11th Iberian Congress of Perception (CIP 2026)
Palma

Program with Abstracts of Talks & Posters

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May 27th – May 29th, 2026

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11th Iberian Congress of Perception (CIP 2026)

Program

Wednesday, May 27, 2026

15:00 – 16:00	**Registration**
16:00 – 17:00	**Opening Remarks** **SEPEX Conference - Keynote 1: Carlos Velasco** *Individual-level cross-cultural variations in crossmodal correspondences*
17:00 – 18:30	**Welcome reception**

Thursday, May 28, 2026

09:30 – 10:30	**Session 1: Motion perception I** *Independent roles of surround suppression and cross-scale interaction in motion perception*. **Ignacio Serrano-Pedraza** (Universidad Complutense de Madrid, UCM) *The Motion-Induced-Position-Shift in 3D: Consequences for perception and action*. **Borja Aguado** (Universitat Central de Catalunya, VIC) *Spatiotemporal constraints on cross-scale interactions in motion direction discrimination.* **Sandra Arranz Paraíso** (Universidad Autónoma de Madrid, UAM)
10:30 – 11:00	**Coffee break & Posters**
11:00 – 12:00	**Session 2: Visual and neural processing** *Neural correlates of Metacontrast Masking of Symmetric Stimuli*. **Giulio Contemori** (University of Padova) *Spatio-temporal dynamics of visual processing during fixation*. **Cristina de la Malla** (Universitat de Barcelona, UB) *Neural Adaptation Effects on Haidinger's Brushes Perception: Polarization and Rotation Thresholds in Healthy Individuals.* **Luca Battaglini (**University of Padova)

12:00 – 13:00	**Session 3: Attention, awareness & time** *Seeing vs. knowing: Disentangling attention's role in conscious perception and metacognition*. **Oihane Baskaran** (Universidad Nacional de Educación a Distancia, UNED) *How Perceptual Evidence Accumulation Shapes Subjective Time*. **Silvia Seghezzi** (Birkbeck University of London) *Rhythms from within: How heartbeat and breathing shape action–perception coupling*. **Alejandro Galvez-Pol** (Universitat de les Illes Balears, UIB)
13:00 – 15:00	**Lunch**
15:00 – 16:00	**Session 4: Colour and contrast perception** *Entropy Characterisation of Colour Naming Variability in Red–Green Dichromats*. **Leticia Álvaro Llorente** (Universidad Complutense de Madrid, UCM) *Consistency and consensus in the use of Basic Colour Terms (BCTs) in red-green dichromats and normal trichromats*. **Humberto Moreira Villegas** (Universidad Complutense de Madrid, UCM) *Glutamatergic hypofunction impairs contrast perception.* **Cristina Rodríguez-Arribas** (Universitat de Barcelona, UB)
16:00 – 16:30	**Coffee break & Posters**
16:30 – 17:15	**Session 5: Aesthetic perception** *Effects of generation time on effort attribution and aesthetic evaluation of AI-generated visual art*. **Guido Corradi** (Universidad Nacional de Educación a Distancia, UNED) *Intra-Individual Stability in Preference for Curvature*. **Enric Munar** (Universitat de les Illes Balears, UIB)

Friday, May 29, 2026

09:30 – 10:30	**Session 6: Motion perception II** *NMDAR hypofunction drives impaired motion sensitivity but spares spatial suppression in early psychosis*. **Daniel Linares** (Universitat de Barcelona, UB) *Retinal Curl as a Functional Signal: Moving Beyond Focus of Expansion for Heading Estimation*. **Joan López-Moliner** (Universitat de Barcelona, UB) *Cross-scale interactions influence global motion discrimination*. **Omar Bachtoula** (Universidad Complutense de Madrid, UCM)

10:30 – 11:00	**Coffee break & Posters**
11:00 – 12:00	**Session 7: Interoception** *Cardiorespiratory coupling to active visual search*. **Victor Vila Ramírez** (Universitat de les Illes Balears, UIB) *Exploring the two-way interaction between cardiorespiratory activity and visual perception*. **Lucas Naranjo** (Universitat de les Illes Balears, UIB) *Cardiorespiratory modulation of active tactile sensing*. **Angelia Caparco** (Universitat de les Illes Balears, UIB)
12:00 – 13:00	**Keynote 2**: **Elisa Raffaella Ferrè** *Prisoners of Gravity: How Gravity Shapes Human Experiences*
13:00 – 15:00	**Lunch**
15:00 – 16:00	**Session 8: Social and applied perception** *Making the World Predictable: solving intractable inference through information bottlenecks in brain, body, and world*. **Luis M. Martinez** (Instituto de Neurociencias de Alicante) *Enhancing navigation and obstacle avoidance with a vibrotactile device as secondary electronic travel aid*. **Carlos de Paz** (Universidad Autónoma de Madrid, UAM) *Curved background and foreground elements enhance the appeal of indoor spaces*. **Erick G. Chuquichambi** (Universitat de les Illes Balears, UIB)
16:00 – 16.30	**Posters**
16:30 – 17:00	**Business meeting**

Abstracts

Talks

Wednesday, May 27, 2026

SEPEX Conference - Keynote 1: Carlos Velasco

Department of Marketing, BI Norwegian Business School, Oslo, Norway

16:00 – 17:00

Individual-level cross-cultural variations in crossmodal correspondences

Research on the universality of crossmodal correspondences has largely concentrated on cross-country comparisons, often neglecting the modulatory role of individual-level cultural orientations. This study investigates the influence of individual-level cultural dimensions on taste–shape and speech sound–shape correspondences in Japan and the USA. Specifically, the effects of looseness–tightness and Hofstede's cultural dimensions on the existence and strength of these correspondences were examined.

Across two experiments, we replicated canonical correspondences at the group level, with the sound associated with bouba and sweet taste word consistently judged as rounder than kiki and bitter. Importantly, we also found systematic moderating effects of cultural dimensions. In Experiment 1 (USA, Japan), all cultural dimensions moderated the sound–shape correspondences, and all but collectivism and looseness–tightness influenced the associations between sweet and bitter and shapes. In Experiment 2 (USA, pre-registered), sound–shape correspondences were moderated by power distance, uncertainty avoidance, masculinity, and looseness–tightness, whereas taste–shape correspondences were influenced by power distance, collectivism, and masculinity.

Across both experiments, sound–shape correspondences were consistently moderated by power distance, uncertainty avoidance, masculinity, and looseness–tightness, while taste–shape correspondences were commonly moderated by power distance and masculinity. Theoretically, the findings suggest that these crossmodal correspondences are culturally parameterised rather than universal, shaped by normative mechanisms linked to social regulation and value priorities.

Thursday, May 28, 2026

Session 1: Motion perception I

09:30 – 10:30

Moderator: Enric Munar

Independent roles of surround suppression and cross-scale interaction in motion perception.

Ignacio Serrano-Pedraza, Raúl Luna, Marcos Padilla-Ruiz, Omar Bachtoula.
Facultad de Psicología. Universidad Complutense de Madrid (UCM), Madrid, Spain

Two inhibitory mechanisms are well known in motion perception. The first is surround suppression, where duration thresholds for motion discrimination increase for large, high-contrast stimuli relative to smaller ones. The second is cross-scale interaction, in which the duration threshold for detecting motion of a high spatial frequency pattern increases when a static low-frequency component is added. Previous studies have suggested a link between surround suppression and motion-segregation efficiency, but it remains unclear whether motion segregation is also related cross-scale interactions. To address this question, we performed three motion-discrimination experiments.

In Experiment 1, duration thresholds were measured using binary noise windowed by raised-cosine apertures of 5 deg and 0.75 deg. In Experiment 2, thresholds were measured for discriminating the motion of a 3 cpd drifting Gabor (4 deg diameter), presented either alone or combined with a static anisotropic noise centred at 1cpd. In Experiment 3, we measured motion-segregation duration thresholds for an oriented ellipse drifting at 4.94 deg/s, composed of binary-noise and surrounded by binary noise moving in the opposite direction at the same speed; participants reported the orientation of the ellipse. From Experiments 1 and 2 we derived two indices: a suppression index (SI), defined as the log-threshold difference between the large and small stimuli; and an interaction index (II), defined as the log-threshold difference between the compound and simple stimuli.

SI did not correlate with II and showed no relationship with motion-segregation thresholds. In contrast, II showed a significant positive correlation with motion-segregation thresholds. These results suggest that surround suppression and motion segregation are independent processes. Interestingly, they reveal a strong relationship between cross-scale interaction and motion segregation, suggesting that motion segregation depends on how the visual system integrates motion information across spatial scales rather than on the strength of surround suppression.

The Motion-Induced-Position-Shift in 3D: Consequences for perception and action.

