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Induction of Hebbian associative plasticity through paired noninvasive brain stimulation of premotor-motor areas to elucidate the network's functional role

Speaker: Turrini, Sonia

Track: Action and movement

Abstract

The introduction of the TMS cortico-cortical paired associative stimulation (ccPAS) technique has spurred a paradigm shift in the study of brain connectivity: ccPAS targets cortical pathways, repeatedly stimulating nodes to transiently enhance/hinder their coupling, exploiting Hebbian spike-timing dependent plasticity. This allows manipulation of cortical networks, to study their physiological characteristics and functional relevance from a causal perspective.

The aim of this thesis is to leverage ccPAS to deepen the understanding of human visuomotor circuits, focusing on the pathway between the ventral premotor (PMv) and primary motor cortex (M1). Through its copious projections to the M1, the PMv is believed to be crucial for various visuomotor behaviors, such as arbitrary visuomotor mapping and hyper-learned visuomotor associations underlying automatic imitation. Yet, causal evidence for the PMv-to-M1 network's functional relevance is limited.

A first series of studies investigated the physiological bases of ccPAS, and tested how it can affect the strength of effective connectivity and excitability of targeted areas. Secondly, we focused on the role of the PMv-to-M1 circuit in forming visuomotor associations. The application of brain-state-coupled ccPAS demonstrated the relevance of PMv-to-M1 connectivity to arbitrary visuomotor mapping, and the combination of ccPAS with behavioral paradigms used to study automatic imitation provided causal evidence of the pathway's role, within the action observation network, in automatic imitative behavior. Finally, we combined dual-coil TMS connectivity assessments and ccPAS in young and elderly individuals to trace the connectivity, plasticity, and relevance of premotor-motor networks to manual dexterity and strength in aging. In healthy elderly adults, we observed that a decline in connectivity and plasticity of the motor system predicted a decline in manual motor functions.

These findings highlight the efficacy of ccPAS in modulating cortical connectivity and behavior, offering valuable insights into visuomotor circuits. The research paves the way for clinical interventions based on connectivity manipulation.

Author/s: Sonia Turrini

Type: PhD prize

A tale of two limbs: Towards a unified motor fingerprint across whole-body movements

Speaker: Manuello, Jordi

Track: Action and movement

Abstract

Research on human motor behavior has extensively investigated the kinematics of both upper and lower limb. However, these two districts were often considered separately. Consequently, while it is well known that movements performed with either arms or legs exhibit highly variable motor implementation, the study of their potential covariation effects remains basically neglected.

To fill this gap, a combined analysis of motor variability of the upper and lower limb was carried out. 16 healthy subjects completed a pointing task, vertical extensions of the dominant arm, and self-paced walking on dual-belt treadmill, while kinematics was recorded through optoelectronic cameras. Upper limb movement was described through shoulder elevation angle, angular velocities of flexion/extension of the elbow, and angular velocities of flexion/extension of the wrist. Lower limb movement was described through the angular velocities of flexion/extension of the hips, knees and ankles.

The Procrustes transformation was then used to compute distance between movements (separately for upper and lower limb), and results served as input for (two separate) 2-dimensional Multidimensional scaling. Finally, the space of variability of each subject was quantified as the amount of the bi-dimensional space covered by the executed movements, separately for the limbs, and enclosed by an ellipse. Results indicate positive correlation effect ($p < 0.05$) between the space of variability measured for the upper and the lower limb of each subject.

These results may indicate the presence of common sources of variability both for upper and lower limb movements, in turn providing support for the existence of coherent individual motor fingerprint.

Author/s: Jordi Manuello, Valeria Longatelli, Emilia Biffi, Tommaso Ciceri, Andrea Cavallo, Luca Casartelli
Type: Mini-talks

Action prediction is facilitated by contextual cues in children with cerebral palsy but not in children with developmental coordination disorder

Speaker: Boscarol, Sara

Track: Action and movement

Abstract

Understanding others' actions entails the use of internal motor models. Recent findings demonstrated that children with Developmental Coordination Disorder (DCD), as those with Cerebral Palsy (CP), both characterized by the presence of difficulties in performing and learning movements, also display anticipatory planning deficits.

However, while DCD children do not use pre-cue information to refine their actions, CP children seem to benefit from contextual cues to adjust their performance. Here, we studied whether this difference in action execution is mirrored during action perception. In particular, we tested whether, compared to typical development peers (TD), DCD and CP benefit from contextual priors in predicting the unfolding of social (actions) or nonsocial (moving shapes) events.

Results showed TD were facilitated by contextual priors in both prediction tasks, and the same effects were obtained for CP, despite their extensive motor deficits. Conversely, DCD benefitted from contextual priors only in the non-social task, but not in the social prediction task. These results suggest that anticipatory action planning in DCD is not merely due to a general blindness to contextual changes (since they used contextual priors in the non-social task) or to low-level kinematic alterations (since CP did not alter context-based predictions in either task).

They rather support a general action prediction deficit in DCD individuals that prevents them to anticipate and adapt their motor execution and perception to environmental changes. By showing different sensitivity to contextual priors, these results would suggest differentiated intervention strategies in DCD and CP patients.

Author/s: Sara Boscarol, Verusca Gasparroni, Letizia Turchi, Alessandra Finisguerra, Cosimo Urgesi

Type: Mini-talks

Assessing the effects of transcutaneous Vagus Nerve Stimulation on motor activation and inhibition

Speaker: Finisguerra, Alessandra

Track: Action and movement

Abstract

Transcutaneous Vagus Nerve stimulation (tVNS) has been proposed as a prospective treatment for clinical conditions with altered GABAergic neurotransmission. Several studies demonstrated that tVNS can improve, at least at behavioural level, participants' performance in inhibitory control tasks, supposedly mediated by GABA neurotransmission. However, the neurophysiological evidence showing its effects on GABA-mediated inhibition in the motor cortex is still limited. Here, we aim to investigate the effect of active (vs. sham) tVNS on corticospinal excitability and cortical inhibition as assessed through single and paired-pulse Transcranial Magnetic Stimulation.

Left-ear tVNS was delivered while participants performed a computerized visuo-motor task. In a baseline condition and after delivering tVNS, excitatory and inhibitory (GABA-A and GABA-B mediated) indices were assessed from the left (ipsilateral to tVNS) or the right (contralateral to tVNS) motor cortex.

Preliminary results revealed a facilitatory effect on visuomotor task performance during active vs. sham tVNS. Moreover, we found a specific increase after active compared to sham tVNS of intracortical inhibition mechanism mainly mediated by GABA-A receptors, either in the left or the right motor cortex. The study provides supportive evidence for the application of tVNS as an alternative, non-invasive and coadjuvant treatment for disorders featured by altered inhibitory mechanisms.

Author/s: Alessandra Finisguerra, Sara Boscarol, Letizia Turchi, Viola Oldrati, Cosimo Urgesi

Type: Mini-talks

Dual-task effects on sustained attention and inhibitory control in a partial sleep deprivation paradigm

Speaker: Gianelli, Claudia

Track: Action and movement

Abstract

The widespread effect of sleep deprivation on basic cognitive functioning raises the question of its effect on daily activities, and particularly those that – being performed simultaneously – are inherently more challenging. The simultaneous performance of a cognitive and a motor task (i.e., dual-tasking) has indeed shown to reflect an interference, usually referred to as Cognitive Motor Interference (CMI). CMI is generally quantified in terms of dual-task effects (DTEs), tracking the extent of the interference between single and dual-tasking for both cognitive and motor performance.

This study aimed at investigating the effect of an acute partial sleep deprivation on upper limb dual-task performance. Through a within-subject design, participants screened for good sleep quality (Pittsburgh Quality Index ≤ 5) underwent one night of normal sleep (NS), from 12AM to 9AM, and one night of partial sleep deprivation (SD), from 1AM to 6AM. After both NS and SD conditions, participants performed, in randomized order, tasks targeting inhibitory control (Go/No-go task; GNG), sustained attention (Psychomotor vigilance task; PVT) and motor performance (finger tapping; FT) under single (ST) and dual-task (DT) conditions (i.e., the FT motor task was combined with either PVT or GNG).

Regardless of the sleep condition, comparing DT and ST performance revealed significant DTEs for both cognitive abilities. Moreover, we observed larger DTEs after sleep deprivation compared to normal sleep. Unveiling the factors shaping dual-task performance in sleep-deprived situations can provide novel insights into the implications of both sleep-disordered conditions and specific lifestyles entailing occasional sleep deprivation.

Author/s: Marta Milanese, Nicola Canessa, Claudia Gianelli

Type: Mini-talks

Exploring the effects of transcutaneous Vagus Nerve Stimulation on long-term potentiation induced by paired associative stimulation.

Speaker: Turchi, Letizia

Track: Action and movement

Abstract

Transcutaneous vagus nerve stimulation (tVNS) is held as a non-invasive tool to enhance the effect of motor rehabilitation in neurological diseases. However, there is no evidence supporting its neurophysiological effect on brain plasticity. Here, we aimed to explore the effects of tVNS on brain plasticity, induced by Paired Associative Stimulation (PAS), i.e., a paradigm generating long-term potentiation in the human motor cortex.

We measured the effects of active vs sham tVNS on neuroplasticity induced by PAS over the left or right primary motor cortex (M1). PAS consisted in a 13-minute block of repetitive pairing of peripheral median nerve stimulation and cortical TMS on M1. Before, immediately after, and 30 minutes later PAS, we recorded the recruitment curve and the amplitude of the motor evoked potentials from the index and little finger muscles. This procedure was repeated in three different daily sessions: at baseline without any stimulation and after 60 min of active and sham tVNS. During tVNS, participants perform a visuomotor task with their index finger to exploit possible state-dependent effects of tVNS.

Preliminary results did not show any increase in PAS-induced plasticity. Differently, an explorative analysis seems to suggest a counteracting effect of active tVNS on PAS-induced plasticity. Given that previous studies showed an increase in cortical inhibition after active tVNS, these results would support the role of cortical inhibition as critical for regulating plasticity, providing some hints on the application of tVNS as a noninvasive and nonpharmacological way to regulate aberrant brain plasticity.

Author/s: Letizia Turchi, Sara Boscarol, Viola Oldrati, Cosimo Urgesi, Alessandra Finisguerra

Type: Mini-talks

Motor inhibition in joint action with natural and artificial agents

Speaker: Siri, Giulia

Track: Action and movement

Abstract

Motor inhibition is crucial for effective collaboration between people, as it allows us to suppress and adjust actions in joint action scenarios (JA). Previous research showed a social effect on motor inhibition: a delay in stopping ongoing motor actions with others, relative to when conducting actions alone.

This effect is presumably due to the need to represent both our own actions and those of our partner, thus delaying motor inhibition mechanisms. In this study, with the use of a humanoid robot, we explored the factors that contribute to this social effect on motor inhibition. We asked participants to perform a joint action task with another agent. Their task was to open a bottle held by a mechanical clamp or a partner (human or robot). On 33% of the trials, they heard a stop signal tone, which indicated that they needed to stop an ongoing action. In Experiment 1, participants performed the task with a static humanoid robot, while in Experiment 2 with a human confederate instructed to not exhibit any social behavior.

In Experiment 3, participants performed the task with a robot exhibiting social behaviors. Results indicate a delay in motor inhibition in Experiment 2, but not in Experiment 1, suggesting that only human partners impact motor inhibition even without any social behavior exhibited. Experiment 3 showed that the robot's social behavior speeds up motor inhibition. Results suggest that social behavior influences motor inhibition differently depending on the interaction partner.

