeitia

**P1-26 Cognitive estimation. A reliable predictor of driving safety**

Jose Luis Tapia, Francisco Rocabado, Jon Andoni Duñabeitia

**P1-27 Social psychology in the afterlife: The dead as agents of social influence**

Paulo Moreira, Francisco Cruz, André Mata

**P1-28 Effects of motion signal strength and body orientation on Representational Gravity: Which way is ‘down’ in spatial localization tasks?**

Ana Loureiro, Nuno de Sá Teixeira

**P1-29 Representational Momentum and Gravity with Isoluminant Stimuli: Evidence for a push-pull mechanism?**

André Carvalho Costa, Nuno de Sá Teixeira

**P1-30 The effect of the menstrual cycle on women’s time perception**

Nuno Fernandes, Joana Arantes

**P1-31 Kappa and Tau Effects: A Theoretical Account Based Upon a Perceptual Spatiotemporal Frame of Reference**

Nuno de Sá Teixeira

**P1-32 The interplay among face trait inferences before and during Covid-19**

Mariana Madeira, Natália Lisandra Fernandes, Josefa N. S. Pandeirada



**P1-33 Psychophysiological markers during the observation of affective touch at different speeds**

Ana Rita Pereira, Adriana Sampaio, Diego Pinal, Alberto Gonzalez Villar

**P1-34 The effect of mask wearing on speech intelligibility: an audiovisual effect**

Filipa Ponte, Filipa Melo, Inês Duarte, Catarina Mendonça

**P1-35 Facial emotion recognition deficits in Parkinson's disease: the role of executive and affective domains**

Antonia Siquier, Pilar Andrés

**P1-36 Exploring cognitive control and bilingualism through behavioral and electrophysiological methods**

Melodie Bellegarda, Pedro Macizo

**P1-37 Exploring the inhibition processes of the material with an intrinsic survival value using the directed forgetting process**

Andrés Eduardo Zerpa Pérez, María Ángeles Alonso Rodríguez

**P1-38 Reversed spatial congruency effects for upright and inverted faces**

Andrea Marotta

**P1-39 To Be Attentive, Do Not React: Linking Dispositional Mindfulness to Attentional Networks and Vigilance Performance**

Cásedas, Luis, Cebolla, Ausiàs, Lupiáñez, Juan

**P1-40 Direct your gaze toward the planet: An eye tracking study on the influence of goal priming in promoting green behavior**

Marta Madeira, Pedro J. Rosa, Patrícia Arriaga



**P1-41 Authority brings responsibility: Experts' opinions promote unwarranted optimism about health-related pseudoscience**

Josue Garcia Arch, Itxaso Barberia, Javier Rodriguez-Ferreiro, Lluís Fuentemilla

**P1-42 Perceptual learning in a target identification task: Could same and different trials engage different cognitive processes?**

Rocio Angulo, Germán Cipriani, Gabriela Carboni, Dominique Kessel



# 6 May

## Room 1

### Poster Session 2



**P2-1 Exposure to bodies of water can improve working memory performance**

F. Javier González-Espinar, Juan J. Ortells, Silvia Hernansanz, Pedro R. Montoro

**P2-2 Primary school children comparison of different length numbers: A developmental test of the decomposed parallel processing of multidigits**

Ismael Gutierrez-Cordero, Juan Antonio Álvarez-Montesinos, Javier García-O

**P2-3 Polarity subjunctives in Spanish: A self-paced reading study**

Josep Demestre

**P2-4 Formal language hierarchy as a hierarchy of cognitive complexity**

Renia Morfakidou, Susana Silva, Filomena Inácio, Karl Magnus Petersson, Vasiliki Folia

**P2-5 Learning from Errors Regardless of Difficulty Level of the Study Material**

Yeray Mera, Eugenia Marin-Garcia

**P2-6 Emoji-SP, a Spanish emoji database including visual complexity, familiarity, frequency of use, clarity, emotional valence and arousal norms for 1,031 emojis**

Juan Haro, Pilar Ferré, Miguel Ángel Pérez Sánchez, Irene Moreno, José Antonio Hinojosa