Borja Aguado, Loes Van Dam. *Universitat Central de Catalunya (Vic), Barcelona, Spain*

This study investigates the Motion-Induced Position Shift (MIPS) in a three-dimensional virtual-reality environment and examines how parameters of the perception-action cycle such as perceptual uncertainty, motor noise, and action cost, influence tracking accuracy. Fourteen participants (N = 14) performed a continuous target-tracking task in which tracking accuracy was manipulated using limited-lifetime random dot targets (SD = 1° or 2°), target distance (1.25, 2.25, 3.25 m), dot-pattern motion

direction (six cardinal 3D directions), dot speed (0, 5, 10°/s), and scene context (rich vs. poor pictorial cues), presented in separate blocks. Results revealed a robust MIPS effect across motion directions, distances, target sizes, and cue conditions, supporting the generality of this phenomenon in 3D environments and providing a paradigm to probe positional and motion cue integration in three dimensions. Inverse-kinematics models of motor control indicated that MIPS magnitude was modulated by sensory uncertainty of the target, whereas kinematic variables of motion control did not significantly influence the effect.

Spatiotemporal constraints on cross-scale interactions in motion direction discrimination.

Sandra Arranz Paraíso, Ignacio Serrano Pedraza**.** *Universidad Autónoma de Madrid (UAM), Madrid, Spain*

Motion direction discrimination of a drifting high spatial frequency pattern is impaired when a static low spatial frequency pattern is added to it (Derrington & Henning, 1987; Serrano-Pedraza, Goddard & Derrington, 2007). This impairment has been attributed to an inhibitory interaction between motion sensors tuned to high and low spatial frequencies. Although it is known that the strength of this interaction increases at short stimulus durations (between 25 and 100 ms) and large stimulus sizes (e.g., 4 deg), its effect at very short durations (<25 ms) and very large sizes (> 4 deg) has not been previously examined. The aim of this study was to characterize the spatiotemporal limits of this motion interaction. We used a PROPixx projector with a framerate of 1440Hz in a motion direction discrimination task across nine stimulus durations (2, 5, 10, 20, 30, 40, 60, 80, and 120 ms), two speeds (2 and 4 deg/sec), and two stimulus sizes (4 and 8 deg). The proportion of correct responses was measured using the method of constant stimuli. Stimuli consisted of vertical Gabor patches of 46% contrast. Stimuli consisted of 1 and 3 c/deg patterns in five conditions: single moving patterns (3m and 1m), static-moving compounds (3s+1m and 3m+1s), and a double-moving compound (3m+1m). Reversals in motion discrimination were observed in the 3m+1s condition for stimulus durations between 20 and 40 ms and only for the 4 deg stimulus size at both speeds. Interestingly, reversals disappeared for the larger stimulus size of 8 deg. These results show that motion interaction occurs within a narrow temporal window and is critically dependent on stimulus size.

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Session 2: Visual and neural processing

11:00 – 12:00

Moderator: Alejandro Gálvez-Pol

Neural correlates of Metacontrast Masking of Symmetric Stimuli.

Giulio Contemori, Marianna Musa, Martina Passaggi, Carolina Maria Oletto, Stefano Vicentin, Luca Battaglini, Giorgia Cona, Marco Bertamini. *Department of General Psychology, University of Padova, Padova, Italy*

Metacontrast masking impairs the visibility of a visual target when it is followed by a spatially adjacent but temporally delayed mask. Although the phenomenon is well characterized behaviourally, the neural mechanisms underlying masking—particularly the contribution of feedback processes—remain debated. Here, we addressed this question using a visual symmetry discrimination task, which depends on global perceptual integration. Symmetrical and asymmetrical octagonal stimuli were presented foveally at stimulus onset asynchronies (SOAs) of 10, 50, or 200 ms, each followed by a spatially non-overlapping annular mask. Behavioural accuracy exhibited a robust U-shaped function across SOAs, with maximal suppression at 50 ms.

To identify neural correlates of this suppression, we applied a synthetic-minus-natural ERP subtraction technique and analysed the resulting difference waveforms within three spatiotemporal regions of interest: two predefined clusters (an early posterior window and a late centro-parietal window) and one SPN-like cluster (276–424 ms), empirically defined via a cluster-based permutation test on unmasked trials. The SPN (Sustained Posterior Negativity) is a well-established ERP component associated with symmetry perception and global form integration. While the predefined clusters exhibited only modest early ERP suppression, their time course did not mirror the behavioural dip. In contrast, the SPN-like cluster showed both linear and quadratic (U-shaped) modulation across SOAs, and exploratory correlations between ERP amplitude and accuracy indicated a strong association between neural suppression and perceptual performance.

These findings demonstrate that metacontrast masking disrupts feedback-mediated visual integration within a temporally specific window and underscore the importance of using task-sensitive, spatially and temporally precise ERP analyses to isolate neural signatures of perceptual suppression.

Spatio-temporal dynamics of visual processing during fixation.

Cristina de la Malla, Martina Poletti**.** *Vision and Control of Action (VISCA) Group, Department of Cognition, Development and Psychology of Education, Institut de Neurociències, Universitat de Barcelona (UB), Barcelona, Spain*

Visual exploration of scenes consists of rapid saccades interleaved with brief fixations. Although information is processed across the visual field during fixation, the temporal evolution of this processing and the interplay between foveal and extrafoveal processing remain incompletely characterized. We investigated whether the time course of change localization during fixation differed across regions of the visual field. In an initial study, participants made a saccade toward a fixation point surrounded by four bars that could be located either all in the fovea (0.3º eccentricity), all in the periphery (9º eccentricity), or two in the fovea and two in the periphery. Upon saccade landing, one of the bars briefly changed its orientation, and at the end of the trial participants reported the location of

the moving stimulus. Stimulus size and orientation-change magnitude were adjusted to equate task difficulty across locations. The ability to localize changes in peripheral areas improved as a function of time after fixation onset, whereas localization performance in the fovea remained stable. The same pattern held when foveal and peripheral stimuli were monitored simultaneously. To determine if this temporal modulation follows a graded, eccentricity-dependent profile, in a second study stimuli were presented at different eccentricities (0.3º, 2º, 6º, 15º), either in isolation or split across two eccentricities. Performance improved throughout fixation, with larger improvements at greater eccentricities. When two eccentricities were monitored simultaneously, early fixation performance favored stimuli closer to the center of gaze, but peripheral performance rapidly recovered, following a similar time course to when tested alone. Together, these findings reveal that fixation is not a static processing window but a dynamic period in which visual processing recovers following saccades in a graded, eccentricity-dependent manner. Peripheral processing appears to incur an early post-saccadic cost that is progressively compensated during fixation, highlighting fundamental spatiotemporal constraints in active vision.

Neural Adaptation Effects on Haidinger's Brushes Perception: Polarization and Rotation Thresholds in Healthy Individuals. **Luca Battaglini,** Dominga Ortolan, Gianluca Ruffato**.** *Department of General Psychology, University of Padova, Padova, Italy*

This research examined how neural adaptation affects the perception of Haidinger's brushes, an entoptic phenomenon that allows humans to visually detect polarized light. The investigation specifically focused on the relationship between the pattern's rotation speed and the light's polarization level to establish normative data in healthy individuals.

The researchers constructed an experimental apparatus using two LED light sources, with one modified by a variable-speed rotating linear polarizer. By adjusting the relative LED intensities, different polarization levels could be achieved. The study involved 37 healthy participants who underwent one-eye testing across seven polarization levels, with both descending and ascending limit tests determining rotational speed thresholds.

Analysis revealed a linear decrease in rotational speed threshold corresponding to the logarithm of polarization level. All subjects could detect the pattern at 20% polarization or higher, but detection capabilities dropped significantly at 10% and 5% levels. The average polarization threshold was calculated at 9.7 ± 1.2%. Notably, participants with lower initial rotational thresholds at maximum contrast demonstrated better performance at detecting lower polarization levels.

The findings validate the significant impact of rotational speed on perceiving Haidinger's brushes, particularly when polarization is minimal. Since normal pattern perception is linked to macular pigment distribution and density, these results provide valuable insights for developing screening tools based on Haidinger's brush perception that could enable early detection of maculopathy and other macular conditions.

Session 3: Attention, awareness & time

12:00 – 13:00

Moderators: Victor Vila-Ramírez

Seeing vs. knowing: Disentangling attention's role in conscious perception and metacognition.

Oihane Baskaran, Pedro R. Montoro, Antonio Prieto. *Departamento de Psicología Básica I, Facultad de Psicología, Universidad Nacional de Educación a Distancia (UNED), Madrid, Spain*

The role of attention in conscious perception and its relationship to metacognitive monitoring remain widely debated in neuroscience. Across two experiments, we developed a dissociation paradigm to disentangle attention's effects on metacognitive access to perceptual contents. Participants performed a visual discrimination task (i.e., reporting whether a tilted Gabor grating was oriented left or right) and made trial-by-trial subjective confidence judgments on their decisions (on a 4-level confidence rating scale) under full- and divided-attention conditions (single- vs. dual-task). We implemented two different staircases across experiments: an adaptive staircase to equate subjective confidence judgments between full and divided-attention blocks, allowing performance to vary freely (Experiment 1); and a QUEST (Bayesian staircase) procedure to equate performance in the discrimination task across blocks (Experiment 2), allowing subjective confidence to vary freely. This design allowed us to isolate how attention modulated performance in the discrimination task (discrimination sensitivity) and subjective confidence independently. Our results point toward a potential dissociation between perceptual processing and cognitive access, in agreement with hierarchical models of metacognition. We will discuss how the allocation of attentional resources differently impacts first-order performance versus second-order confidence, providing new insights into the mechanisms underlying conscious perception and metacognitive access.