Author/s: Giulia Siri, Abdulaziz Abubshait, Agnieszka Wykowska, Alessandro D'Ausilio, Davide De Tommaso

Type: Mini-talks

The impact of ‘motor distance’ on action understanding: how motor similarities guide our comprehension of others

Speaker: Maronati, Camilla

Track: Action and movement

Abstract

Research on movement kinematics has demonstrated that observers can understand actions' outcome only by looking at the reach-to-grasp phase of a movement directed to an object. However, it remains unclear the extent to which the kinematic similarity between the observer and the agent affects the ability of reading the action and how such similarity reflects on neural signals. We combined motion capture technologies with video recording to acquire a dataset of reach-to-grasp actions, directed to objects with different weights (light/heavy), executed by 90 different participants.

We used the Procrustes transformation to compute the motor distance between movements and agents. In two subsequent behavioral and electrophysiological (EEG) action-observation tasks, we presented observers, who had previously performed the action execution task, with 240 videoclips, and manipulated the motor distance between their movement kinematics and those presented in the videos. Observers were asked to carefully watch the reach-to-grasp phase of the action and to classify the target objects' weight. The ANOVA confirmed that observers were more accurate ($F(1,19) = 4.976$; $p < 0.05$) and faster ($F(1,19) = 22.883$; $p < 0.001$) in understanding actions characterized by a smaller motor distance (i.e., with a more similar movement kinematics) from them.

This result is suggesting that the ability to comprehend the outcome of observed actions depends on motor similarities between observers and agents. We will also present results from the EEG analysis, which has been carried out with the purpose of investigating the relationship between motor distance and desynchronizations in the beta band.

Author/s: Camilla Maronati, Francesca Patarini, Jlenia Toppi, Jordi Manuello, Elisabetta Ferrari, Cristina Iani, Sandro Rubichi, Angela Ciaramidaro, Laura Astolfi, Andrea Cavallo

Type: Mini-talks

Unravelling the role of the insula in apraxia: A systematic review of VLSM studies in stroke patients

Speaker: Scuderi, Angelica

Track: Action and movement

Abstract

Apraxia refers to a variety of higher-order motor disorders not primarily caused by motor, sensory or cognitive impairment. Evaluation of apraxia typically involves gestural imitation, pantomime, and actual tool use. Lesion studies correlate the ability of movement control to cortical areas such as the inferior frontal gyrus, inferior parietal, and temporal lobes. Apraxia-related lesions often extend to subcortical regions, white matter, and the insula.

Despite its involvement in several cognitive and sensorimotor-related processes, the insula's role in gesture execution remains unclear. Functional imaging revealed a role of the left anterior insula in tool recognition and object use. Individual experimental studies fail to explain the involvement of the insula in praxic abilities, however involvement of the right insula during gesture imitation was documented. Stroke affecting the middle cerebral artery frequently damages the insula, suggesting its secondary role in apraxia.

We conducted a systematic review of studies in apraxic stroke patients which used VLSM. 31 of the papers identified through keyword searches met inclusion criteria. Consistent with the literature, most of the selected studies identify apraxia as a typical syndrome of LBD. The left insula has been found to be one of the most frequently impaired areas in patients who manifested apraxia after a stroke, particularly when assessed with pantomime and imitation tasks.

Although the role of the insula is not always investigated and is sometimes indicated only in relation to language abilities, its structural and functional integrity seem closely related to the quality of praxic abilities.

Author/s: Angelica Scuderi, Francesca Favieri, Erik Leemhuis, Mariella Pazzaglia

Type: Mini-talks

When self-agency goes wrong: the case of schizophrenia.

Speaker: Rossetti, Ileana

Track: Action and movement

Abstract

The sense of agency is the feeling of voluntarily controlling our actions and, through them, the events in the outside world. Here, we explored the sense of agency in individuals with schizophrenia.

We measured the intentional binding phenomenon (an implicit index of self-agency) using a validated ecological temporal judgment paradigm based on the comparison between active and passive movements.

Participants (30 patients and 30 controls) were instructed to actively or passively press a switch to turn on a light bulb. In both movement conditions, the bulb turned on with variable delays (250, 450 or 650ms). Participants had to judge the temporal interval between the action (keypress) and the outcome (lighting of the bulb).

We analysed the subjective perceived temporal compression of the action-outcome interval across movement conditions and delays: based on the intentional binding phenomenon, the higher the perceived time compression, the stronger the experienced implicit sense of agency.

Our results indicate that time compression values are greater in active compared to passive actions, particularly for shorter action-outcome temporal delays (Condition $\times$ Delay: $p=.007$). Compared to controls, patients show a reduced difference in compression between active and passive actions (Group $\times$ Condition: $p=.004$).

These findings suggest that, although the experience of agency is similarly modulated by movement conditions and temporal delays in controls and patients, the distinction between voluntary and involuntary actions is less clear-cut in patients. This dysfunction might contribute to some agency-related symptoms typically present in schizophrenia (e.g., delusions of control).

Author/s: Ileana Rossetti, Margherita Musco, Angelo Maravita, Eraldo Paulesu, Laura Zapparoli

Type: Mini-talks

A comparison of deep learning architectures for detecting motor execution from EEG data.

Speaker: Lozzi, Daniele

Track: Action and movement

Abstract

One of the studies of the active brain-computer interface (BCI) focuses on identifying movements from human neurophysiological signals to control external devices such as robotic arms. In the literature, EEG-based BCI is utilized to decode user's information to perform action or fill the gap from the brain to the arms in the case of illness.

The purpose of this work is to understand, among the scientific literature, what the best Deep Learning (DL) architecture is for motor execution (ME) classification. Data from 105 people from the Physionet dataset and 15 subjects from the Upper Limb dataset were used. EEGnetv4, Deep4Net, and EEGITnet were used to classify EEG signals under ME for real-time BCI.

A comparison of three different types of DL architecture training the network from scratch, using the data from the Physionet and Upper Limb, preprocessed in the same way to make them similar, was provided using filtering, ICA decomposition and algorithm for automatic artifacts removal. In this way, the comparison of results is not influenced by the bias introduced in each step of feature cleaning, extraction, or selection. To the best of our knowledge, no other studies have conducted a similar analysis, making it impossible to compare this achievement with others previously published in the literature.

The best results were achieved from the EEGnetv4 trained without Common Spatial Pattern transformation: 0.70 and 0.77 of accuracy for Physionet and Upper Limb dataset respectively.

Author/s: Daniele Lozzi, Alessandro Di Matteo, Costanzo Manes, Enrico Mattei, Filippo Mignosi, Giuseppe Placidi

Type: Mini-talks

From uncscious to conscious: electrophysiological correlates of consciousness during perception and action

Speaker: Noviello, Simona

Track: Action and movement

Abstract

Perception, awareness, and time have a close relationship that has been investigated for a long time. Here, we replicated a study by Zhu and colleagues (2016), to examine the specific frequency at which CFS can effectively suppress 3D stimuli from consciousness. In CFS experiments, rapidly flashing patterns are typically presented to the dominant eye, while the other eye is directed towards a stationary stimulus.

This procedure induces a suppression of the visibility of the unchanging stimulus. In the present study, we used a CFS pattern that changed frequencies across 10 different levels (0, 1, 3, 5, 7, 10, 13, 16, 20, and 32 Hz) in separate trials. Participants were instructed to press a button as soon as they began to see a stimulus break through suppression. This approach allowed us to identify the frequency that elicits the greatest suppression and to calculate the average time required for a stimulus to arise into consciousness.

Our results with the 3D stimulus align with those reported by Zhu and colleagues: the optimal frequency to suppress both 2D and 3D stimuli appears to be in the high-theta to low-alpha range, which is related to the temporal frequency of attention and perceptual visual cycles. These findings contribute to our understanding of the mechanisms underlying the suppression of visual stimuli from awareness.

We are now using these data for a new study, on the EEG correlates of conscious and unconscious stimuli during perception and action, to study the difference in their access to consciousness.

Author/s: Simona Noviello, Alessio Toraldo, David Melcher, Irene Sperandio, Mirko Tommasini

Type: Mini-talks

How Observing Actions Affects the Speed of Our Reasoning

Speaker: Nabil Ras, Ivan

Track: Action and movement

Abstract

Research on reasoning shows that the mental spatial representations involved in spatial reasoning are rich in motor components. Similarly, studies on action observation reveal specific activations in the observer's motor system.

In one study, we explore whether and when observing actions involving physical effort influences spatial reasoning. Half of the participants (the "box group") watched a video in which an actor lifted either heavy boxes (heavy condition) or light boxes (light condition), and then solved spatial reasoning problems related to the arrangement of boxes in space.

The other half of the participants (the "weights group") watched a video in which an actor lifted either heavy weights (heavy condition) or light weights (light condition), and then performed the same spatial reasoning tasks involving the arrangement of boxes. Our hypothesis is that response times are longer for participants in the heavy condition of the box group compared to those in the light condition, but not in the weights group, where there is no congruence between the object in the observed action and the object in the action imagined to solve the reasoning task.

The experimental manipulation is expected to favour the box group in the creation of a kinematic mental model with the same kinematic properties as the action observed in the video.

The results confirm our predictions, suggesting that the mental models underlying spatial reasoning are influenced by action observation, but only when there is content congruence between the prior motor information and the spatial reasoning task.

Author/s: Ivan Nabil Ras, Monica Bucciarelli, Walter Schaeken, Francesco Iani

Type: Mini-talks

How to measure climate change worry in adolescents? Analyzing the adequacy of a dichotomous response scale for the Climate Change Worry Scale through Item Response Theory

Speaker: Santisi, Sofia

Track: Action and movement

Abstract

Climate change worry (CCW) is a motivating factor for the implementation of pro-environmental behaviors, especially among youth. Consequently, it is particularly relevant to identify the best item response scale to assess this trait among adolescents to plan preventive interventions.

We focused on the Climate Change Worry Scale (CCWS), a unidimensional instrument with ten items having a 5-point ordered frequency response scale. The CCWS has been developed for adults and validated with adolescents by applying Classical Theory of Test. We employed Item Response Theory (IRT) to test the hypothesis that a dichotomous response scale (No/Yes) would be more adequate than the original polytomous scale (from Never to Always). Our prediction was that CCW indicators among adolescents can be assessed for being present or absent more than as a continuum in terms of frequency. Participants were 1846 adolescents (58% male; Mage = 16.37 years, SD = 1.25).

All the items, except for item 1, did not fit to the Graded Response Model, while all the items fitted under the 2PL model for dichotomous items. When referring to this model, Test Information Function showed high levels of information, especially at low levels of trait. Thus, CCWS items resulted to be more adequate to discriminate adolescents who are not worried about climate change, more than assessing the continuum of CCWS, as expected by using a 5-point response scale. Further studies are needed to better analyze the functioning of a dichotomous response scale for the CCWS.

Author/s: Sofia Santisi, Laura Di Leonardo, Caterina Primi, Maria Anna Donati

Type: Mini-talks

Interoception, pregnancy and the categorization of abstract and concrete concepts

Speaker: Diana, Salvatore Manuel

Track: Action and movement

Abstract

A growing body of research is focusing on the role of interoception – the sensing of the physiological condition of the body - in cognitive processes. Here, we asked whether the physiological changes experienced by women during pregnancy might affect conceptual representation, particularly of abstract concepts (for whom the interoceptive dimension seems particularly relevant).