**P2-7 Emotional prototypicality facilitates word recognition: a lexical decision study**

Juan Haro, Rocío Calvillo-Torres, Claudia Poch, José Antonio Hinojosa, Pilar Ferré

**P2-8 The processing of inflectional morphology in children and adults**

Alberto Dominguez, Anthea Santos, Fu Yang

**P2-9 Brain dynamics of the transition from serial to whole-word reading strategies: electrophysiological evidence**

Beatriz Bermúdez Margaretto, Federico Gallo, Cristina Martínez García, Paz Suárez Coalla, Alberto Dominguez, Fernando Cuetos



**P2-10 B-Minds: A Protocol to Study the Effects of the Exposure to English as a Second Language in a Nursery Environment**

Ana Paula Soares, Natália Guerra, Diana R. Pereira, Helena M. Oliveira

**P2-11 White-matter connections between ventral occipito-temporal cortex and inferior frontal gyrus**

Garikoitz Lerma-Usabiaga, Rodrigo Vianna de Almeida, Manuel Carreiras, Pedro M. Paz-Alonso

**P2-12 Extending the contamination effect to recognition memory**

Sónia M. P. Santos, Natália Lisandra Fernandes, Josefa N. S. Pandeirada

**P2-13 Older or wiser? Exploring the role of lexicon size on word recognition**

Inês Salomé Morais, Filomena Inácio, Melissa Crepaldi, Raquel Gregório, Alexandra Reis, Luís Faísca

**P2-14 Do I seem trustworthy? Can source trustworthiness moderate the effects of repetition and contradiction on truth judgements?**

Rita R. Silva, Margarida V. Garrido, Beatriz Gusmão

**P2-15 The role of executive control in rumination and academic procrastination**

Mariana Ferreira, Catarina Rosa, Pedro Bem-Haja, Isabel M. Santos, Mónica Marques

**P2-16 Linking rumination and proactive control in reducing implicit racial bias**

Maria I. Ferreira, Catarina Rosa, Pedro Bem-Haja, Isabel M. Santos, Inês Fonseca

**P2-17 Identifying specific age-related cognitive changes with the Three-Conflicts Cognitive Control Task**

Giorgia Ricchetti, Alba Navarro-Egido, María Rodríguez-Bailón, Daniel Salazar Frías, José Antonio Merchán-Baeza, M<sup>a</sup> Jesús Funes



**P2-18 SpaVerb-LD: A Mega-Study of word recognition Times for 4,565 Spanish Verbs: Effects of Psycholinguistic and Motor Component Variables**

Romina San Miguel Abella, María González Nosti, Javier Marín Serrano, Elena Herrera Gómez, Miguel Ángel Pérez Sánchez

**P2-19 How do we communicate stereotypes? The Linguistic Expectancy Bias in a first and a second language**

Magda Saraiva, Margarida Vaz Garrido, Gün R. Semin

**P2-20 Machine learning paradigms predict age-related changes in neural networks underlying emotional regulation**

Elena Solesio-Jofre, Ángela Fernández-Pascual, María Hernández-Lorca, Elisabet Alzueta

**P2-21 Breaking boundaries: how to exploit congruency cues conveyed by the previous trial**

Luis Jiménez, David Gallego, Cástor Méndez

**P2-22 Role of internal values and social norms in fairness preferences**

Paloma Diaz-Gutierrez, Harshil Vyas, Christophe Boone, Carolyn Declerck

**P2-23 Proactive selective activation of stimulus categories in high and low competition contexts**

Blanca Aguado-López, José M. G. Peñalver, David López-García, Christopher I. Williamson, Luis F. Ciria, María Ruz

**P2-24 Does Arabic number coding involve quantity activation? Exploring the effect of processing load**

Ana Calviño-López, Juan Antonio Álvarez-Montesinos, Ismael Gutierrez-Cordero

**P2-25 High-Frequency Transcranial Random Noise Stimulation Enhances Unfamiliar Face Matching of High Resolution and Pixelated Faces**

Alejandro J. Estudillo, Ye Ji Lee, Juan Antonio Álvarez-Montesinos, Javier García-Orza