Keywords: metacognition, confidence, metacognitive efficiency, perceptual sensitivity, attentional load, consciousness, Bayesian modelling.

How Perceptual Evidence Accumulation Shapes Subjective Time.

Silvia Seghezzi, Aimee Parish, Irena Arslanova. *Birkbeck University of London, London, England*

How is subjective time shaped by perceptual evidence accumulation during decision-making? Previous research suggests that duration judgements are influenced by sensory information and perceptual confidence, yet it remains unclear whether experienced time reflects the accumulation of any salient features or specifically the accumulation of task-relevant evidence that supports a perceptual decision. This project addressed this question using a time-estimation task adapted from a letter-stream categorisation paradigm.

Participants viewed rapid streams of letters and judged whether the stream contained more bd or pq letters, reported their confidence, and estimated the stream's duration. Two properties of evidence were manipulated. First, evidence amount was varied by presenting either a low or high number of target letters within the stream. Second, evidence net was manipulated by creating either informative

streams, in which accumulated evidence strongly favoured one response, or neutral streams, in which evidence was balanced and decisions relied more on noise or prior expectations.

Fifty-five participants completed the online study following piloting and power analysis. Results showed that streams containing more target letters were perceived as significantly longer than physically identical streams with fewer targets, demonstrating that subjective time tracks the amount of accumulated evidence. Informative streams were also judged as longer than neutral streams; however, this effect was mediated by increased confidence, suggesting that evidence structure influenced time perception indirectly through metacognitive processes.

Overall, these findings indicate that subjective time expands with the accumulation of decision-relevant evidence, with additional modulation by perceptual confidence.

Rhythms from within: How heartbeat and breathing shape action–perception coupling. **Alejandro Galvez-Pol.** *Active Cognition, Embodiment, and Environment Lab, Psychology Department, Universitat de les Illes Balears (UIB), Mallorca, Spain*

Perception and action are not separate processes; they form a continuous loop in which organisms move to gather information to guide subsequent behavior. This loop is embedded within autonomic cycles, notably heartbeat and respiration, that have often been dismissed as background physiological noise. I argue instead that these rhythms act as a temporal scaffold, shaping when we perceive and move by creating recurring windows for information sampling and action implementation. On this view, cardiorespiratory cycles bias the timing and duration of environmental interactions by shaping when stimuli are sensed, how long sensing is sustained, and when movement is initiated. Within this framework, organisms may exploit distinct cardiorespiratory phases to optimize, compensate, or adjust sensory acquisition. In the cardiac cycle, perceptual facilitation is frequently observed during diastole relative to systole, likely reflecting cyclic shifts in sensory gain. Conversely, respiratory effects appear more context-dependent, varying with task demands and sensory modality; as respiration is partly voluntary, organisms may use it to actively modulate sampling and action. Finally, I formalize these interactions under an active inference framework. In this model, cardiorespiratory phase cyclically modulates expected precision, defined as the reliability assigned to different information streams. This produces a graded alternation: sensory evidence accumulation is prioritized at specific periods of the cycle, while motor implementation is facilitated at others. Overall, viewing bodily rhythms as internal control variables may help unify accounts of moment-to-moment perceptual and motor variability, support ecological experimental designs, and motivate body-based methods to enhance performance.

Session 4: Colour and contrast perception

15:00 – 16:00

Moderators: Erick G. Chuquichambi

Entropy Characterisation of Colour Naming Variability in Red–Green Dichromats.

Leticia Álvaro Llorente, Julio Lillo, Humberto Moreira**.** *Departamento de Psicología experimental, Procesos cognitivos y Logopedia. Facultad de Psicología. Departamento de Psicología Social, del Trabajo y Diferencial. Facultad de Psicología. Universidad Complutense de Madrid (UCM), Madrid, Spain*

A naming experiment was conducted with 64 adults: 32 red–green dichromats (CVD; all males, 15 protanopes, 17 deuteranopes) and 32 colour-normal participants (CVN; 15 males, 17 females). CVD classification was confirmed using Rayleigh matches on a Nagel anomaloscope. A total of 101 stimuli from the NCS atlas were reproduced on a calibrated 24-inch LaCie 324i monitor as circular patches (4° visual angle) against a grey background. Participants named the stimuli using one of the 11 Spanish basic colour terms (BCTs): rojo-“red,” verde-“green,” azul-“blue,” amarillo-“yellow,” rosa-“pink,” naranja-“orange,” morado-“purple,” marrón-“brown,” blanco-“white,” gris-“grey,” and negro-“black”. Stimuli included best exemplars, boundary stimuli, and intermediate samples positioned between exemplars and category boundaries in CIELUV space. Naming variability was quantified using Shannon entropy. Unlike the consensus index, which reflects only the most frequent response, entropy (H) captures the entire response distribution, providing a measure of uncertainty that quantifies variability across all BCTs: $H = -\sum p_i \log_2(p_i)$, where i indexes each of the 11 BCTs and p_i represents the proportion of times each term was used to name a given stimulus. When $p_i = 0$, a small Gaussian noise term was added to avoid undefined logarithmic values.

CVD observers showed consistently higher entropy than CVN observers, indicating greater naming variability. Group differences were largest for less representative stimuli and derived chromatic categories. “Yellow” and achromatic terms exhibited low entropy across groups, reflecting stable categorisation. In contrast, “green” and “brown” showed the highest entropy in CVD observers, consistent with their reliance on the L–M chromatic mechanism. “Pink,” “orange,” “grey,” and “purple” also showed elevated entropy in CVD participants, whereas “blue” showed intermediate values. Overall, categorical uncertainty increased for poorly representative stimuli and was significantly amplified by impaired chromatic discrimination, highlighting the interaction between perceptual constraints and colour category structure. These findings are discussed in conjunction with additional colour-naming metrics.

Consistency and consensus in the use of Basic Colour Terms (BCTs) in red-green dichromats and normal trichromats.

Humberto Moreira Villegas, Julio Lillo, Leticia Álvaro. *Departamento de Psicología Social, del Trabajo y Diferencial. Facultad de Psicología. Universidad Complutense de Madrid (UCM), Madrid, Spain*

Colour vision deficiency (CVD) is characterized by reduced colour discrimination, and affects about 8% of males and 0.4% females worldwide. Here we compare the consistency and the consensus when using Basic Colour Terms (BCTs) between red-green dichromats and normal trichromats. Thirty two dichromats (15 protanopes, 17 deuteranopes) and 32 normal trichromats (17 females, 15 males) took

part in a colour naming experiment in which they had to use only one BCT (red, green, blue, yellow, pink, orange, purple, brown, white, grey, and black) for naming a total of 101 colour samples that were selected to represent all of the basic colour categories (BCCs) across colour space and were presented on a calibrated monitor. Participants were diagnosed by a battery of colour tests (Ishihara, City University Test CUCVT, Lanthony test, and Rayleigh matches on an anomaloscope, Tomey AF-1, Tomey, Nagoya, Japan). Consistency (the same participant used the same term to name a given colour sample in different occasions) and consensus (different observers used the same term to name a given colour sample) were analysed. Results showed the same pattern both for consistency and consensus in all groups of observers: consistency and consensus varied as a function of both representativeness and type of category. Consistency and consensus scores were highest for prototypical stimuli, medium for intermediate representatives, and lowest for poor exemplars. Consistency and consensus scores were highest for primary achromatic categories, medium for primary chromatic categories, and lowest for derived categories. Group mean consistency and consensus scores revealed a clear effect of observer group: normal trichromats showed higher colour naming consistency and consensus than observers with CVD both for representativity and across category type. Results are discussed according to the Universals and Evolution Hypothesis, and practical implications are discussed according to Universal Design “perceptible information” principle to ensure accessible colour codification.

Glutamatergic hypofunction impairs contrast perception. **Cristina Rodríguez-Arribas**[1], Lorena Arribas[2], Henry Pullin[1], Víctor Patricio[2], Laia Prades[2], Rafael Marin-Campos[2], Josep Dalmau[2,3,4], Joan López-Moliner[1], Albert Compte[2], Daniel Linares[1,5] *1. Vision and Control of Action Group, Departament de Cognició, Desenvolupament i Psicologia de l'Educació, Institut de Neurociències, Universitat de Barcelona, Barcelona, Spain. 2. Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Barcelona, Spain. 3. Hospital Clínic, Barcelona, Spain. 4. CaixaResearch Institute, Barcelona, Spain. 5. Serra-Húnter Fellow*

Perceptual alterations in schizophrenia can be used to identify underlying neural and computational anomalies, potentially serving as valuable biomarkers. It has been hypothesized that these alterations arise from a hypofunction of the glutamatergic NMDA receptors (NMDAR), but direct perceptual evidence for this account remains limited. For instance, animal models demonstrate that pharmacological blockade of NMDAR reduces the neural response to contrast in the visual cortex—a mechanism proposed to explain the impaired contrast perception widely observed in schizophrenia. However, such deficit could also stem from alterations in other neurotransmitter systems including the anti-dopaminergic effects of antipsychotic medication. Here, to more directly assess the role of the glutamatergic hypofunction in contrast perception, we measured contrast perception in patients with anti-NMDAR encephalitis, a rare disorder precisely driven by a glutamatergic hypofunction. Participants performed a two-alternative forced-choice task, identifying which of two stimuli had higher contrast. The stimulus contrasts varied widely, spanning from near-threshold detection levels to high contrasts. We found that, compared to healthy controls, patients with anti-NMDAR encephalitis showed a strong reduction in sensitivity, especially at low contrasts. This finding aligns with the response attenuation observed in animal models following NMDAR blockade, which also is stronger at low contrast. Our results indicate that alterations in contrast perception are mediated by glutamatergic hypofunction supporting the hypothesis that perceptual alterations in schizophrenia may be driven, at least in part, by glutamatergic dysfunction.