A sample of 40 women (37 controls and 3 pregnant women) performed the Heartbeat Counting Task (a measure of interoceptive accuracy) and an ‘interoceptive-exteroceptive’ categorization task of abstract and concrete concepts varied for their grounding in interoceptive and sensorimotor experiences (emotional, philosophical, natural, artefact). Participants responded by moving the computer mouse.

Overall, concrete-artefact concepts were categorized faster and more correctly (as exteroceptive) than the other concepts, suggesting that they clearly convey exteroceptive features. Differently, concrete-natural concepts elicit interoceptive features to a greater extent with slow responses, a high number of (interoceptive) misclassification, and movement trajectories attracted by the competing (interoceptive) response option. Interoception confirms to be particularly relevant for abstract-emotional concepts, as indicated by the lower chance of misclassifying them compared to abstract-philosophical ones.

Results on group differences (to be considered preliminary as the reduced size of the pregnant group) indicates no major differences in the speed and accuracy of interoceptive-exteroceptive categorization of the concepts considered. Enhanced ‘interoceptive attraction’ of the trajectories’ of concrete-natural concepts is observed in the pregnant group, which suggests a greater relevance of the interoceptive dimension in this population (to be confirmed once the study group has been expanded).

Author/s: Anna Borghi, Laura Barca

Type: Mini-talks

Mindfulness, self regulation and pro-environmental behaviour

Speaker: Colombo, Serena

Track: Action and movement

Abstract

Human responsibility for the environmental crisis has been documented by increasing scientific evidence, and climate change is today a major subject of public concern. Numerous studies have investigated what drives pro-environmental behaviours (i.e. behaviours that seek to minimize the impact of one's actions on the ecosystem), yet most explanations have been criticised for failing to explain the environmental attitude-behaviour gap.

Based on evidence indicating that dispositional mindfulness would predict engagement in pro-environmental behaviour, and findings linking mindfulness to enhanced self-regulation, as well as self-regulation to pro-environmental behaviour, we made the hypothesis that mindfulness could contribute to explain why some people seem more likely to behave coherently with their attitudes towards the environmental crisis.

To test this assumption, we carried out two correlational studies. The first one assessed, through an online survey (n=228), whether mindfulness would affect the relationship between pro-environmental attitudes and behaviours. Our results indicate that Acting with Awareness and Nonjudging would moderate the effects of pro-environmental attitudes on behaviours, suggesting that increased self-regulation abilities may participate to explain the positive correlation found between mindfulness and pro-environmental engagement.

The second study (n=262) assessed whether mindfulness would contribute to explain individuals' emotional response to the climate crisis and their likelihood to embrace an adaptive coping strategy.

Our findings show that mindfulness would predict lower climate change anxiety and would moderate the relationship between climate anxiety and pro-environmental behaviour, suggesting that mindfulness may make individuals more prone to adopt an adaptive coping strategy facing the climate change threat.

Author/s: Serena Colombo, Salvatore Chiarella, Antonino Raffone, Luca Simione

Type: Mini-talks

Sport and resilience: preliminary study on volleyball players

Speaker: Santostefano, Alessia

Track: Action and movement

Abstract

Resilience is an adaptation process to maintain or restore well-being following an adverse event. In sports psychology, this term indicates the capability of athletes to counteract situations of adversity as challenges for improvement rather than as insurmountable obstacles (Fletcher and Sarkar, 2012). Therefore, resilience becomes an indispensable prerequisite for achieving sporting success (Weissensteiner et al., 2009).

Few studies have investigated the psychological and environmental factors related to athletes' ability to resist under high-pressure situations. In our study, we administered the Italian version of the 14-item Resilience Scale and the Toronto Alexithymia Scale (TAS-20) to 12 female volleyball athletes (mean age = 26 years, SD = 2.25). We also administered these scales to a control group of 12 women leading a sedentary lifestyle (mean age = 24 years, SD = 3.42). This design allowed us to compare the resilience and emotional recognition of athletes and non-athletes.

The findings of our study are novel and significant. We observed that athletes scored significantly higher on resilience (81 vs 64), indicating that sports can enhance the ability to withstand adversity. Additionally, while there were no differences in the total scores of the Toronto Alexithymia Scale (TAS-20) between the two groups, athletes scored significantly lower on the Difficulty Identifying Feeling TAS-20 subscale. This suggests that sports enhance emotional recognition, a skill that could be beneficial in anticipating the actions of opponents.

Although preliminary, the present study suggests the importance of psychological aspects of performance and encourages investigating athletes' behavioural characteristics to reach sporting success.

Author/s: Alessia Santostefano, Noemi Passarello, Angela Catania, Patrizia Turriziani, Barbara Rossi, Francesca Gelfo, Fabio Lucidi, Laura Mandolesi

Type: Mini-talks

Who turned the light on? How avatar's hand tracking modulates sense of agency in virtual reality.

Speaker: Mariano, Marika

Track: Action and movement

Abstract

Virtual Reality (VR) allows the implementation of innovative rehabilitation, offering greater ecological validity in the context of motor functions. To be effective, these treatments should foster virtual embodiment, the process of becoming rooted in the virtual body, including a sense of agency towards the avatar's movements.

Here, we investigated the different dimensions of the agency experience in VR (i.e., explicit and implicit), manipulating the avatar's interactive capabilities (i.e., still vs. moving avatar).

We tested 70 healthy adult participants in a VR setting while performing active or passive movements for turning on, after a variable delay, a lightbulb.

Before the experiment, half of the participants could see their virtual hands move consistently with their real hand movements (group M+), whereas the other half saw their virtual hands stationary on a table (group M-).

Explicit and implicit sense of agency was assessed (considering the intentional binding as an implicit index).

Our results show that participants experience an explicit sense of agency (i.e., higher agency ratings in active trials), similarly in both VR scenarios (M+ and M-). This phenomenon is similarly experienced at the implicit level (i.e., significant intentional binding effect for temporally contingent outcomes), but only if real movements are mirrored by an avatar's movements (M+ scenario).

These results confirm the dissociation between implicit and explicit processing frequently seen in psychology and suggest the importance of being able to represent our movements in a virtual reality environment through the presence of an avatar whose movements simulate exactly the participants' ones.

Author/s: Marika Mariano, Alessandro Gabbiadini, Caterina Negrone, Emanuele Sapio, Giulia Stanco, Laura Zapparoli, Massimo Montanaro, Niccolò Raffa

Type: Mini-talks

Darts' fast-learning reduces theta power but is not affected by Hf-tRNS: A behavioral and electrophysiological investigation

Speaker: Cornacchia, Ester

Track: Action and movement

Abstract

Sports trainers have recently shown increasing interest in innovative methods, including transcranial electric stimulation, to enhance motor performance and boost the acquisition of new skills during training.

However, studies on the effectiveness of these tools on fast visuo-motor learning and brain activity are still limited. In this randomized single-blind, sham-controlled, between-subjects study, we investigated whether a single training session, either coupled or not with 2mA online high-frequency transcranial random noise stimulation (hf-tRNS) over the bilateral primary motor cortex (M1), would affect dart-throwing performance (i.e., radial error, arm range of motion, and movement variability) in 37 healthy volunteers. In addition, potential neurophysiological correlates have been monitored before and after the training through a portable electroencephalogram.

Results revealed that a single training session reduced radial error and arm range of motion during the dart-throwing task, but not movement variability. Furthermore, after the training, resting state-EEG data showed a decrease in theta power. Radial error, arm movement, and EEG were not further modulated by hf-tRNS. This indicates that a single training session, regardless of hf-tRNS administration, improves dart-throwing precision and movement accuracy.

However, it does not improve movement variability, which might require multiple training sessions. Theta power decrease could describe a more efficient use of cognitive resources due to the fast dart-throwing learning.

Further research could explore different sports by applying longer stimulation protocols and evaluating other EEG variables to enhance our understanding of the lasting impacts of multi-session hf-tRNS on the sensorimotor cortex within the framework of slow learning and training assistance.

Author/s: Ester Cornacchia, Valerio Manippa, Giorgia Francesca Scaramuzzi, Anna Concetta Spina, Francesca Amico, Annalisa Palmisano, Gaetano Scianatico, Richard Buscombe, Richard Avery, Volker Thoma, Davide Rivolta

Type: Poster

Me, you and ... the smartphone: generational differences in digital interaction

Speaker: Liso, Alba

Track: Action and movement

Abstract

In today's world, people are required to interact with technology for many essential services such as banking, administrative and registry operations. While the younger generations have become skilled in performing these tasks directly in digital environments, the older generations, who used to perform them in the physical world, are forced to adapt to these new circumstances.

These generational differences have been characterized by the terms Digital Immigrants (DI) and Digital Natives (DN) (Prensky, 2001), highlighting the cultural and age-related differences in skill acquisition between those born before and after 1980. Even though these differences lead to serious problems in digital inclusion, there are no studies that have quantitatively investigated the differences in performance between generations, in order to identify the process of skills acquisition.

The aim of the present study is to quantitatively describe the digital interaction performance by considering certain behavioural parameters. Participants were recruited from both the DI and DN groups and were asked to search for specific information on Google and to use WhatsApp to chat with a regular contact. The participants' hands were video recorded.

The resulting videos allowed the following parameters to be measured: (i) typing speed, (ii) number of typing errors, (iii) number of times text suggestions were used, (iv) number of uncorrected errors, and (v) typing style (two thumbs vs. index right hand). The results showed significant differences between the two experimental groups.

Author/s: Alba Liso, Elisa Straulino, Lorenzo Viviani, Luisa Sartori, Laila Craighero

Type: Poster

Physical exercise and risk-taking behavior: how are they related one another?

Speaker: Turco, Elena

Track: Action and movement

Abstract

Evidence shows that physical exercise (PE) improves psychological wellbeing. PE induces the release of endorphins, which in turn increase the production of dopamine. This rising has been associated with increased risk-taking and reward-seeking behavior. However, some evidence points out that physical exercise acutely reduces risk-taking related to substances abuse, decreasing cravings.

To better understand the relationships between PE – with or without concurrent electrical stimulation of the muscles - and risk-taking, we carried out a pilot study with a convenience sample of 20 healthy men (age range = 18-55 years; $M = 37.8$ $SD = 9.48$).

Participants were randomly allocated in either the cycling group ($N = 10$) or the cycling with superimposed electrical myostimulation group ($N = 10$). Electrical stimulation was applied bilaterally to lower limbs.

They underwent an interval training session of moderate intensity on a cycle ergometer for a single session and two times a week for six weeks. Participant performed the Balloon Analogue Risk Task (BART), after 24 hours since the single training (T1) and after the six weeks (T2). Preliminary results showed a decrease in risk-taking in the group with electrical stimulation (baseline: $M = 51.1$, $SD = 49.5$; T1: $M = 40.0$, $SD = 9.26$; T2: $M = 44.4$, $SD = 7.80$), while no changes were observed in the group without electrical stimulation (baseline: $M = 37.7$, $SD = 11.0$; T1: $M = 36.7$, $SD = 9.34$; T2: $M = 38.6$, $SD = 13.4$). Our preliminary findings suggest that adding electrical stimulation during physical exercise may mitigate risk-taking.