**P2-26 The influence of expectations on the illusion of control effect**

Carlos M. Vera, Cristina Orgaz, Pedro R. Montoro, María José Contreras

**P2-27 Cognitive impairment in long-term covid-19: a neuropsychological examination**

María del Carmen Pérez-Sánchez, María González Nosti, Álvaro Javier Cruz Gómez, Elena Herrera Gómez

**P2-28 Effects of Social Influence on Moral Judgement**

André Amaral, Mário Ferreira

**P2-29 Iconic gestures facilitate word processing: a cross-modal priming study with auditory and visual word recognition**

Iván Sánchez Borges, Carlos Javer Álvarez González

**P2-30 Saccadic abnormalities and eating disorders: protocol of an experimental study in young-adult women with subclinical symptomatology**

Sergio Navas-León, Luis Morales Márquez, Ana Tajadura-Jiménez, Milagrosa Sánchez-Martín, Mercedes Borda-Más

**P2-31 Analyzing the relationship between artistic creativity and cognition**

M. S. Beato, M. Suarez, O. Rivero, J. Eseverri

**P2-32 Spatial cognition: The role of mental rotation, spatial visualization, and working memory**

M. S. Beato, M. Suarez, J. Eseverri, O. Rivero

**P2-33 Predictors of flashback and event memories of the 2016 Euro Cup final**

Andreia Ribeiro, Margarida Marques, Magda Roberto, Ana Raposo

**P2-34 Selecting Learning Environments: The role of Error**

André Gonçalves, Leonel Garcia-Marques



**P2-35 Testing the robustness of the testing effect**

Marta Barros, André Guerra, Joana Almeida, Ana Lapa, María J. Maraver, Ana Raposo

**P2-36 Do source monitoring abilities impact memory error correction in adolescents?**

Joana Almeida, André Guerra, Marta Barros, Ana Lapa, Ana Raposo, María J. Maraver

**P2-37 Influence of bilingualism on stereotype expression: the role of executive control and motivation to respond without prejudice**

Sofía Castro, Marcin Bukowski, Juan Lupiáñez, Zofia Wodniecka

**P2-38 Are brand names special words? Visual-letter similarity on brand names versus common names**

Ana Marcet, Ana Baciero, Melanie Labusch, María Fernández-López, Manuel Perea

**P2-39 Can you draw the logo of your car? A study of how Spanish adults recall and recognize car logos**

Julia Mayas Arellano, Pedro R. Montoro Martínez, Antonio Prieto Lara

**P2-40 Creative cognition: common and independent contributions of executive functioning, associative processes and age**

M. Teresa Lechuga García, Rocío Linares Martínez, J. Luis Peláez Alfonso, Santiago Pelegrina López

**P2-41 Paying attention to the distractors. The modulation of the flanker compatibility effect by selective focusing of attention**

Pedro R. Montoro, Julia Mayas, Antonio Prieto

**P2-42 Endogenous attentional effects over conscious detection and discrimination**

Mar Martín-Signes, Marta Becerra-Losada, Cristina Cano-Melle, Ana B. Chica

**P2-43 Differences in gaze and arrows processing: the effect of "joint distraction"**

Belén Aranda-Martín, María Ángeles Ballesteros-Duperón, Juan Lupiáñez



**P2-44 Self-bias effects on perceptual matching with neuromodulation of the VMPFC and DLPFC: a high-definition transcranial direct current stimulation (HD-tDCS) study**

Víctor Martínez-Pérez, Lucía B. Palmero, Guillermo Campoy, Luis J. Fuentes

**P2-45 Does context bias preference for probabilistic sources of food?**

Marília Carvalho, Luíza Cerri, Armando Machado, Marco Vasconcelos



# 7 May

## Room 1

### Poster Session 3



**P3-1 The effect of temporal and spatial proximity on the sequential grouping of similar items in visual working memory**