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Session 5: Aesthetic perception

16:30 – 17:30

Moderators: Borja Aguado

Effects of generation time on effort attribution and aesthetic evaluation of AI-generated visual art.

Guido Corradi, Cecilia Theirs, Sergio Villar, Maria Luisa Martínez-Martí. *Departamento de Psicología Social y de las Organizaciones, Facultad de Psicología, Universidad Nacional de Educación a Distancia (UNED), Madrid, Spain*

The effort heuristic posits that greater perceived effort leads to higher evaluations of creative outcomes. Although this effect is robust for human creators, it is unclear whether similar mechanisms apply to Artificial Intelligence (AI). The present research examines whether increased generation time functions as an effort cue for AI systems and whether such cues enhance aesthetic judgments of AI-generated visual artworks (images). Across two pre-registered studies, generation time was systematically manipulated. In Study 1 (N = 207), participants were informed that images were generated either quickly (30 seconds), moderately (4–8 minutes), or slowly (over 30 minutes), using a between-subjects design. Study 2 (N = 204) adopted a within-subjects design in which participants directly experienced short versus longer waiting times (4 vs. 20 seconds) before image generation.

Across both studies, longer generation times reliably increased perceived effort attributed to the AI. However, this increased effort attribution did not result in higher aesthetic evaluations, including measures of liking, beauty, depth, quality, complexity, or monetary value. Instead, participants' positive attitudes toward AI and the extent to which they attributed consciousness-like qualities to the system were the strongest predictors of aesthetic appreciation.

These findings indicate a dissociation between effort attribution and reward in the context of artificial agents. While observers readily infer effort from temporal cues, such inferences do not function as quality signals when human agency is absent. The results suggest that the effort heuristic is constrained by creator identity and that aesthetic evaluations of AI-generated artworks are shaped more by beliefs about AI than by temporal effort cues.

Intra-Individual Stability in Preference for Curvature.

Enric Munar, Samuel Palacios, Erick G. Chuquichambi. *Universitat de les Illes Balears (UIB), Mallorca, Spain.*

Scientific literature on empirical aesthetics shows a higher preference for curved over angular contours and lines, establishing a preference effect for curvature. However, some studies have shown a remarkable range of variability of this effect. One possible source of this variability is the sensitivity to curvature preference among participants. To investigate the intra-individual variability of this sensitivity, we conducted two studies. In the first study, the hundred participants rated four types of

images to assess the variability of the preference: (a) meaningless shapes; (b) indeterminate paintings, (c) drawings of everyday objects, and (d) photographs of interior spaces, from less to more meaningful. The second study addresses the consistency of curvature preference using a test-retest paradigm with the same stimuli as the first study. Participants rated their liking of the stimuli three times, conducted over a period of two weeks. One hundred participants initiated the second study, but only 92 completed the three sessions. In the third session, participants also rated the curvature of the stimuli, i.e., a measure of perceived curvature. The results show that, in all four assessments (one in the first study and three in the second), participants did not show a significant preference for curvature in interior spaces, although there was a slight tendency towards it. In the other three types of stimuli, the effect of curvature preference is clearly significant. We calculated a curvature preference value for each participant and type of stimulus, subtracting the rating mean of the angular stimuli from the rating mean of the curved stimuli. The correlations between stimuli in each session are moderate to high, with the particularity that they gradually increase from the first to the third session in the second study. The correlations between sessions were high with meaningless shapes, and high to moderate with paintings and drawings.

Friday, May 29, 2026

Session 6: Motion perception II

09:30 – 10:30

Moderators: Lucas Naranjo

NMDAR hypofunction drives impaired motion sensitivity but spares spatial suppression in early psychosis.

Daniel Linares, Francina Badia, Laia Prades, Mireia Rosa-Justicia, Rafael Marin-Campos, Josefina Castro-Fornieles, Josep Dalmau, Albert Compte, Gisela Sugranyes. *Universitat de Barcelona (UB), Barcelona, Spain*

Beyond visual hallucinations, people with schizophrenia exhibit altered performance in controlled visual perception tasks. Understanding these alterations is important because they may underlie everyday visual difficulties, provide insights into the neural and computational dysfunctions of the disorder, and potentially serve as biomarkers for diagnosis or disease progression. Specifically, the illness is associated with reduced motion sensitivity and diminished spatial suppression—a phenomenon where discriminating high-contrast moving stimuli is paradoxically harder for large versus small sizes. To determine if these specific perceptual deficits appear at psychosis onset and if they are driven by NMDAR hypofunction, which is considered a core pathophysiological mechanism of schizophrenia, we measured motion sensitivity and spatial suppression in first-episode psychosis patients, patients recovering from anti-NMDAR encephalitis, and healthy controls. Both clinical groups exhibited significantly impaired motion sensitivity across high and low contrasts, a robust deficit corroborated by our supplementary meta-analysis of chronic schizophrenia. Conversely, spatial suppression remained completely intact in both early-illness groups, with the meta-analysis showing only modest reductions in chronic stages. This indicates impaired motion sensitivity is an early, core feature of psychosis, whereas spatial suppression is initially preserved. Crucially, by fitting full psychometric functions to explicitly account for directional choice biases, stimulus-independent lapses, and unexpected brief-duration motion reversals, we confirmed that these motion sensitivity impairments represent genuine perceptual sensory deficits rather than generalized performance artifacts.

Retinal Curl as a Functional Signal: Moving Beyond Focus of Expansion for Heading Estimation.

Joan López-Moliner, Kontessa I. Zorpala. *Universitat de Barcelona (UB), Barcelona, Spain*

How does the brain estimate heading during active locomotion? Classic models posit that the visual system must "de-noise" the retinal image by filtering out rotational flow (curl) to recover the Focus of Expansion (FOE). We challenge this assumption, proposing instead that the brain treats retinal curl as a primary functional signal for navigation. Using a real-time gaze-contingent manipulation, we isolated the effects of rotational flow while participants viewed simulated walking paths. While natural viewing produced systematic heading biases, these biases were eliminated when foveal curl was

selectively cancelled—demonstrating that retinal curl, not just translational flow, dictates the perceived heading. We formalize this with a ring-attractor neural network that integrates gaze-contingent inhibition and a 'straight-ahead' prior. Our results suggest that rather than performing complex FOE recovery, the brain exploits the geometry of gaze stabilization to simplify the computational demands of navigation.

Cross-scale interactions influence global motion discrimination. **Omar Bachtoula,** Ignacio Serrano-Pedraza**.** *Department of Experimental Psychology, Faculty of Psychology, Universidad Complutense de Madrid (UCM), Campus de Somosaguas, Madrid, Spain*

An interaction across spatiotemporal scales arises in visual motion perception when static coarse scales are combined with moving fine scales. At short durations, this interaction produces a motion illusion in which the stimuli appear to drift opposite to the real motion. In the present study, we assessed the presence of this cross-scale interaction in the global motion level with plaids composed of gratings of ±45º. Across three experiments, we measured the proportion of correct responses at four durations (25, 50, 100, and 200 ms). In experiment 1, we tested whether the illusion arising from the cross-scale interaction also affects the perceived pattern motion of plaids that combine coarse and fine spatial scales and are windowed by circular Gaussians of different sizes. The interaction appeared only for the shorter presentations (25 and 50 ms) and stimulus sizes larger than 1 deg. In experiment 2, we used plaids windowed by Gaussians elongated either vertically or horizontally. Results revealed a strong asymmetry, as the cross-scale interaction emerged only when the pattern motion of plaids occurred along the axis of elongation and not when it was orthogonal to it. This asymmetry suggested a processing after local motion has been integrated, since stimuli were equally visible in both windows. To further test this hypothesis, in experiment 3, we removed all components of one orientation from the elongated plaids, resulting in stimuli containing only oblique parallel coarse- and fine-scale gratings. Under these conditions, a strong cross-scale interaction was observed, and the asymmetry between windows disappeared, indicating that it is the result of a processing that occurs after motion signals have been integrated across orientations. Therefore, these findings suggest that, for global motion, orientations are first combined within a scale and then, the different scales are integrated

Session 7: Interoception

11:00 – 12:00

Moderators: Guido Corradi

Cardiorespiratory coupling to active visual search. **Victor Vila Ramírez**[1], Sven Ohl[2], Alejandro Galvez-Pol[1]. ***1.*** *Active Cognition, Embodiment, and Environment Lab, Psychology Department, Universitat de les Illes Balears (UIB), Palma de Mallorca, Spain.* ***2.*** *Humboldt-Universität zu Berlin, Berlin, Germany*

The nature of perception is active: we move our sensors, such as the eyes, to sample our surroundings. In visual perception, for example, coordination between eye movements and fixations is essential for an efficient sampling of the environment. Crucially, perception of the outside is in a relationship with the internal perception of the body and its rhythms (i.e., interoception), such as the cardiac or respiratory cycles. Although recent research has examined how these cycles shape perception, most paradigms limit participants' ability to engage with visual input. Here, we propose a novel, ecological approach to investigate how active sensing and interoceptive rhythms interact.