Author/s: Elena Turco, Ester Tommasini, Daniela Tavian, Alessandro Antonietti, Paola Iannello

Type: Poster

Representational organization of grasping actions across motor execution and imagery

Speaker: Marras, Laura

Track: Action and movement

Abstract

While a robust body of studies suggests that motor performance and imagery share similar cortical networks, it remains unclear whether they also share the same representational organization. A previous study investigated the representational structure of three hand-action types during execution or imagery in motor-related areas.

The results showed distinguishable response patterns but a consistent representational geometry of the different action types across the two conditions. Here, we investigated the representation of a larger set of grasping actions.

Two groups of participants performed (N=9) or imagined (N=9) grasping 20 common objects during fMRI scanning. Representational dissimilarity matrices (RDMs) for each cortical area (Glasser-HCP Atlas, 360 parcels) and condition were derived, based on the GLM t-scores of each grasp. To identify areas with a similar representational geometry across conditions, we computed the correlation between execution and imagery RDMs. We found significant correlations ($p < 0.05$, Mantel test, FDR correction) in 41 areas, with the highest correlation coefficients in bilateral visual areas and left Intraparietal Complex.

Finally, to determine whether this common representational structure was driven by a synergistic coding, we compared the RDMs from the significant areas with an RDM derived from a kinematic synergy model.

While we found significant correlations ($p < 0.05$, FDR correction) in six and two brain areas for the execution and imagery conditions, respectively, no area showed significant correlation in both conditions, suggesting that the common representational structure across motor conditions may not be solely driven by synergistic coding.

Author/s: Laura Marras, Francesca Simonelli, Andrea Leo, Giacomo Handjaras, Emiliano Ricciardi

Type: Poster

Spike-time-dependent plasticity induction reveals dissociable ventral and supplementary premotor-motor pathways to automatic imitation.

Speaker: Turrini, Sonia

Track: Action and movement

Abstract

Introduction: Humans tend to spontaneously imitate others' behavior, even when detrimental to the task at hand. The Action Observation Network (AON) is consistently recruited during imitative tasks. However, whether automatic imitation is mediated by cortico-cortical projections from AON regions to the primary motor cortex (M1) remains speculative. Similarly, the potentially dissociable role of AON-to-M1 pathways involving the ventral premotor cortex (PMv) or supplementary motor area (SMA) in automatic imitation is unclear.

Methods: Here, we used cortico-cortical paired associative stimulation (ccPAS) to enhance or hinder effective connectivity in PMv-to-M1 and SMA-to-M1 pathways via Hebbian spike-time-dependent plasticity (STDP) to test their functional relevance to automatic and voluntary motor imitation.

Results: ccPAS affected behavior under competition between task rules and prepotent visuomotor associations underpinning automatic imitation. Critically, we found dissociable effects of manipulating the strength of the two pathways. While strengthening PMv-to-M1 projections enhanced automatic imitation, weakening them hindered it. On the other hand, strengthening SMA-to-M1 projections reduced automatic imitation but also reduced interference from task-irrelevant cues during voluntary imitation.

Discussion: Our study demonstrates that driving Hebbian STDP in AON-to-M1 projections induces opposite effects on automatic imitation that depend on the targeted pathway. Our results provide unprecedented causal evidence of the functional role of PMv-to-M1 projections for automatic imitation, seemingly involved in spontaneously mirroring observed actions and facilitating the tendency to imitate them. Moreover, our findings support the notion that SMA exerts an opposite gating function, controlling M1 to prevent overt motor behavior when inadequate to the context.

Author/s: Sonia Turrini, Francesca Fiori, Naomi Bevacqua, Chiara Saracini, Boris Lucero, Matteo Candidi, Alessio Avenanti

Type: Poster

Understanding the Impact of Limb Dominance on Body Representation Following Amputation: Insights from a Behavioral Study

Speaker: Russo, Cristina

Track: Action and movement

Abstract

Previous findings show a strong involvement of the right dominant limb on the Body Schema (BS), a sensorimotor body map: a dominant body part is recognized faster than the non-dominant one in a mental rotation task (e.g., 'feet dominance effect'). Although the reorganization in the left hemisphere strongly impacts the body processes involved in motor control, further investigations must clarify the effects of dominant limb amputation on other body representations, as on the one coding visuospatial inputs (Body Structural Representation, BSR).

This study assessed the BSR changes occurring as a function of the dominant or non-dominant lower limb amputation.

Twenty-five participants (22 males; 13 with right amputation; age: 42.6 ± 11.4) underwent a task implicitly investigating the BSR.

Participants responded manually to the colour of task-relevant stimuli superimposed upon non-task-relevant pictures of feet and hands.

Faster reaction times (RTs) were expected for the body parts envisioned on the same side of the space of the task-related response key (e.g., 'Sidedness effect').

Results confirmed the consistency of the Sidedness effect ($F(1,23)=7.32$; $p=.01$, $\eta^2_g=.003$) but showed significantly slower RTs in participants with dominant amputation compared to those with non-dominant amputation ($W=187$; $p=.002$; $\delta=.23$).

The Sidedness effect supports the hypothesis that amputees can implicitly access BSR. However, in the case of right dominant limb amputation, the access appears to be more demanding as it requires a massive and general cortical reorganization in the left hemisphere, which is acknowledged to be more involved in body processing.

Author/s: Cristina Russo, Giovanni Ottoboni, Alessia Tessari

Type: Poster

Amodal Completion and Visual Depth

Speaker: Gerbino, Walter

Track: Attention, perception and consciousness

Abstract

In their classic essay Michotte, Thinés and Crabbè (1964) proposed to extend the notion of amodal completion to the structuring of perceptual space (in particular, to interobject distance) and expressed their dissatisfaction for the absence of experimental research inspired by this notion. Despite the renewed interest for amodal completion (van Lier & Gerbino, 2015; Gerbino, 2020; Spence & Di Stefano, 2024) it is not clear whether, and to what extent, such a proposal by Michotte and collaborators has been considered and proved to be useful.

An apparently connected phenomenon is the bar-in-the-box illusion (Gerbino & Fantoni, 2007), which can be observed mainly in pictorial conditions and is consistent with a tendency to minimize surface depth. Beyond this specific application of the minimum principle, do other phenomena indicate that the fundamental structure of perceptual space is amodal, as seemingly suggested by Michotte and collaborators?

Author/s: Walter Gerbino

Type: Talk in simposio

Change vs. Functional Conservation in Profound Deafness: What Evidence from Brain Imaging?

Speaker: Benetti, Stefania

Track: Attention, perception and consciousness

Abstract

The study of cortical plasticity in profound deafness offers a valuable insight into the remarkable adaptive mechanisms of the human brain. However, the findings collected to date have sparked a lively debate within the scientific community, raising fundamental questions: What role does the phenomenon of cross-modal cortical recruitment play in behavioral adaptation? Does the human brain possess broad adaptive potential, or are mechanisms at work that tend to preserve the cortical specialization typically observed in hearing individuals? Can cross-modal cortical recruitment be definitively interpreted as evidence of cortical reorganization?

In light of these open questions, my presentation aims to reexamine recent findings gathered through a combination of psychophysical studies and functional and structural neuroimaging techniques in individuals with profound deafness. These investigations confirm the visual recruitment of auditory regions in profound deafness, revealing, however, a marked functional selectivity, particularly evident in tasks that benefit from multimodal convergence. Furthermore, these observations suggest the preservation of both computational capacities in regions deprived of their preferred sensory input and the macrostructure of connective pathways between auditory and visual regions. Surprisingly, visual stimuli responses in auditory regions are also observed in hearing individuals, though to a lesser extent.

While acknowledging the inherent limitations of the methodologies employed in this research, the functional selectivity of cross-modal recruitment and the anatomical-computational preservation collectively raise further questions about the nature of the observed plasticity. Indeed, the results of our studies underscore a substantial contribution from preexisting neural architecture rather than suggesting a cortical reorganization entirely driven by sensory deprivation experience.

Author/s: Stefania Benetti

Type: Talk in simposio

Extension as an expressive factor of implicit movement

Speaker: Mastandrea, Stefano

Track: Attention, perception and consciousness

Abstract

The representation of movement on a two-dimensional surface has always been a challenge for artists, and designers. Arnheim (1974), Cutting (2002), Massironi & Bonaiuto (1966) proposed various expressive factors of movement in static images, which can be summarized as: symmetry breaking, multiple images, blur, diagonals, and lines of action.

We have added a new factor, "Extension," which refers to the degree of limb opening for the expression of implicit movement. In a first experiment, we selected works of art depicting horse gaits: stop, walk, trot, gallop, and flying gallop à la Gericault (Mastandrea & Kennedy, 2018).

The results showed that the perceived implicit movement progressively increased from stop to flying gallop, depending on the extension of the horse's legs. In a second experiment, we aimed to confirm the validity of the extension factor and selected 20 photographs of a dancer in five positions (from a simple standing pose to a split) on the ground, in the air, frontal, and lateral (Mastandrea & Kennedy, 2022).

Again, the progressive extension of the ballerina's legs produced a greater perception of movement, especially in the air and lateral positions (considered the most difficult). Moreover, the perceived movement correlated positively with the difficulty of the position and aesthetic appreciation.

We can therefore assert that the results show that limb extension, in different contexts, can be expressive of movement. For artists and designers, it may be useful to know that extension stimulates implicit movement and that difficult-to-perform postures can receive great admiration.

Author/s: Stefano Mastandrea

Type: Talk in simposio

Is (the lack of) vision important for V1? New insights from the study of the 'blind brain'.

Speaker: Ricciardi, Davide Bottari, Emiliano

Track: Attention, perception and consciousness

Abstract

The sensory-deprived brain has long been considered a fascinating subject for understanding human cognition and behavior. Driven by advances in neuroimaging, the number of studies describing the functional and structural neuroanatomy of congenitally or late-blind individuals has steadily increased in recent years. These observations on blindness offer a unique opportunity to understand the extent to which sensory experience—or its absence—is necessary to shape the development, maturation, and functioning of the human brain's organization.

Findings to date agree that most of the brain's architecture develops and functions in blind individuals similarly to sighted individuals. This perspective supports the hypothesis that cortical modules can process information—at least to some extent—independently of sensory modality, implying that the human brain is somewhat pre-programmed to develop and function in the manner we know. However, the sensory-deprived brain does undergo structural and functional reorganization due to the absence of vision. Additionally, recent findings also support the idea that sensory experience is nonetheless necessary for refining higher-level sensory functions.

In this context, a challenging question for researchers concerns the functional "fate" of the primary visual cortex (V1). This presentation will provide an updated overview of our observations on the deprived V1, which continues to process low-level perceptual features transmitted through non-visual modalities.

Author/s: Emiliano Ricciardi, Davide Bottari

Type: Talk in simposio

Paolo Bonaiuto all'Università di Bologna

Speaker: Umiltà, Carlo

Track: Attention, perception and consciousness

Abstract

All'Università di Bologna, agli inizi degli anni '60 del secolo scorso, la ricerca psicologica era di impostazione gestaltista e si occupava soprattutto di fenomeni (prevalentemente di percezione, quasi esclusivamente visiva) e trascurava i processi che quei fenomeni producevano. Lo studio dei processi era lasciato alla neurofisiologia.

Al termine del decennio la rivoluzione cognitivista aveva raggiunto Bologna e le ricerche psicologiche si occupavano soprattutto di processi. Ciò avveniva con l'impiego di procedure sperimentali molto avanzate (per esempio, la "deprivazione sensoriale") e con l'impiego di paradigmi di psicologia sperimentale nell'esame di pazienti cerebrolesi. Paolo Bonaiuto ebbe il ruolo principale in questa evoluzione della ricerca psicologica a Bologna.