Antonio Prieto, Vanesa Peinado, Julia Mayas

**P3-2 Deficits in information retrieval in working memory in the elderly**

Rocío Linares, Marina Torres-Aguayo, Santiago Pelegrina

**P3-3 Measuring the Automaticity of the N170 Component: The Role of Attentional Focus**

Ana Belén García-Gámez, Alexandra Reis, Luís Faísca

**P3-4 Letters in the looking glass: Developmental trajectory of mirrored letter processing within words**

Tânia Fernandes, Sofia Velasco

**P3-5 Conversational turn-taking in autism spectrum disorder**

Joana C. Carmo, Lilla Magyari, Carlos N. Filipe

**P3-6 A Multidimensional Representational Space of Affective and Neutral Words**

Angel A. Betancourt Diaz, Pilar Ferré, Marc Guasch

**P3-7 The peculiarities of grammatical gender representation and processing in bilinguals: A meta-analysis on the cross-linguistic gender congruency effect**

Ana Rita Sá Leite, Karlos Luna, Isabel Fraga, Montserrat Comesaña

**P3-8 Word Prevalence for 40.777 Catalan words**

Marc Guasch, Roger Boada, Jon Adoni Duñabeitia, Pilar Ferré



**P3-9 Assessing the cognitive plausibility of LSA cosines using the semantic priming paradigm**

Marc Guasch, Guillermo Jorge-Botana, Ricardo Olmos

**P3-10 Embodied language processing can affect our morals: A preliminary study**

Pablo Solana, Omar Escámez, Ángel Ayala, Julio Santiago

**P3-11 What do we actually know about the neural basis of flow state?**

Clara Alameda, Daniel Sanabria, Luis F. Ciria

**P3-12 Addressing the format of novel task representations using a behavioral paradigm: validation and preliminary results**

Ana F. Palenciano, Carlos González-García, Alexandra Woolgar, María Ruz

**P3-13 Exploring the link between Geometry performance, Visuospatial and Motor abilities in primary schoolers**

Laura M. Fernández-Méndez, Chiara Meneghetti, Agustín Martínez-Molina, Irene Mammarella, María José Contreras

**P3-14 Love me in L1, but hate me in L2: How native speakers and bilinguals rate the affectivity of words when feeling or thinking about them**

Pilar Ferré, Marc Guasch, Hans Stadthagen-Gonzalez, Montserrat Comesaña

**P3-15 Relationships between time, value and space are hard to find in the brain**

Omar Escámez, Carlos González-García, Alex Kranjec, Tilbe Göksun, Carmen Callizo-Romero, Pablo Solana, Julio Santiago

**P3-16 Giving and receiving reminders: Prospective memory in young and older adults**

Carmen Gil Robles, Alaitz Aizpurua Sanz, Malen Migueles Seco



**P3-17 Visual words live on the edge: the impact of vertices in lexical access**

Ana Lourenço, Miriam Aguilar, Tânia Fernandes

**P3-18 Evidence on motivational processes toward non-consensual sexual intercourse: The effects of gender and type of violence in eye-screen distance**

Pedro J. Rosa, Joana Carvalho, Ana C. Ribeiro, Patrícia Marta, Lucas Domingos, Celina Simon

**P3-19 Exploring the potential role of the right temporoparietal junction on reading aloud in Spanish: a TDCS study**

Nicolás Gutiérrez Palma, Casandra Isabel Montoro Aguilar

**P3-20 Proneness to causal illusions is associated with poorer discrimination of legitimate versus fake news**

Joan Saltor, Itxaso Barberia, Javier Rodríguez-Ferreiro

**P3-21 If you respond “no” you may forget the question**

Anqi Zang, David Beltrán, Manuel de Vega

**P3-22 Chinese-English readers: the role of L2 proficiency for Orthographic learning in a second orthographic system: behavioral and EEG evidence**

Yang Fu, Beatriz Bermudez-Margaretto, Huili Wang, David Beltrán, Alberto Dominguez

**P3-23 A Race to Remember: The effect of Prospective Memory Task Difficulty in Incidental Learning**

Beatriz Mello, Patrícia Matos, Angela Bartolo, Pedro B. Albuquerque

**P3-24 The suppression of the mirror-generalization mechanism for mirror-letter discrimination enhances a right asymmetry bias on object recognition**