To close this gap, we have designed a gaze-contingent paradigm that allow us to track eye movements in a visual categorization task. Participants will freely explore a natural scene (i.e., bushes), with hidden stimuli (i.e. a tiger-coloured Gabor patch). A circular window locked to participants' gaze will constrain visibility, like a torchlight scanning the scene. This active condition will be contrasted with a passive one: participants will view a replay of another's gaze movement, thus, the volitional part of the task is lost. The use of eye tracking, electrocardiography, and a respiration band will give us a wide understanding of visual perception and its coupling with cardiac and respiratory phases.

Preliminary analyses will provide an initial validation of the paradigm and inform subsequent, more comprehensive analyses following the completion of data collection.

Based on previous research, we predict that cardiac and respiratory cycles will influence where and when people look and how quickly they respond. Our paradigm moves beyond traditional lab paradigms, offering a real-world approach to the influence of the rhythms of the body on perception, cognition, and emotion, bringing us one step closer to understanding how we see and feel in everyday life.

Exploring the two way interaction between cardiorespiratory activity and visual perception. **Naranjo Lucas**[1], Gerosa Marta[2,3]; Dagen Mascha[3], Aggarwal Niket[2], Gaebler Michael[2], Galvez-Pol Alejandro[1] ***1****. ACE2Lab Department of Psychology, University of the Balearic Islands, Palma de Mallorca, Spain.* ***2****. Department of Neurology, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany* ***3****. Berlin School of Mind and Brain, Faculty of Philosophy, Humboldt-Universität zu Berlin, Berlin, Germany*

Near-threshold perception is modulated by the cardiorespiratory cycle: visual and tactile sensitivity fluctuates with cardiac and respiratory phase, improving during diastole and inspiration. However, it remains unclear whether these effects extend beyond controlled laboratory conditions into everyday perceptual experience, and whether they reflect changes in sensory processing per se or are partly

driven by concurrent modulation of motor preparation and action timing. A related open question is whether observers have preferred bodily windows for sampling — that is, whether they spontaneously time their sensory intake to coincide with phases of enhanced perceptual sensitivity.

We present two complementary approaches to these questions. In a self-paced psychophysical task, participants choose when to initiate stimulus onset while cardiac and respiratory signals are continuously recorded, allowing us to test whether observers preferentially sample during favorable bodily phases and whether this alignment improves perceptual performance across varying levels of task difficulty. In a large-scale ecological survey (target N > 500), participants report real-life situations linked to changes in their breathing. Automated thematic analysis reveals that distinct respiratory phases map onto distinct experiential profiles — preparation, sustained focus, and release — a structure validated by independent affective ratings.

Together, these approaches test whether cardiorespiratory modulation of perception operates beyond the threshold and the laboratory, and whether organisms actively exploit their own bodily rhythms to perceive

Cardiorespiratory modulation of active tactile sensing. **Angelia Caparco,** Alejandro Gálvez-Pol. *Active Cognition, Embodiment, and Environment Lab, Psychology Department, Universitat de les Illes Balears (UIB), Palma de Mallorca, Spain*

Perception is an active process shaped by the body's internal rhythms. The cardiac and respiratory cycles create brief windows of higher or lower neural excitability, influencing how sensory information is sampled and processed. Humans can exploit these fluctuations by timing the movements of their sensors (eyes, fingertips) to align with optimal brain-body states, a process known as active sensing. This study examines how active tactile sensing is coordinated with heart and breathing rhythms, and how this coordination adapts to task demands.

45 participants will perform a tactile orientation discrimination task. On each trial, they will touch a 3D-printed grating with their index finger and judge its orientation (horizontal vs vertical). Task demands will vary along two dimensions: stimulus difficulty (easy vs. hard gratings) and whether difficulty is known in advance (cued vs. uncued). We will continuously record heart activity (ECG), brain activity (EEG), and respiration. We will examine whether touch duration varies with (i) cardiac and respiratory phase at touch onset, (ii) neural excitability indexed by sensorimotor alpha power, and (iii) cortical processing of cardiac signals indexed by pre-touch heartbeat-evoked potentials (HEPs).

We predict that touch onsets will cluster during late inhalation, and that touches initiated during systole will last longer than those during diastole, reflecting prolonged evidence accumulation during lower-sensitivity windows. This phase alignment is predicted to strengthen for harder stimuli, especially when difficulty is known in advance. At the neural level, touch onsets during late inhalation are predicted to coincide with lower alpha power over somatosensory cortex, while larger pre-touch HEP amplitude is predicted to precede longer touches. These findings will clarify how the brain aligns sensory sampling with bodily rhythms to fine-tune the neural processes underlying adaptive behaviour.

Keynote 2: Elisa Raffaella Ferrè.

School of Psychological Sciences, Birbeck University of London, London, United Kingdom

12:00 – 13:00

Prisoners of Gravity: How Gravity Shapes Human Experiences

"Everything you think you know about moving and judging distances on Earth just disappears… your brain has to relearn how to do even the simplest tasks" - Dave Scott, Apollo 15

Gravity is so fundamental to life on Earth that we rarely notice it, until it changes. From the moment of birth, our brains are immersed in a constant 1g environment, and every neural system that guides movement and perception is calibrated against it. At the heart of this calibration are the vestibular otoliths, tiny inner-ear sensors that provide the brain with a continuous and largely unconscious signal about gravity. Remove that signal, and something remarkable happens: the brain's model of the world begins to unravel.

What happens when gravity is no longer what we expect? Is the human brain hardwired for Earth's gravity, or can it adapt? How does perception hold together on the Moon, where gravity is one-sixth of Earth's, or on Mars, where it is one-third? And what does altered gravity reveal about the hidden architecture of the mind that normal life keeps permanently concealed?

Drawing on research that combines psychophysics, neuroimaging, computational modelling, and space science, I will show how gravity silently organises human experience from the inside out. I will demonstrate how its removal distorts perception, disrupts even the simplest voluntary movements, and can produce profound shifts in bodily awareness and states of consciousness. I will argue that gravity is not merely a physical force acting on the body- it is a scaffold for the brain's model of reality itself, one so deeply embedded that we only discover its existence when it is taken away. We are, in the most literal sense, prisoners of gravity.

Session 8: Social and applied perception

15:00 – 16:00

Moderators: Angelia Caparco

Making the World Predictable: solving intractable inference through information bottlenecks in brain, body, and world. Arturo José Valiño[1], Axel Constant[2], Laura D. DiPaolo[2], Felipe Criado-Boado[1], Andy Clark[2,3], **Luis M. Martinez**[4]. *1. Instituto de Ciencias del Patrimonio (INCIPIT-CSIC), Santiago de Compostela, Spain. 2. Department of Engineering and Informatics, The University of Sussex, Brighton, UK. 3. Department of Philosophy, The University of Sussex, Brighton, UK. 4. Instituto de Neurociencias de Alicante (CSIC-UMH), Alicante, Spain.*

Predictive brains are bidirectionally coupled with their environments, in constant interaction to reduce uncertainty by extracting regularities from sensory inputs. Here, we develop a formal information-theoretic approach that links the ideal observer of computational mechanics with the non-ideal observer of cognitive neuroscience, i.e., a Bayesian brain confronting the profound intractability of performing exact inference since a generative model is always simpler than the world. We argue that this intractability is solved through the systematic use of information bottlenecks, which compress and selectively filter environmental information before it is incorporated into internal generative models.

We show that such bottlenecks operate across multiple scales, from the evolution of neural circuits and sensory systems to the active exploratory actions that organisms use in real-time to select and structure their own sensory inputs. A key aspect of our proposal is that information bottlenecks are not only internal and biological, but can also be externalized through actions in the world. By transforming their environments, agents construct external bottlenecks—material and cultural structures that stabilize information, constrain attention, and transmit regularities that are shared across individuals and even across generations. From this perspective, niche construction, material culture, monuments, and even social and cultural prescriptions, can be also understood as external memory devices, collective information bottlenecks that extend the predictive machinery of the brain into the world itself. In sum, the brain solves the intractability problem of inferring information not only by internal neural mechanisms, but by systematically constructing and exploiting information bottlenecks in the world itself.