Fu anche un pioniere nell'ottenere finanziamenti per la ricerca da istituzioni nazionali ed internazionali. Va infine sottolineato che l'intensa attività scientifica non gli impedì di proseguire le predilette indagini fenomenologiche, che continuò a svolgere attraverso i contatti con il Gruppo N di Padova.

Author/s: Carlo Umiltà

Type: Talk in simposio

Reevaluating Cortical Plasticity: Insights from Congenital Sensory Deprivation

Speaker: Pavani, Francesco, Bottini, Roberto

Track: Attention, perception and consciousness

Abstract

This symposium aims to delve into the complexities of cortical reorganization and plasticity, particularly in response to congenital sensory conditions such as blindness and deafness. Despite extensive research, the extent and nature of brain plasticity in such conditions remain equivocal. The symposium will problematize current understandings, inspired by recent challenges to traditional notions of cortical reorganization.

These challenges suggest that behavioral adaptations following peripheral damage to sensory input systems, like congenital blindness or deafness, may not necessarily reflect cortical reorganization but could rather be manifestations of the potentiation of pre-existing neural architectures.

Author/s: Francesco Pavani, Roberto Bottini

Type: Abstract complessivo di un simposio

Symposium in Honor of Paolo Bonaiuto: Perception, Art, Expressiveness

Speaker: Mastandrea, Stefano

Track: Attention, perception and consciousness

Abstract

The symposium is dedicated to Paolo Bonaiuto, who recently passed away, a scholar of visual perception and psychology of art, themes he began developing in the 1960s in Bologna. His Gestalt-based studies - on topics such as field effects, sensory deprivation, and the expressive qualities of artworks - made an innovative contribution to the discipline. His collaboration with artists, particularly with the N group of Padua and Manfredo Massironi, led to scientific and artistic experiments on perceptual phenomena.

This period of great cultural and interdisciplinary ferment contributed, through the research and studies conducted, to the emerging field of Psychology of the art, particularly concerning the processes of vision in the experience of artworks. Between 2000 and 2004, Paolo Bonaiuto served as President of the International Association of Empirical Aesthetics (IAEA), an organization that brings together the most prominent international researchers in empirical aesthetics.

Author/s: Stefano Mastandrea

Type: Abstract complessivo di un simposio

Tertiary qualities and the “receptive eye”

Speaker: Calì, Carmelo

Track: Attention, perception and consciousness

Abstract

The construct of tertiary or expressive qualities marks the theory of the Gestalt psychology, from its introduction by Köhler, Koffka and Lewin to its generalization by Metzger to one of the modes of being of what perceivers encounters in the environment or by Arnheim to the art production and experience.

This paper presents Bonaiuto’s discussion of the validity conditions of the construct in the terms of the experimental phenomenology with the aim of laying out a unified theory that maps the effects of the tertiary or expressive qualities on the structures of the environment and the observer.

It is argued that this standpoint implies an empirically significant refinement of the Gestalt psychology, which can be conducive to build a model of “expressive competence” suitable to be extended to varied fields for future research.

Author/s: Carmelo Calì

Type: Talk in simposio

Altered neural oscillations underlying visuospatial processing in cerebral visual impairment

Speaker: Federici, Alessandra

Track: Attention, perception and consciousness

Abstract

Visuospatial processing deficits are commonly observed in individuals with cerebral visual impairment (CVI), even in cases where visual acuity and visual field functions are intact. CVI is a brain-based visual disorder associated with the maldevelopment of central visual pathways and structures. However, the neurophysiological basis underlying higher-order perceptual impairments in this condition has not been clearly identified, which in turn poses limits on developing rehabilitative interventions.

Using eye-tracking and EEG recordings, we assessed the profile and performance of visual search on a naturalistic virtual reality-based task.

Adolescents with CVI and age-matched controls with neurotypical development were instructed to search, locate, and then fixate on a specific target placed among surrounding distractors at two levels of task difficulty. We investigated ocular behaviour (i.e., success rate, reaction time, and gaze error) and neural oscillations, analysing both evoked and induced components of a broadband frequency range (4–55 Hz). Behavioural data showed an overall visual search impairment in CVI participants.

Neural oscillations analysis revealed, regardless of task difficulty, markedly reduced evoked theta activity and higher induced gamma response in CVI. Moreover, while in controls, induced alpha activity increased with task difficulty, this modulation was absent in the CVI group, identifying a potential neural correlate of visual search and distractor suppression deficits.

We conclude that pervasive impairments of visual search in CVI are associated with substantial alterations across a wide range of neural oscillation frequencies. Alterations were found in both evoked and induced oscillatory components, suggesting the involvement of feedforward and feedback processing.

Author/s: Alessandra Federici, Christopher R. Bennett, Corinna M. Bauer, Claire E. Manley, Emiliano Ricciardi, Lotfi B. Merabet, Davide Bottari

Type: Talk in simposio

Comparison of Spatial Localization Abilities and Reaction Times Between Adults and Children on the Frontal Plane

Speaker: Calafatello, Gloria

Track: Attention, perception and consciousness

Abstract

The ability to orient towards a sound source is present from the early days of life. Studies on adults reveal greater accuracy in localizing horizontal stimuli than vertical ones. To understand the development of auditory localization skills on the frontal plane, this experiment compares spatial localization abilities between adults and children (3-5 years old), analyzing accuracy and reaction times (RTs) for horizontal and vertical stimuli on the frontal plane.

The responses and RTs for four stimuli (two horizontal and two vertical) placed on a 5x5 speaker matrix were recorded via tactile response.

A two-way ANOVA revealed differences between groups ($p < 0.001$) and conditions ($p < 0.001$). Post-hoc tests confirmed that both groups were more accurate for horizontal sounds (adults: $p < 0.001$, children: $p < 0.001$). Additionally, adults were faster at localizing the stimuli, and both groups were faster at localizing horizontal sounds (adults: $p < 0.0001$, children: $p = 0.0059$). Although children's results show a similar pattern to adults, their performance generally reflects lower accuracy and longer RTs. Children aged 3-5 localize horizontal sounds better than vertical ones, confirming that preschool-aged children are sensitive to brain characteristics that favour sound localization.

Furthermore, the present results align with the literature suggesting a progressive increase in accuracy and faster RTs, which stabilize during development and reach the full maturation of perceptual systems.

Author/s: Gloria Calafatello, Alessia Tonelli, Silvia Zanchi, Maria Bianca Amadeo, Carolina Tammurello, Walter Setti, Monica Gori

Type: Talk in simposio

Cross-modal numerical information in the human newborns' brain: an EEG frequency-tagging study

Speaker: Eccher, Elena

Track: Attention, perception and consciousness

Abstract

Since the first hours of life human newborns are subjected to a multitude of stimuli and they need to learn quickly how to integrate visual and auditory input. Cross-modal integration operates not only at the perceptual level, where low-level features of stimuli such as shape, texture, and temporal occurrence are recognized, but also at a more abstract level.

For instance, research has shown that human newborns are able to discern congruent and incongruent conditions in numerosity when presented simultaneously with visual and auditory stimuli. Indeed, newborns as young as 50-hours old exhibit prolonged attention towards the screen when the number of a set of dots corresponds to the number of syllables in a concurrent auditory stream, compared to when such correspondence is absent. It has been hypothesized that this ability reflects an inherent abstract numerical representation present from birth.

Tacking advantage of a novel EEG frequency-tagging paradigm, we adapted the original behavioural study to investigate the neural basis of this phenomenon, aiming to understand how the brain process congruent and incongruent audio-visual numerical information.

Preliminary results will be presented to discuss not only the neural underpinnings of the so-called number sense, but also to show how critical auditory stimulation is for supporting complex abstract representations in the brains of newborns.

Author/s: Elena Eccher, Marco Buiatti, Veronique Izard, Giorgio Vallortigara, Manuela Piazza

Type: Talk in simposio

Fetal learning before and after birth: Exploiting neural entrainment to assess perinatal learning capacity

Speaker: Castellani, Nicolo

Track: Attention, perception and consciousness

Abstract

Learning is the fundamental backbone of social creatures. In humans, learning is the essential ability to take advantage of what others have already experienced. Here, we want to evaluate the presence of learning during pregnancy and the maintenance of it after birth in postnatal life. Exploiting EEG neural entrainment, we want to evaluate the presence of a brain preference for a learned melody in contrast to the unlearned one.

40 young adults were divided into two experimental groups. They listened once a day for a month to one of two different melodies (melody A vs melody B). After the training, participants underwent an EEG experiment in which they listened, in a randomized order, the two melodies. An encoding model measured the degree of synchronization between brain activity and the continuous auditory input of the learned and unlearned melody.

We contrasted the neural tracking of the learned versus the non-learned melody in both group (i.e. Group A trained on melody A and group B trained on melody B), employing a permutation cluster based test. Crucially, the pattern showed by the data is reversed, when group A is evaluated, the TRF for the melody A (i.e. the learned one) is greater than TRF for the melody B ($P_{\text{clust}} < 0.05$); crucially, when group B is evaluated we found an opposite pattern ($P_{\text{clust}} < 0.05$).

Our results in adults indicate that our protocol is valid to test the presence of fetal learning. The following steps will consist of finishing the data collection in newborns.

Author/s: Nicolo Castellani, Barbara Italia, Karol Poles, Alice Rossi Sebastiano, Davide Bottari, Francesca Garbarini

Type: Talk in simposio

Movement-dependent modulation of audiotactile integration early in life: distinct patterns of multisensory integration following self- and externally-directed movements in adults and newborns

Speaker: Rossi Sebastiano, Alice

Track: Attention, perception and consciousness

Abstract

Compelling evidence shows that audio-tactile multisensory integration (AT-MSI) is modulated by body proximity already at birth. In our view, early movement may represent the developmental context allowing to encode multisensory stimuli in a body-centered reference frame, by anchoring auditory and tactile inputs to the body through proprioception.

Based on these premises, we addressed whether AT-MSI is modulated by movement's directionality, i.e., whether distinct patterns of AT-MSI can be measured following hand-movements directed either to the self-body or to the external environment. First, we devised an EEG audio-tactile paradigm to capture this effect in adults and, then, we tested it in newborns. In our paradigm, tactile stimuli are delivered on the hand, either alone or concomitant with a sound and, by leveraging a postural manipulation, the hand is dragged either towards or away from the body. In a series of experiments, we demonstrate that, in adults, greater AT-MSI responses are observed following self- as compared to externally-directed movements.

Crucially, preliminary results in newborns suggest the presence of this adult-like pattern already at birth. In sum, we provide original evidence on movement-dependent modulations of AT-MSI, in line with pioneering prenatal studies, highlighting differential kinematics during self- and externally-directed movements. In our interpretation, when movements aim toward the self, proprioceptive input anchors audio-tactile stimuli to the body, resulting in boosted AT-MSI responses.

Our data indicate the presence of such a mechanism already at birth, which may ensure the evolutionary advantage of allowing better processing of environmental events approaching the body.

Author/s: Alice Rossi Sebastiano, Barbara Italia, Nicolò Castellani, Giulia Serra, Karol Poles, Alessandra Coscia, Chiara Peila, Francesca Garbarini

Type: Talk in simposio

Predictive processes and linguistic patterns in early language acquisition

Speaker: Polver, Silvia

Track: Attention, perception and consciousness

Abstract

Brain functions depend on recognizing patterns to predict future events (Auksztulewicz et al., 2018; Morillon & Schroeder, 2015). Early in auditory processing, the brain detects repetitions, guiding attention to specific intervals in the auditory stream (Auksztulewicz et al., 2018).