Ana Paula Soares, Maria Araújo, Ana Duarte Campos, Helena M. Oliveira



**P3-25 Exploring the effect of Moral Elevation on the causal attributions of others' actions**

Ion Yarritu

**P3-26 Exploring the conceptual structure of Spanish Experimental Psychology**

Javier Ortiz-Tudela, Carlos González-García

**P3-27 Can explicit instructions compensate for implicit statistical learning deficits in children with Developmental Language Disorder? Insights from ERPs**

Ana Paula Soares, Francisco-Javier Gutiérrez-Domínguez, Alexandrina Lages, Helena M. Oliveira, Marisa Lousada

**P3-28 False memories and pandemic. Aging effects on prospective memory and positivity bias**

Malen Migueles, Alaitz Aizpurua, Izarne Lizaso, Ainara Aranberri

**P3-29 Effects of distinctive encoding on the DRM illusion when list items are rated for pleasantness.**

Alicia Álvarez-Martínez, María José Sampedro-Vizcaya, José Fernández-Rey

**P3-30 Emotional prototypicality rating for 636 Chinese words: a database of Chinese words denoting emotions**

Zheng Ruiyao, Guo Taomei, Zhang Meng, Marc Guasch, Pilar Ferré

**P3-31 Memory Reporting Strategies in Conversational Pragmatics**

Beatriz Martín-Luengo, Karlos Luna, Alina Leminen, Yury Shtyrov

**P3-32 Endorsement of pseudoscientific beliefs and the tendency to jump to conclusions**

Javier Rodríguez-Ferreiro, Itxaso Barberia,



**P3-33 Influence of a Rhythmic Context Over the Foreperiod Effect: Implications about the maintenance and transfer of rhythmic entrainment**

Rafael Román-Caballero, Elisa Martín-Arévalo, Juan Lupiáñez

**P3-34 Bolder is no better: Boldface generates metamemory illusions**

Karlos Luna, Sara Cadavid

**P3-35 A new measure of epistemically unwarranted beliefs for Spanish population**

Daniel Huete-Pérez, Fàbia Morales-Vives, José M. Gavilán, Roger Boada, Juan Haro

**P3-36 Does virtual reality increase the sense of embodiment in the rubber hand illusion?**

Antonio Javier Sutil Jiménez, Guzmán Alba Laso, Andrés Molina López, Manuel Francisco Fajardo Rodríguez, Miguel Ángel Muñoz García

**P3-37 Looking forward to the future: the COVID-19 pandemic reinforced future focus, secularity, and tendency to place the future in front in young adults from several cultures**

Carmen Callizo-Romero, Slavica Tutnjevi, Marc Ouellet, Alexander Kranjec, Yan Gu, Tilbe Göksun, Sobh Chahboun, Daniel Casasanto, Julio Santiago

**P3-38 Differential outcomes procedure: exploring eye movements when applying differential outcomes**

Victoria Plaza, Kyran Tannion, Peter C. Gerhardstein, Lorena A. M. Arnal, Ángeles F. Estévez, Luis J. Fuentes

**P3-39 Modulation of irrelevant distraction within a complex attentional task: the ANTI-Vea-D**

Tao Coll Martín, Hugo Carretero Dios, Juan Lupiáñez Castillo



**P3-40 Is it safe to look? The time course of attentional bias for social stimuli in behavioral inhibited children**

Catarina Cova Fernandes, Ana Teresa Martins, Luís Faísca

**P3-41 Eye-gaze vs arrows as spatial cues: a meta-analytical response**

Jeanette Alicia Chacón-Candia, Rafael Román-Caballero, Belén Aranda-Martín, Juan Lupiáñez, Maria Casagrande, Andrea Marotta

**P3-42 The role of alerting in feature integration**

María I. Cobos, Irune Ramírez, Ana B. Chica

**P3-43 Dogs barking and babies crying: The effect of background noise on physiological state, reaction times, memory and mathematical processing**

Ana Arruda, Carolina Mesquita, Rodrigo Couto, Vanessa Sousa, Catarina Mendonça