Enhancing navigation and obstacle avoidance with a vibrotactile device as secondary electronic travel aid. **Carlos de Paz[1],** Juan Antonio Huertas[1], Jorge Ibáñez-Gijón[1], Juan Andrés Martín-Gonzalo[2], Ana Beatriz Varas[2] & David Travieso[1]. *1. Facultad de Psicología. Universidad Autónoma de Madrid (UAM), Madrid, Spain. 2. Escuela Universitaria de Fisioterapia de la ONCE. Universidad Autónoma de Madrid (UAM). Madrid, Spain.*

People with visual impairments commonly rely on the use of a white cane to navigate and avoid obstacles. Although this analog tool is highly reliable and easy to use, its drawback is the impossibility to anticipate obstacles beyond reach and routes, as well as obstacles above waist level. Electronic travel aids (ETAs) and sensory substitution devices (SSDs) are new technological solutions designed to enhance the tactile and/or auditory capabilities to access the information needed to overcome those

drawbacks. In the present study, 25 individuals with visual impairments used the T-Sight, a vibrotactile SSD, and/or the white cane in a navigation task involving obstacle avoidance. While the performance achieved with the device, measured by the number of collisions and walking speed, did not surpass the white cane, the SSD did have a positive impact on ambulation. Participants reduced the number of white cane touches towards environmental obstacles and performed obstacle avoidance maneuvers earlier. These results demonstrate the potential of vibrotactile devices to address the limitations of the white cane.

Curved background and foreground elements enhance the appeal of indoor spaces. **Erick G. Chuquichambi**[1], Claudia Damiano[2], Na Wei[3], & Dirk B. Walther[2]. *1. Universitat de les Illes Balears, UIB, Palma de Mallorca, Spain. 2. University of Toronto. 3. Temple University.*

Curvature is a prominent visual feature that influences aesthetic experiences across various contexts. Particularly within architectural design, understanding how curvature impacts perceptual and emotional responses can inform both the aesthetics field and practical architectural design applications. This study investigated the effects of background and foreground curvature on aesthetic judgements of interior architectural spaces. In an online study using a 2 (Background: curvy vs. angular) x 2 (Foreground: curvy vs. angular) within subjects, participants evaluated 56 digitally rendered indoor spaces on measures of liking, beauty, fascination, coherence, hominess, privateness, and time they would spend in the space. Emotional responses to each space were also assessed using a subset of words from the Positive and Negative Affect Scale (PANAS). Our findings revealed that spaces with curved elements were consistently rated higher across multiple dimensions. For liking, spaces with curvy background elements were rated significantly higher than angular ones, $F(1, 29) = 6.04$, $p = 0.02$. Spaces with curvy foreground elements were also rated higher, $F(1, 29) = 18.95$, $p < 0.001$. Similar effects were observed for beauty, fascination, hominess, and coherence. Interactions between background and foreground curvature highlighted the dominant role of foreground features in shaping aesthetic preferences. Curvy foregrounds consistently drove higher ratings, and their effects were further enhanced when paired with curvy backgrounds, suggesting that foreground curvature plays a leading role in influencing aesthetic responses. Analyses of the PANAS words demonstrated that curvy spaces elicited more positive affect (e.g., uplifted) and less negative affect (e.g., stressed), supporting the biophilic design hypothesis that nature-like visual features, such as curvy elements, in architecture result in positive affective experiences. These results highlight the benefits of curvy elements in architectural design,and offer insights into how visual features of both background and foreground elements interact to shape aesthetic and emotional experiences.

Abstracts

Posters

1. New approaches to subliminal perception: Exploring the unconscious perception of masked primes with Bayesian regression models and General Recognition Theory (GRT). **Christian Andrade,** Mikel Jiménez, José A. Hinojosa, Pedro R. Montoro & Antonio Prieto. *Universidad Complutense de Madrid (UCM), Madrid, Spain*

Can the information that remains outside observers' awareness influence their behavior? This question has been one of the most challenging within experimental psychology and cognitive neuroscience. In this present study we aim to assess to what extent global shapes constructed by means of the perceptual grouping of local elements can be perceived in the absence of awareness, by applying two novel methods: (1) a regression-based Bayesian generative model and (2) Sensitivity vs. Awareness curves derived from General Recognition Theory (GRT) that differ in how they define "unconscious" (chance-level discrimination vs. absence of subjective awareness) and "processing" (priming vs. detection), and also in their underlying mathematical frameworks. Given the wide disparity between approaches and their differing assumptions this work focuses on compare and contrast the results and convergence between both frameworks. To this end, we examined the visual processing of briefly presented masked stimuli using two prime-mask stimulus onset asynchronies (SOA): 40 ms (Experiment 1) and 67 ms (Experiment 2). While both methods provided evidence for the unconscious processing of the global shape with longer SOAs (67 ms); in Experiment 1, under shorter SOA conditions (40 ms), we found a divergence between GRT (SvA) analyses, which supported the unconscious processing of the targets, and the regression-based Bayesian generative model, which yielded strong evidence against it. Both methods and their results are deeply discussed in terms of their underlaying assumptions, validity and robustness, with special attention to the cautions that must be taken when interpreting the results, due to the different (and divisive) theoretical assumptions that guide both methods, and the way in which evidence about unconscious processing is obtained.

2. Type-B metacontrast masking in foveal and peripheral vision. **Martina Passaggi,** Giulio Contemori, Aanya Khare, Deniz Demirkapi, Marianna Musa, Luca Battaglini, Carolina Maria Oletto, Marco Bertamini. *University of Padova, Padova, Italy*

Visual masking is a technique used for preventing access to visual information by presenting stimuli and masks at brief SOAs. Type-B masking occurs when the mask is presented between 0 to 200ms after the target stimulus. This type of masking is thought to rely on feedback mechanisms interfering with feedforward processing (Breitmeyer, & Öğmen, 2007). Zhaoping's Central-Periphery Dichotomy model hypothesises that peripheral vision is dominated by feedforward processing: therefore feedback-dependent visual phenomena are hypothesised to be less effective in the periphery (Zhaoping, & Liu, 2022).

To investigate this hypothesis, we studied metacontrast type-B masking for symmetry perception (SOA range of 0-200ms). We believe that this task isolates feedback-dependent processing, because symmetry detection requires global integration of information. We tested central (0°) and peripheral (9°) presentations. An adaptive target and mask sizing procedure was implemented, to account for differences in task difficulty between foveal and peripheral presentations. The results reveal an expected robust U-shaped curve in fovea, with maximal suppression at SOA of 50ms and no facilitation at 0ms. In periphery, a strong masking effect at short SOAs (0-40ms) is found, followed by monotonic increase in performance.

These results support the idea that foveal vision relies more on recurrent feedback, while peripheral vision is dominated by faster feedforward processing. The absence of facilitation observed when using complex, symmetric stimuli suggests that facilitation is not an intrinsic feature of metacontrast type-B masking, but rather stems from feedforward-reliant target-mask integration mechanisms.

3. Feeling more, but seeing the same? How exogenous attention modulates awareness across processing levels.

Oihane Baskaran, Pedro R. Montoro, Antonio Prieto.
Departamento de Psicología Básica I, Facultad de Psicología, Universidad Nacional de Educación a Distancia (UNED), Madrid, Spain

Understanding how attention shapes conscious perception remains a central challenge in cognitive neuroscience. The Levels of Processing (LoP) hypothesis proposes that consciousness emerges gradually for low-level features but dichotomously for high-level processing, yet attention's role within LoP remains unexplored. Therefore, we investigated how exogenous spatial attention modulates conscious perception across processing levels. Participants performed low-level (color discrimination) and high-level (semantic categorization) tasks preceded by valid or invalid peripheral cues and reported subjective awareness using the Perceptual Awareness Scale (PAS). Objective accuracy, subjective awareness, and metacognitive efficiency (Mratio) were analyzed using hierarchical Bayesian models. Results revealed distinct awareness dynamics across processing levels: low-level tasks showed a linear, graded PAS-accuracy relationship, whereas high-level tasks exhibited a quadratic, threshold-like trend, with accuracy increasing more sharply at high awareness levels. Exogenous cues enhanced subjective awareness judgments, particularly in high-level tasks, but did not improve accuracy, indicating that attention amplifies phenomenal awareness without accessing other processes. Metacognitive efficiency was optimal (Mratio≈1) in most conditions, but invalid cues in high-level tasks induced above expected efficiency (Mratio>1), suggesting post-decisional evidence accumulation under attentional and task-demand conflict. These findings support a hierarchical model of consciousness in which attention, processing depth, and metacognition interact dynamically: attention boosts sensory experience, high-level processing imposes thresholds for access, and metacognitive access vary across different conditions. Our study highlights the value of combining subjective and objective measures of awareness and show how Bayesian modeling can integrate awareness, performance, and metacognitive judgments to provide a unified view of visual (un)conscious perception.

Keywords: attention, visual awareness, consciousness, metacognition, levels of processing, Bayesian modeling.