Speech perception involves the dynamic sampling of acoustic information across different time scales simultaneously (Morillon & Schroeder, 2015), with timing predictability playing a crucial role in language learning (Kujala et al., 2023). Despite infants having immature auditory systems, they display remarkable ability in speech detection (Cabrera & Gervain, 2020).

However, the specific factors enhancing their encoding of natural speech remain unclear (Nencheva & Lew-Williams, 2022). Moreover, since natural auditory scenes are less strictly predictable, the extent to which the brain tolerates variability while still perceiving sounds' sources signals as predictable remains unresolved (Bendixen, 2014). We investigated whether infants' speech sensitivity arises from recognizing temporal patterns. Testing 6-month and 12-month-olds with EEG during natural conversations, we manipulated pause durations: typical (200 ms), overlapping (500 ms), and prolonged (850 ms).

We expect 6-month-olds to predict with short and long pauses but falter with overlap. Twelve-month-olds might struggle even with long pauses, mirroring adults albeit with more uncertain responses. Exploring temporal predictability in early language processing, our study sheds light on neural mechanisms during critical language development periods in infancy.

Author/s: Silvia Polver, Maria Clemencia Ortiz Barajas, Ramon Guevara, Judit Gervain

Type: Talk in simposio

Prosodic and linguistic cues from voices: which holds greater attention from newborns?

Speaker: Silvestri, Valentina

Track: Attention, perception and consciousness

Abstract

Voices are arguably the most relevant auditory stimuli for human social interactions conveying linguistic content but also offering several paralinguistic cues about the speakers, including their identity, gender, age, and emotional state. Thus, from voices, it is possible to extract both the linguistic content conveying propositional meaning and the prosodic aspects conveying the speaker's affective intention and emotional status. To date, there is substantial evidence indicating that newborns are equipped to identify both linguistic cues, recognize different languages (Byers-Henlein et al., 2010; Mehler et al., 1988), and also to be sensitive to prosodic and social aspects, being able to discriminate the emotional valence of sentences (Mastropieri & Turkewitz, 1999). However, it remains unknown to what extent linguistic or prosodic aspects of speech attract newborns' attention the most.

In the present study, to unravel the impact of linguistic and social cues on influencing voice attention, newborns are presented with the same nursery rhyme narrated by an actress (i.e., condition with both linguistic and prosodic aspects), hummed by the same actress (i.e., condition with only prosodic cues) or narrated by a synthesizer (i.e., condition with only linguistic cues) while their high-amplitude nonnutritive sucking behavior was registered.

Our findings revealed a decelerated nonnutritive sucking behavior for the nursery rhyme narrated by the synthesizer, interpreted as a consequence of attentional capture in response to the condition in which the linguistic content is not coupled with the prosodic cues, as in the case of natural language to which newborns are exposed since the prenatal period.

Author/s: Valentina Silvestri, Silvia Polver, Maria Lorella Giannì, Angelo Petrelli, Lorenzo Colombo, Hermann Sergio Bulf

Type: Talk in simposio

Sensory space: Exploring the dimensions and development of perception of the body and the environment with and without sensory disabilities

Speaker: Zanchi, Silvia

Track: Attention, perception and consciousness

Abstract

The ability to perceive and combine spatial coordinates that come from different sensory signals is fundamental for knowing the environment and interacting with it. The role of vision is predominant in providing an accurate representation of space; however, understanding the contribution of the other senses in its absence is essential for a complete analysis of the different ways in which the brain processes the environment.

This symposium aims to propose an in-depth look at the different dimensions of spatial perception and their crucial role in cognitive, motor, and behavioral development. In particular, during the symposium, the skills of spatial reasoning, localization, perception and exploration of the external environment and in relation to one's own body and others will be explored. Furthermore, we will focus on the ability to create precise and accurate representations of the space with which the body interacts, in the presence and absence of sensory disabilities, during development until reaching adulthood, and we will shed light on the features of these processes.

The talks of the various speakers will allow us to offer a rich overview of the modalities of spatial perception that evolve during development and that change based on the availability of sensory resources, also highlighting the clinical implications for sensory disabilities and for the optimization of the interaction between the individual and the physical and social environment

Author/s: Silvia Zanchi, Monica Gori

Type: Abstract complessivo di un simposio

The dance of attachment: linking motor characteristics with attachment and behavioural measures of the dyad mother-child with visual impairment

Speaker: Guarischi, Marta

Track: Attention, perception and consciousness

Abstract

Introduction: Studying attachment development in children with visual impairment (VI) is fundamental to investigating the associations of the attachment style with the maturation of socioemotional skills and the emergence of psychological conditions.

Methods: Four children with VI (38.5 ± 33.9 months old) played while parents sat in one corner of the set-up. We used the Vicon Motion Tracking System to quantify the mean distances between parents and children during playground exploration. Parents completed two questionnaires: the Child Behaviour Checklist (CBCL) and the Adult Attachment Questionnaire (ASQ).

Results: Concerning the ASQ, we found a high positive correlation between the mean distance and anxious ambivalent ($r=0.92$) style of attachment; conversely, we found a high negative correlation between the mean distance and the secure style ($r=-0.62$), both not significant. Concerning the CBCL, we highlight a high negative and significant correlation between the mean distance and the subscales related to sleep problems ($r=-0.96$, $p=0.03$). Conversely, we found a moderate negative correlation between mean distance and the somatic complaints ($r=-0.51$) and the withdraw subscales ($r=-0.55$), which were not significant.

Conclusion: Our preliminary results suggest an interesting link between motor characteristics, the attachment style of the mothers, and some behavioural characteristics of children with VI. Our ecological set up also resembled children every-day environment, allowing a more realistic data collection and thus, more unbiased results. This enabled us to investigate motor characteristics that represents an indirect measure of cognitive, emotional, and relational aspects.

Author/s: Marta Guarischi, Eleonora Montagnani, Guido Catalano, Sabrina Signorini, Monica Gori

Type: Talk in simposio

The ontogenetic necessity to extract information from the auditory environment

Speaker: Silvestri, Valentina

Track: Attention, perception and consciousness

Abstract

From the very beginning infants are aware of their surrounding environment. Since the auditory system is one of the first sensory systems to develop, newborns can already absorb a wealth of information from their auditory environment. They exhibit both behavioral and neurophysiological responses to a variety of external sounds, such as pure tones, sounds at different acoustic frequencies, and speech.

The goal of this symposium is to update the audience on current knowledge concerning newborns' auditory perceptual expertise and on how they cope with the rich surrounding auditory environment soon after birth. We aim to address not only the development and timing of organized auditory sensory skills like voice and speech processing, multisensory integration, and numerical cognition, but also the mechanisms that drive their emergence.

The first part of the symposium will focus on the factors influencing voice processing in newborns (Silvestri) and speech processing in infants (Polver). Next, we will tackle the effects of prenatal auditory learning on subsequent abilities at birth (Castellani). The discussion will continue with a series of studies investigating how information from different senses is constantly integrated, highlighting early signatures of audio-tactile body-related multisensory integration (Rossi Sebastiano) and audio-visual numerical information (Eccher) in the newborn's brain.

Together, this symposium will represent an attempt to address open questions regarding the integration of different auditory processes and to foster a discussion on the early abilities and skills in the first months of life as well as the role of auditory experiences both before and after birth.

Author/s: Valentina Silvestri

Type: Abstract complessivo di un simposio

The role of visual impairment in spatial cognition, an in-depth study of spatial numerical representation and spatial reasoning

Speaker: F. Cuturi, Luigi

Track: Attention, perception and consciousness

Abstract

In the context of visual impairment, spatial cognition can be affected by factors as: total or partial visual deprivation, blindness onset, and duration of disability. Specifically, in a spatial number representation task where participants indicate on a haptic bar where a positive or negative target number is located, low vision participants perform worse with negative numbers than totally blind participants. It is hypothesized that in the case of low vision, vision, albeit partial, plays a key role in achieving a more complex level of spatial processing.

Reaching such level may be necessary to reverse the polarity of numbers on the spatial representation, thus resulting in a deficit in identifying the progression of negative numbers on the number line in case of visual impairment. In the present study, we aim to test this hypothesis by investigating the relationship between the ability to represent numbers spatially and more complex problem solving and spatial reasoning abilities as a function of visual impairment. In addition to the haptic number line, participants with visual impairment undergo the haptic adaptation of the Kohs-block test where they are asked to reproduce an abstract haptic configuration using blocks with faces distinguished by a different texture.

Comparing performance in these tests allows us to test whether more complex spatial cognitive abilities (Kohs-block test) discriminatively affect performance at the haptic number line in relation to the degree of visual impairment (e.g., low vision, congenital blindness, acquired blindness).

These results provide useful notions for spatial rehabilitation in cases of low vision and progressive visual impairment.

Author/s: Luigi F. Cuturi

Type: Talk in simposio

Exploring Interoceptive Dimensions and Body Representations in Parkinson's Disease

Speaker: Gaita, Mariachiara

Track: Attention, perception and consciousness

Abstract

Interoception, the process by which signals originating from within the body are perceived and integrated, is crucial for constructing mental body representations. Despite its significance, the relationship between interoception and higher-order functional body representations (BR), particularly in Parkinson's disease (PD), remains understudied.

This study aims to investigate potential alterations in different BR and conscious interoceptive dimensions in PD.

Thirty participants, comprising 15 individuals diagnosed with PD and 15 healthy controls (HC), underwent a comprehensive neuropsychological assessment. This assessment included tasks tapping action-oriented BR (Hand Laterality Task, HLT), and non-action-oriented BR (Frontal Body Evocation task, FBE). Additionally, participants were assessed for three aspects of interoceptive processing: sensitivity (Self-Awareness Questionnaire), accuracy (Heartbeat Detection Task; HDT), and awareness (accuracy-confidence correlation).

BR and interoceptive dimensions were compared between the groups using non-parametric analysis (i.e., the Mann-Whitney U test).

The HDT scores were significantly lower among patients with PD compared to HC ($U=60.000$; $p=0.029$). Similarly, the HLT total ($U=59.500$; $p=0.026$), HLT for the right hand ($U=60.000$; $p=0.029$), and FBE for the body right side ($U=61.000$; $p=0.033$) scores were significantly lower among PD patients compared to HC.

The inner and outer body processing are both compromised in PD. These findings emphasize the significance of assessing interoception and functional BR in PD, whose alterations are potentially associated with insular degeneration, calling for additional research to comprehensively understand their impact on daily functioning and quality of life.

Author/s: Mariachiara Gaita, Giovanni Luca Di Benedetto

Type: Talk in simposio

Exploring the Interplay Between Interoception and Dissociative Experiences: Insights from a Non-Clinical Population

Speaker: Vercelli, Gabriele

Track: Attention, perception and consciousness

Abstract

The critical contribution of interoceptive signals to bodily self awareness and self-consciousness has recently been investigated by an increasing number of studies. Also, it has recently been suggested that interoceptive dysfunction can prove to be an important component of many neurological and psychiatric disorders (i.e. dissociative disorders, eating disorders, PTSD, somatic disorders), some of which exhibit overlapping characteristics with disorders characterized by increased dissociative tendencies.

This observation hints at a potential underlying connection between interoception and dissociation, the exploration of which could provide valuable insights into the concept of Self and the diagnosis and management of related disorders. Given the significance of this relationship, this study aimed to directly investigate this relationship within a non-clinical population, observing whether scarce interoceptive abilities were associated with a higher tendency for spontaneous and induced dissociative experiences (using the Mirror Gazing Task).

Findings showed that the MGT was effective in inducing state dissociation. Furthermore, dissociative feelings negatively correlated with interoceptive sensibility and, similarly, trait dissociation was negatively associated to interoceptive sensibility. Induced or spontaneous non-clinical dissociation, instead, was not associated with changes in interoceptive accuracy (as measured via the Heartbeat Counting Task). These results identify a relationship between non-pathological state and trait dissociation and interoceptive sensibility, specifically interoceptive components related to the trustworthiness and awareness of visceral signals.

Considering the important role of interoception in shaping bodily self-awareness and self-consciousness, we are currently investigating the relationship between visceral self-awareness and dissociative traits in Anorexia Nervosa.

Author/s: Gabriele Vercelli, Anand Rai, Sofia Ciccarone, Giuseppina Porciello, Ilaria Bufalari

Type: Talk in simposio

Exploring typical and atypical interoceptive patterns in Hypertension and Gastrointestinal Disorders: Clinical Relevance and Insights for interventions

Speaker: Salaris, Andrea

Track: Attention, perception and consciousness

Abstract

Interoception, i.e. the process through which the brain perceives, interprets, and integrates signals originating from the viscera has profound implications not only for cognition and behaviour, but also for physical and mental health.

Although research has focused on interoceptive impairments in psychiatric disorders, a variety of medical conditions may show altered perception of visceral signals. Borderline hypertensive (BH) patients, for example, may exhibit increased pain threshold, suggesting abnormal interoceptive processes. In a similar vein, patients with functional gastrointestinal disorders (FGID), a condition in which chronic gastrointestinal symptoms and visceral pain are present without apparent structural abnormalities, may show interoceptive alterations.

We conducted two studies to explore interoception in a sample of BH patients and individuals suffering from FGID. We assessed interoceptive accuracy (gastric for FGID, cardiac for BH patients) and sensibility, exploring the relationship between interoception and symptomatologic domains, such as altered pain perception in BH and visceral sensitivity in FGID. Results show that: i) even if BH patients do not have decreased interoceptive accuracy (compared to healthy controls), their pain threshold was negatively associated with interoceptive sensibility; ii) FGID patients exhibited altered gastric interoceptive accuracy (compared to healthy controls) that negatively correlated with anxiety towards gastric symptomatology.

These preliminary findings highlight the role of interoception in shaping the symptomatology of BH and FGID patients and suggest that future studies could focus on novel therapeutic targets aimed at enhancing interoception ultimately improving symptoms.

Author/s: Andrea Salaris, Chiara Cantoni, Cristina Ottaviani, Giuseppina Porciello, Hajar Al Naqshbandi, Luca Carnevali, Luca Provenzano, Sofia Ciccarone

Type: Talk in simposio

Interoception for cardiac and gastric signals: exploring individual differences and their implications for cognitive and mental health

Speaker: Salaris, Andrea, Silvia Canino

Track: Attention, perception and consciousness

Abstract

Interoception is the perception of inner bodily sensations, including signals from diverse bodily systems, such as the cardiac and digestive ones. This sensory capacity exhibits significant variability among individuals, garnering attention in research because of its relevance to mental and physical health and in driving cognitive processes such as decision-making and social cognition. Despite tremendous advances, numerous questions remain to be addressed.

This symposium aims to delve into the intraindividual variability of interoceptive processing and its implications for mental and cognitive health. Through a series of talks, we will explore the complex interplay between the conscious perception of bodily signals and mental processes, shedding light on how individual differences in interoception contribute to cognitive functioning and well-being.

In the first part, we will focus on interoception for cardiac signals, exploring the dimensions that, at the conscious level, are more commonly supported across various taxonomies: interoceptive accuracy, sensibility, and awareness. Canino will show how these dimensions vary during development, focusing on adolescence, a period of life where many psychiatric disorders have their onset and which is argued to have a substantial impact on health later in life. Then, Vercelli and Gaita will shed light, respectively, on the consequences of such individual differences in (i) shaping bodily self-awareness and self-consciousness in a non-clinical population and (ii) in the construction of higher-order functional body representations in Parkinson's disease.

Salaris will conclude by analyzing the role of interoception in the symptomatology of functional gastrointestinal disorders and borderline hypertension, focusing on cardiac and gastric interoception.

Author/s: Silvia Canino, Andrea Salaris

Type: Abstract complessivo di un simposio

Understanding individual differences in interoception: insights from adolescence

Speaker: Canino, Silvia

Track: Attention, perception and consciousness

Abstract

The perception of interoceptive signals and their neural representation profoundly affect physical, mental, and cognitive health. Despite this appreciation, the developmental trajectory of interoception is relatively under-researched, particularly during adolescence, a relevant period for interoceptive learning, as many bodily changes characterize it. This study aims to address this gap by exploring the development of different interoceptive dimensions, namely, interoceptive accuracy (IAcc), sensibility (ISe), and awareness (IAw), focusing on adolescence.

Fifty-five adolescents (12-14 yrs) and forty-seven young adults (20-34 yrs) participated in the study. They completed a heartbeat counting task probing IAcc (ratio of actual to reported heartbeats) and IAw (accuracy-confidence correlation), and two questionnaires exploring ISe across bodily axes.

Adolescents were as accurate as young adults in counting their heartbeats, suggesting an adult-like pattern in accurately processing interoceptive information (IAcc). However, when evaluating their performance, they showed lower metacognition, reporting lower accuracy-confidence correlations (IAw). Also, adolescents scored significantly different from young adults on ISe questionnaires, focusing more on somatosensorial and visceral body sensations (ISe) than young adults. Furthermore, the correlational analysis showed a lack of significant associations between the interindividual variability in the different interoceptive dimensions.

As already proved in studies on adults, current results indicate that the three interoceptive dimensions (IAcc, IAw, ISe) are independent and follow distinct developmental trajectories during adolescence. Given the impact of interoception in decision-making and emotional processing, this variance could be a candidate mechanism for the increased incidence of risky behaviors and emotional difficulties in this life period.

Author/s: Silvia Canino, Valentina Torchia, Teresa Iona, Simona Raimo, Liana Palermo

Type: Talk in simposio

Body-Specific Associations in Digital Interactions: The Role of Hand Dominance in Valence Perception

Speaker: Maisto, Marta

Track: Attention, perception and consciousness

Abstract

The Body-Specificity Hypothesis suggests that the area around the dominant hand is perceived positively, contrasting with a negative perception around the non-dominant hand.

Given the increasing interest in embodied cognition for interactive technologies, our study aimed to investigate body-specific associations in real-world settings, examining whether these extend to mainstream digital gestures like swiping. Experiments 1 and 2 involved presenting 28 valence-laden images to N=30 right-handed participants (Experiment 1) and N=30 left-handed participants (Experiment 2) on a tablet.

Participants made valence judgments with each hand in separate sessions, engaging in a congruent task (swipe toward the dominant side - positive, swipe toward the non-dominant side - negative) and an incongruent task (the opposite response pattern). Following the valence judgment task, participants assessed the intensity of their responses using a 9-point Likert scale.

Results indicated that right-handers (Experiment 1) were faster in the congruent condition ($p < .001$) than in the incongruent condition and showed faster responses when swiping for negative images with the non-dominant hand ($p < .001$). Left-handed participants (Experiment 2), on the other hand, did not show differences in response times but evaluated images as more positive/negative in the congruent condition ($p = .01$) compared to the incongruent.

Overall, these findings support the Body-Specificity Hypothesis but also suggest it manifests with a distinctive pattern between right-handers and left-handers.

Author/s: Marta Maisto, Silvia Serino, Marcello Gallucci, Rossana Actis-Grosso

Type: Talk in simposio

Exploring the role of emotion and sensorimotor expertise on memory for action sentences

Speaker: Serino, Silvia

Track: Attention, perception and consciousness

Abstract

While literature suggests that both performing congruent actions and emotional stimuli can enhance memory, their combined impact on memory for action phrases remains largely unexplored.

This contribution presents and discusses recent findings from an experimental study investigating the effect of enactment encoding with emotionally charged stimuli on memory performance. Fifty-six participants encoded action sentences with different emotional connotations (negative, neutral, or positive), using either enactment or verbal-reading methods.

Memory performance was assessed through immediate free recall tasks following each encoding condition and a delayed yes-no recognition task. Results indicate that enactment significantly improves memory, particularly for positively valenced items, with a notable effect on recognition memory but not on free recall performance. Additionally, preliminary data employing the same protocol with professional athletes will be presented and discussed.

This aims to explore the potential role of sensorimotor expertise on memory for enacted action sentences with different emotional connotations

Author/s: Silvia Serino, Rossana Actis-Grosso, Marta Maisto, Paola Ricciardelli, Patrizia Steca

Type: Talk in simposio

Syntax and semantics are linked during sensorimotor processing of noun-adjective pairings: evidence from a grasp-compatibility task.

Speaker: Garofalo, Gioacchino

Track: Attention, perception and consciousness

Abstract

Evidence suggests that specific motor plans linked to potential hand-object interactions are activated when semantically processing graspable object nouns. Furthermore, it has also been demonstrated that adjectives expressing object features can modulate these motor plans. Since semantics and syntax are learned together during the lifespan, it is conceivable that syntax can have a role in sensorimotor activation during language processing.

This study investigated the role of syntax by comparing two languages with different syntactic structures (Experiment 1 – Italian, Experiment 2 – English). In both experiments, an adjective-noun pair was shown on the screen, with the adjective presented always in pre-nominal position. Adjectives denoted either a disadvantageous quality of the object graspability (e.g., sharp) or the object colour (e.g., reddish).

Participants had to categorize the object nouns as natural or artifact, performing a precision or a power reach-to-grasp movement. On different trials, the grasp response was compatible or incompatible with the size of the object denoted by the noun. In Experiment 1 the adjective-noun order violated the syntactic rule and no difference emerged between compatible and incompatible trials. In Experiment 2, the adjective-noun order met the syntactic rule. Results showed slower responses on compatible than incompatible trials when disadvantageous adjectives preceded the nouns, while a standard compatibility effect emerged when colour adjectives preceded natural object nouns.

Similar results were previously found when the Italian combinations followed the correct syntactic order. Taken together, these modulations show that syntax contributes to sensorimotor activation. Results are discussed with respect to embodied cognition theories.

Author/s: Gioacchino Garofalo, Lucia Riggio, Francesco Bianchini, Elena Gherri

Type: Talk in simposio

Are dynamic brain state transitions during rest reliable markers of individual neuropsychological and behavioral differences in preschoolers?

Speaker: Mento, Giovanni

Track: Attention, perception and consciousness

Abstract

The recurrent activation over time of distinct cortical networks, also known as brain states (BSs), plays a crucial role in supporting cognitive control (CC) performance across the lifespan. Hidden Markov Models (HMMs) have emerged as a valuable tool for identifying BSs.

However, studies utilizing HMMs in developmental populations are relatively limited. In this study, we employed high-density electroencephalography (HD-EEG) to identify BSs during rest in a cohort of typically developing, preschool-aged children. Additionally, we computed individual switching rates (SR), entropy, and probabilities of transitions between BSs. Our primary objective was to explore the potential relationships between these individual neurofunctional indices and the participants' neuropsychological and behavioral profiles. A total of 39 neurotypical children, aged 4 to 6 years, participated in two separate resting-state sessions with HD-EEG.