4. Optimizing Field of View in a Vibrotactile Sensory Substitution Device: Effects on Navigation and Obstacle Avoidance.

Mario Arnáiz, Carlos de Paz, Lorena Lobo, Luis Gómez-Jordana, David Travieso. *Universidad Autónoma de Madrid (UAM), Madrid, Spain*

Sensory substitution devices (SSDs) aim to extend the functional capacities of touch by transforming information typically available through vision into structured tactile stimulation. In locomotion, the spatial distribution of sampled information—specifically the device's field of view (FOV)—may critically constrain how obstacle avoidance is regulated. However, the behavioral consequences of altering vibrotactile FOV geometry remain largely unexplored.

The present study examines how different vibrotactile FOV configurations shape locomotor control in a controlled virtual environment. Blindfolded sighted university students navigate a virtual corridor containing three obstacles while wearing a waist-mounted vibrotactile SSD. Participants' position is tracked in real-time using a motion-capture system, and distance information from the virtual environment is transformed into distance-contingent vibrotactile stimulation. This setup allows precise experimental control over sensorimotor contingencies while preserving full-body locomotion.

A within-subject design compares three FOV conditions: (1) wide conical view (60°), (2) narrow conical view (45°), and (3) tunnel view. Obstacle configurations vary across trials to prevent route learning. Dependent variables include movement time, number of collisions, adherence to the geometrically optimal path, walking speed, and kinematic markers of avoidance onset.

By manipulating FOV, we alter the informational geometry available to the perceptual system. We predict that wider conical FOVs will promote earlier anticipatory adjustments and smoother trajectories, whereas tunnel FOVs will induce more sequential exploratory strategies. Narrow conical FOVs may reflect a trade-off between anticipatory information and processing demands.

These findings aim to advance ecological approaches to perception–action by examining how locomotor coordination reorganizes under experimentally controlled informational constraints, while informing principled design parameters for vibrotactile sensory substitution systems.

5. Eye Movements evoked by in antero-posterior vestibular stimulation are consistent with postural responses.

Alexandra Séverac Cauquil, Alba Langlade, Patricia Perez De Azpeitia Maderuelo, Julie Cuvelier, Maxime Rosito, Alexandra Séverac Cauquil. *CerCo CNRS Université de Toulouse, France*

Galvanic vestibular stimulation (GVS) is widely used to probe vestibular function, eliciting eye movements, postural adjustments, cortical activations, and self-motion perception (Marchand, Langlade, Legois et al., 2025). The usual configuration is bilateral bipolar stimulation, with opposite polarities applied to each side. It induces a characteristic oculomotor pattern: ocular torsion and a small horizontal eye movement toward the anode plus a skew deviation (Séverac Cauquil et al., 2003), and a lateral postural sway toward the anode (Fitzpatrick & Day, 2004). The amplitude of these responses has been shown to increase with stimulation intensity. Another, less explored configuration is binaural monopolar GVS, where identical polarities are delivered to both vestibular organs, inducing anteroposterior postural effects (Séverac Cauquil et al., 2000). However, the oculomotor consequences of this stimulation mode remain unknown.

In the present study, GVS was delivered to 18 participants via electrodes placed on the mastoids and C7 using 1.8-s pulses at 0.8, 1.2, and 1.6 mA, applied in randomized order with either cathodal or anodal vestibular stimulation. Binocular eye movements were recorded at 1000 Hz.

Conjugate vertical eye movements were obtained, in opposite directions depending on whether cathodal or anodal currents were applied over the mastoids (repeated-measures ANOVA $F(1,17) = 10.29$, $p = .005$). Anodal stimulation induced upward eye movements, whereas cathodal stimulation resulted in downward eye movements. In addition, stimulation intensity significantly modulated this effect, (direction × intensity interaction; $F(1.88, 31.98) = 6.11$, $p = .006$).

These findings show that binaural monopolar GVS elicits configuration-dependent vertical eye movements, extending previous evidence of its effects beyond posture to the oculomotor domain. By revealing systematic ocular responses in the anteroposterior plane, this study bridges the gap between

well-established postural effects and previously unexplored eye movement responses, and provides new insight into the vestibular mechanisms underlying anteroposterior motion processing.

6. Is there a direction-selective processing of optic flow in humans and non-human primates?

Alexandra Séverac Cauquil, Poullias C, Marchand S, Rosito M, Durand JB, Séverac Cauquil A. *CerCo CNRS Université de Toulouse, France*

The processing of optic flow (OF) is essential for spatial navigation and self-motion perception (Xu & DeAngelis, 2025). OF responses have been characterized in several primate higher visual areas (Duffy & Wurtz, 1991; Bremmer et al., 2002). The large-scale organization of cortical networks supporting this processing, and their directional selectivity, however, remains poorly understood. Recent work in humans identified cortical regions showing preferential responses to forward motion, when indicated with vestibular or visual cues (Aedo-Jury et al., 2020, Marchand et al., 2025). We expand on this thesis by investigating direction-selective OF networks in humans and non-human primates.

fMRI data were acquired from three awake rhesus macaques and six adult humans (Philips 3T, TR = 2s, TE =0.03s). Subjects passively fixated while viewing OF stimuli simulating self-motion in four directions (forward, backward, leftward, and rightward), along with a random-motion control condition. Stimuli were presented in blocks of three TRs, separated by fixation-only intervals of five TRs.

Whole-brain statistical analyses (GLM) identified cortical regions selective for directional OF by opposition to random motion. Results revealed widespread direction-selective responses in both species, indicative of OF processing supporting self-motion perception. Interspecies differences could indicate an ecologically-based specificity for forward motion in humans.

7. Inhibitory performance of perceived body stimuli.

Tommaso Currò. *City St George's, University of London, London, England.*

Motor inhibition is a core component of cognitive control, yet the mechanisms by which perceptual input shapes inhibitory performance remain poorly understood. The present research investigated how body-related stimuli modulate motor inhibition, drawing on embodied cognition theory to propose that sensorimotor processing influences cognitive control in a bottom-up fashion.

Building on evidence that Go/No-Go performance is impaired when participants perceive body stimuli relative to non-body stimuli (Curro et al., 2023), a subsequent study dissociated the contributions of body and motor processing (Curro & Calvo-Merino, under review). Body processing was found to interfere with inhibitory performance, while motor processing facilitated it — particularly under stimulus–response congruence. The present project comprises two experiments designed to extend and clarify these findings.

Experiment 1 tests whether the embodied modulation of motor inhibition generalises beyond the Go/No-Go paradigm to the Stop-Signal Task, a more sensitive and well-validated measure of inhibitory control. We predict that body stimuli will yield longer Stop-Signal Reaction Times relative to non-body controls, replicating the interference effect under a paradigm that more precisely isolates the inhibitory process from general response slowing.

Experiment 2 replicates the core Go/No-Go effect while directly examining the congruence between perceived body stimuli and the effector used to respond. Specifically, it tests whether inhibitory

performance is modulated by the congruence between the observed body part and the responding limb, e.g. seeing a right hand responding with a right hand. We predict that congruency, as where the stimulus depicts the same effector used to respond, will produce facilitation, whereas incongruent mappings will amplify interference, providing direct evidence for an effector-specific motor resonance mechanism.

Together, these findings are expected to support the Embodied Motor Inhibition (EMI) Model, advancing a stimulus-driven, sensorimotor account of cognitive control that challenges strictly top-down models of inhibitory processing.

8. How stable is hedonic sensitivity to curvature across stimuli and time?

Samuel Palacios, Enric Munar, Erick G. Chuquichambi. *University of the Balearic Islands (UIB), Palma de Mallorca, Spain.*

Literature on empirical aesthetics shows a preference for curved over angular contours and lines, establishing a preference effect for curvature. However, some studies have reported considerable variability in the magnitude of this effect. One possible source of this variability is the individual hedonic sensitivity that participants show to curvilinear and angular stimuli. The objective of this study is to investigate the intra-individual and temporal consistency of hedonic sensitivity to curvature across different types of stimuli: meaningless shapes, indeterminate paintings, drawings of everyday objects, and interior spaces. One hundred participants (51 men, 49 women, Mage=43.9, SDage=13.58) rated their liking of the stimuli three times over the span of two weeks. Ninety-two participants completed the third session, in which they also rated how curvilinear they perceived the stimuli. The results show that, in all three sessions, participants did not show a significant preference for curvature in interior spaces and objects, although a slight tendency towards it was observed. In the other two stimulus types, the effect of curvature preference was clearly significant across sessions. Hedonic sensitivity to curvature for each participant and stimulus type was calculated by subtracting the estimated individual slopes for angular stimuli from those for curved stimuli. The correlations between stimuli within each session were moderate to high, and gradually increased from the first to the third session. The correlations between sessions were high for meaningless shapes, and moderate-to-high with paintings and objects. However, test-retest reliability results showed that the temporal consistency of the effect varied depending on the stimulus type, supporting heterogeneity within the same participants. This research contributes to our understanding of hedonic sensitivity to curvature by offering insights into the dynamics of curvature preference across stimuli and time points. We posit that consistency may serve as a criterion supporting the existence of a given hedonic preference.

9. Chasing the most reliable signal: Spatial and temporal reliability shape rapid aiming movements.

Laura Cepero Amores[1], Victoria Plaza[1], M. Pilar Aivar[1], Borja Aguado[2]. ***1***. *Universidad Autónoma de Madrid (UAM), Madrid, Spain.* ***2***. *GRAD Atenció a la Diversitat. Psychology Department. Faculty of Education, Translation, Sports and Psychology. Universitat De Vic - Universitat Central De Catalunya, Spain*

Selecting a task-relevant target while ignoring competing stimuli is a fundamental challenge for the visuomotor system. In natural environments, multiple objects compete for selection, and distractors can bias actions toward non-target locations. This influence likely depends on the spatial relationship between target and distractor and on the reliability of the visual information they provide over time.

The present study examined how distractor position and temporal appearance jointly influence visuomotor target selection during rapid aiming movements.

Fifteen participants performed an interception task in which they clicked on a moving two-dimensional Gaussian target presented on a dynamic white-noise background while ignoring a distractor. Target spatial reliability was manipulated by varying Gaussian dispersion (SD = 25, 40, 55 pixels) while maintaining constant luminous flux. Temporal appearance was manipulated through frame-wise visibility probability (p = .25, .50, .75), producing intermittently visible ("blinking") stimuli that varied perceptual evidence accumulation. In separate blocks either the target or the distractor blinked, allowing relative signal reliability to be controlled. Distractor position relative to the target varied across seven angular separations (0°–180°), plus a no-distractor condition. Movement onset times and cursor trajectories were analysed to characterise target-selection dynamics.

Analyses indicate that increased target uncertainty is associated with longer movement onset latencies. Distractor effects also vary with spatial configuration: at intermediate angular separations, trajectories show early deviations toward the distractor followed by corrections toward the target. These deviations increase when the distractor remains visible while the target intermittently disappears, suggesting that early movement planning is biased toward the most reliable sensory signal. When the target provides stronger visual evidence, movements are initiated earlier and trajectories are more direct.

Results support the view that visuomotor target selection reflects continuous competition between perceptual signals during movement execution rather than a discrete decision prior to movement onset.

10. From Screens to the Real World: How context shapes Visual Search.

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Visual search is a central part of everyday behaviour, yet most empirical knowledge about search mechanisms comes from laboratory studies using computer displays. In these paradigms observers typically inspect static images and indicate target detection with a simple key press. However, search in natural environments involves three-dimensional scenes, requires coordinated eye, head, and body movements, and often culminates in an action directed at the object itself. These central differences raise the question of whether those strategies and learning mechanisms observed in computer-based tasks generalize to more naturalistic contexts.

This study examined how repeated visual contexts influence search behavior in both screen-based and real-world settings. Participants performed comparable visual search tasks either on a computer display or in a natural environment, using real objects. In both cases, the spatial configuration of items was repeated across trials, allowing participants to potentially exploit learned contextual information to guide search. Eye movements were recorded to assess how visual information was sampled and to identify the strategies used during search (systematic exploration or memory-guided orienting).

Results showed that context repetition improved search efficiency in both environments. Specifically, the number of fixations required to locate a target decreased across repeated displays, indicating that observers learned to use contextual information to guide attention. However, the dynamics of this

improvement differed between settings. The rate at which performance improved and the extent of the benefit from repetition varied depending on whether the task was performed on a computer screen or within a natural scene.

These findings indicate that, although contextual learning supports visual search in both environments, the mechanisms through which experience improves performance may depend on the perceptual and motor demands of the task. Studying visual search in more ecologically valid contexts adds difficulties, but provides a broader understanding of how attentional selection operates in everyday behaviour.

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11. Spearheading the Mind: The Parietal's Role in Throwing and Tool Use.

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Tool use and production are integral and unique traits in modern humans. The ability to use projectile tools habitually is a noted feature of cognition only within Homo sapiens. Evidence from paleoneurology further suggests a unique shape change to the parietal lobes within recent Homo sapiens. Here, a new interdisciplinary approach to these lines of inquiry is used to conduct a novel meta-analysis of projectile use, stone tool production, and general tool use. These three activities were shown to primarily involve the parietal lobes. Shape analysis between the parietal lobes of Neandertals and Homo sapiens was conducted and then overlaid with sites of activation from the meta-analyses. Statistically significant overlap was found between the shape difference found in Homo sapiens within the parietal lobes, and the activation sites from the meta-analyses.

In conjunction with archaeological evidence, we offer a compelling and novel possible correlation between the related aspects of shape change and cognitive function sites. These findings suggest viability in analysis between shape and function through a neuroarchaeological lens and offer new directions for future research.

12. Modulating Visual Perception with tES: Preliminary Evidence from the Padova tACS Challenge.

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The present research investigates the online effects of 10 Hz transcranial alternating current stimulation (tACS) on visual perception. tACS is a non-invasive neuromodulation technique involving the application of weak sinusoidal currents to the scalp. Numerous studies suggest that this methodology can entrain neural oscillatory activity, thereby modulating the firing probability of stimulated neurons. However, the literature on tACS often reports inconsistent and poorly reproducible results. The present research is carried out within the framework of the tACS Challenge, a pre-registered protocol designed to verify the presence and effect size of the online effects of this technique across 45 laboratories and 880 participants. The study employs a within-subjects design, comparing performance in an occipital stimulation condition against two active controls (cutaneous and retinal) and a passive control (sham). Following a titration procedure to determine individual perceptual thresholds, participants perform a luminance change detection task. Although the project is multicentre, here we present preliminary partial results from the Padova lab only (n = 15), which should be considered underpowered and discussed as trends. These ongoing data do not show a reliable overall decrease in mean performance in the occipital stimulation condition relative to sham.

However, they suggest an informative trend toward phase-dependent modulation of visual perception in the occipital condition, with a similar apparent trend also emerging in sham, plausibly reflecting the phase effect of the endogenous ongoing alpha activity. Importantly, no comparable trend is apparent in the two active control conditions, arguing against a simple retinal or expectancy-based account. This study will help clarify the efficacy of tACS as a tool for modulating neural activity and establish more robust methodological parameters for future research

13. The Cerebellum's Expanding Role in Human Cognition and Evolution.

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A growing body of research has begun to challenge the long-held view that the cerebellum functions solely as a coordinator of motor activity. While its contributions to motor control remain well established, emerging evidence points to a broader repertoire encompassing higher-order cognitive functions such as abstract reasoning, creativity, prosocial behavior, and the refinement of complex toolmaking techniques. Researchers have also documented an expanding role in emotional processing — most notably in recognizing facial expressions — suggesting the cerebellum serves as an important facilitator of social interaction. This likely reflects an evolutionary exaptation of neural machinery originally dedicated to smoothing and sequencing motor output.

The cerebro-cerebellar network achieves this by generating internal, implicit models of the world that complement and integrate with the external, explicit models associated with cortical processing. The same cerebellar mechanisms that once refined stone knapping may have been co-opted to build predictive models of social behavior, enabling hominins to anticipate the responses of others and engage in increasingly sophisticated intentional reasoning. The cerebellar-creativity hypothesis extends this logic further, proposing that the cerebellum constructs a layered hierarchy of models at progressively higher levels of abstraction. Its role in automating both motor and cognitive sequences allows much of this processing to occur beneath conscious awareness — a feature that may account for the seemingly spontaneous nature of creative insight. Extensive toolmaking practice may have gradually offloaded demands from the central executive, freeing cognitive resources for mind-wandering and novel association.

Neuroanatomical, genomic, and functional evidence all support this trajectory. The cerebellum has undergone lateral and posterior expansion in recent human evolution, with measurable increases in cerebellar fossa volume through time. Genes uniquely expressed in Homo sapiens cluster in brain regions associated with creativity and self-awareness, with the cerebro-cerebellar network prominently represented. This evolutionary arc finds its clearest archaeological expression in behavioral modernity: technically demanding lithic traditions, figurative art, mortuary ritual, and symbolic figurines all reflect a mind increasingly capable of abstraction and cultural complexity.

14. Colour Perception and Emotion in Architectural Sensory Experience.

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This research investigates colour perception as a fundamental dimension of architectural sensory experience, examining how the chromatic character of urban environments shapes emotional responses through perceptual processes. Grounded in the concept of perception as an active and

context-dependent phenomenon, the study approaches colour not as a purely visual attribute, but as an experiential construct emerging from the interaction between environment, memory, and cultural background.

Situated within the broader field of colour studies in architecture and urban design, the research takes the city of Béchar in south-western Algeria as a case study. The city presents a distinctive chromatic identity shaped by its desert landscape, vernacular earthen architecture, and the continuity of historical colours that continue to structure contemporary urban perception. In this context, colour perception is understood as culturally mediated and influenced by long-term environmental exposure.

Methodologically, the study combines an analysis of the city's chromatic framework with an empirical exploration of inhabitants' perceptual and emotional responses. By examining both the material chromatic environment and the subjective processes it generates, the research identifies site-specific emotio-perceptual patterns. Particular attention is given to the role of historical colour continuity in shaping present-day perceptual expectations and emotional associations.

The findings suggest that colour–emotion relationships in architecture cannot be fully explained by universal models alone, but must be interpreted through situated perception, where local chromatic presence and cultural familiarity mediate emotional meaning. The study contributes to a context-sensitive understanding of colour perception and supports the development of architectural chromatic strategies that reinforce local identity and sensory coherence.