They also completed a computerized cognitive task assessing reactive/proactive CC and underwent a battery of executive function tests. Our model identified discrete spatiotemporal patterns mimicking well known resting-state networks, including the anterior and posterior default-mode, temporo-parietal, occipital, sensorimotor, frontal and fronto-temporal circuits.

Interestingly, we observed a gender-related difference, with boys and girls spending more time in default-mode-like and fronto-temporal BSs, respectively. Furthermore, we found that a higher probability of transitioning into fronto-temporal states was associated with better scores in questionnaires assessing executive functioning in everyday life, behavioral difficulties and emotion regulation abilities.

These findings highlight the importance of resting-state brain dynamics as functional scaffolds for behavior and cognition and suggest new methodological tools for assessing individual neurocognitive differences in typical and potentially atypical development.

Author/s: Giovanni Mento, Natalia Zdorovtsova, Gabriela Epihova, Gian Marco Duma, Fiorella Del Popolo Cristaldi, Massimiliano Pastore, Duncan Astle, Lisa Toffoli

Type: Mini-talks

Auto-Global Examination of Mental State (Auto-GEMS): A web-based, self-administered cognitive screening standardized for Italy

Speaker: Bonato, Mario

Track: Attention, perception and consciousness

Abstract

Recent methodological developments have contributed to a significant advance in computerised neuropsychological instruments and procedures, including those accessible through web-based platforms.

We recently developed Auto-GEMS, an open-access, web-based, self-administered screening test in Italian. It allows a quick assessment of an individual's cognitive state and cognitive reserve. Auto-GEMS measures cognitive functioning by using eleven items similarly to the remote (phone or video-call) version (Tele-GEMS) and to the in-person paper and pencil version (GEMS) of the same screening. We collected normative data on a large sample of 1308 participants (age range 18-93), which were then used to investigate psychometric properties and regression models on demographic variables to derive clinical cut-offs.

The psychometric properties of Auto-GEMS have shown good internal consistency, test-retest reliability and convergent validity. This short and user-friendly tool has a number of potential applications. For instance, it can be useful in clinical practice to monitor the cognitive profile of patients or vulnerable individuals, but it can also be used in research studies for screening participants.

The testing materials and the data collected are freely available on the Internet along with a web app to visualise the test outcome in comparison with the normative data.

Author/s: Mario Bonato, Veronica Pucci, Giulio Contemori, Maria Silvia Saccani, Giorgio Arcara, Sara Mondini

Type: Mini-talks

Behavioral and electrophysiological signatures of Perceptual Bias in line length estimation

Speaker: Parisi, Giorgia

Track: Attention, perception and consciousness

Abstract

The Landmark task constitutes one of the most effective behavioral tasks in visuospatial perception, detecting a distortion of space perception known as Perceptual Bias (PB). This study intended to highlight the behavioral and neural basis of PB by administering the Landmark task while concurrently recording EEG.

A computerized Landmark task was administered to thirty-seven healthy participants. They had to report the longest or the shortest of the two segments of pre-bisected horizontal lines that could be symmetrically (i.e., Critical stimuli) or asymmetrically (i.e., Control stimuli) bisected. EEG signal was recorded throughout the experiment.

Three possible PB values could be extracted from Critical trials: $50\% \pm 5$ (i.e., no bias), higher than 55% (i.e., “neglect-like” bias), and lower than 45% (i.e., “pseudoneglect” bias).

Despite high inter-individual variability, participants behaviorally manifested a “pseudoneglect” bias (mean 43.93%), in accordance with the current literature. From the electrophysiological standpoint, pairwise comparisons between Critical vs. Control trials showed a significant difference in the N2 and P3 components’ time windows (i.e., higher in Control than in Critical trials). The N2 result could represent content-specific awareness due to the perceptual difference provided by Control trials only. Consequently, the P3 finding could be related to a stronger post-perceptual decision-making process performed on Control trials.

Finally, a positive correlation between PB and the P2 peak amplitude was found, suggesting that PB takes place at this stage of visual processing, prodromic to the generation of a feature-integrated content of perceptual awareness.

Author/s: Giorgia Parisi, Federica Molteni, Chiara Mazzi, Davide Bonfanti, Adriana Salatino, Raffaella Giovanna Nella Ricci, Silvia Savazzi

Type: Mini-talks

Exerted listening effort guides lip-reading when listening to speech in noise

Speaker: Gessa, Elena

Track: Attention, perception and consciousness

Abstract

In challenging acoustic scenarios, individuals can implement behavioral strategies (e.g., lip-reading) to enhance speech comprehension. We hypothesized that lip-reading depends on the exerted listening effort that accompanies challenging conditions.

To test this, we manipulated listening effort through variations in cognitive demands and motivation. Normal-hearing adults (N=64) performed an audiovisual speech-comprehension in noise in combination with a concurrent mnemonic task with low vs. high working memory engagement. Motivation was manipulated between-subjects through fixed or performance-related monetary rewards. Lip-reading was tracked with eye-movement and pupil dilation served as a physiological measure of listening effort, confirming manipulation effectiveness.

Crucially, we found that exerted listening effort influences lip-reading behavior, with motivation playing a key role in this behavioral adaptation to enhanced cognitive demands.

These findings document the association between internal mental processes and behavioral adaptation in the speech domain.

Author/s: Elena Gessa, Chiara Valzolgher, Elena Giovanelli, Massimo Vescovi, Chiara Visentin, Nicola Prodi, Eloise Di Blasi, Viola Sadler, Francesco Pavani

Type: Mini-talks

How different shades of emotion may affect automatic and voluntary attentional processes: a study with the Emotional Flicker Task

Speaker: Favieri, Francesca

Track: Attention, perception and consciousness

Abstract

Introduction: Individuals exhibit higher attentional allocation toward threatening than neutral information. Nevertheless, a source of variability could be related to both the specific emotion elicited and the attentional process involved. This study aimed to investigate the impact of different emotionally activating negative stimuli on the automatic and voluntary attentional processes.

Methods: Ninety-six participants completed an Emotional-Flicker Task with negative (covid-related; non-covid-related) and neutral scenes. The task allowed for the assessment of changes in the central (CI) or marginal (MI) interest areas of the scene, enabling the examination of both automatic and voluntary orienting of attention respectively. Response times for change detection were compared.

Results: A within-subject ANOVA on Type of Change (CI; MI) x Valence (Covid, Non-Covid, Neutral) reported a significant interaction ($F_{2,192}=176.6$; $p<0.0001$). A different pattern of change detection in COVID-related stimuli emerged. Generally, changes in COVID-related scenes were detected slower, but interestingly, while for neutral and non-covid stimuli CI changes were faster detected than MI, a reverse pattern emerged for COVID-related stimuli.

Conclusions: Our results provide insights into how different shades of negative emotions influence attentional processes. The anxiety generated by COVID-related stimuli appears to interfere with automatic but not voluntary attention. This could be due to the activation of cognitive representations of the pandemic that are involved in the top-down processing of the scene. Conversely, the threatening nature of non-covid scenes would activate an automatic response typical of fear (fight or flight), resulting in a fast detection in the automatic phase of the attention process

Author/s: Francesca Favieri, Giovanna Troisi, Barbara Blasutto, Ilaria Corbo, Giuseppe Forte, Renato Ponce Guerrero, Giulia Marselli, Maria Casagrande

Type: Mini-talks

Parietal tACS coupled with a visuo-attentional training improves lexical access and working memory in dyslexia

Speaker: De Benedetto, Francesco

Track: Attention, perception and consciousness

Abstract

Developmental Dyslexia (DD) is a neurodevelopmental disorder characterized by both auditory-phonological and visual-attentional deficits. This study aimed at investigating the cumulative impact of transcranial alternating current stimulation (tACS) and visual-attentional reading training. tACS was applied to parietal sites, bilaterally at beta frequency (18 Hz), to improve the magnocellular-dorsal (M-D) stream functionality and the capability of ventral stream areas of identifying visual word structures.

All participants were adults with DD diagnosis. They were divided into three groups (N = 37). The first group completed 12 sessions of a reading acceleration training (RAP) while receiving tACS stimulation; the second and third groups underwent a sham stimulation in combination with RAP and phonological training, respectively. Before and after the training sessions, participants were asked to judge the lexicality of written words and pseudo-words while EEG was recorded.

N400 and P600 ERP components were modulated in all groups as a function of the session. Specifically, when comparing groups that underwent RAP training, ERPs reflect a less effortful lexical and semantic categorization post training in the tACS group. Coherently, we observed an improvement in working memory capacity, as assessed by the digit span test only in the tACS group. As for time-frequency data, we expect a decrease in frontal theta band, reflecting working memory load and a decrease in alpha power in temporo-parietal regions, reflecting semantic encoding. Taken together, our results suggest that combining tACS and visual-attentional reading training leads toward a more efficient lexical/semantic categorization, supported by a general improvement in working memory.

Author/s: Francesco De Benedetto, Chiara Turri, Giuseppe Di Dona, Denisa Adina Zamfira, Lisa Venniro, Daniela Perani, Luca Ronconi

Type: Mini-talks

Prismatic adaptation coupled with cognitive training as novel treatment for developmental dyslexia: a randomized controlled trial

Speaker: Zotti, Lilian

Track: Attention, perception and consciousness

Abstract

Despite intense and costly treatments, developmental dyslexia (DD) often persists into adulthood. Several brain skills unrelated to speech sound processing (i.e., phonology), including the spatial distribution of visual attention, are abnormal in DD and may represent possible treatment targets.

This study investigates the efficacy in DD of rightward prismatic adaptation (rPA), a visuomotor adaptation technique that enables visual-attentive recalibration through shifts in the visual field induced by prismatic goggles.

A digital intervention of rPA plus cognitive training was delivered weekly over 10 weeks to adolescents with DD (aged 13–17) assigned either to treatment (N = 35) or waitlist (N = 35) group. We observe a high compliance to treatment. Efficacy was evaluated by repeated measures MANOVA assessing changes in working memory index (WMI), processing speed index (PSI), text reading speed, and words/ pseudowords reading accuracy. rPA treatment was significantly more effective than waitlist ($p \leq 0.001$; $\eta^2 = 0.815$). WMI, PSI, and reading speed increased in the intervention group only ($p \leq 0.001$, $\eta^2 = 0.67$; $p \leq 0.001$, $\eta^2 = 0.58$; $p \leq 0.001$, $\eta^2 = 0.29$, respectively). Although modest change was detected for words and pseudowords accuracy in the waitlist group only (words: $p \leq 0.001$, $d = 0.17$, pseudowords: $p = 0.028$; $d = 0.27$), between-group differences were non-significant.

This is the first study to evaluate the efficacy PA coupled with cognitive training for the non-phonological treatment of cognitive and reading abilities in adolescents with DD. This innovative approach could have implications for early remedial treatment.

Author/s: Giulia Conte, Lauro Quadana, Lilian Zotti, Agnese Di Garbo, Massimiliano Oliveri

Type: Mini-talks

The involvement of extra-striate areas in conscious vision as a function of response requirements: a Fast Optical Imaging investigation

Speaker: Colombari, Elisabetta

Track: Attention, perception and consciousness

Abstract

One of the major challenges of consciousness research is represented by the identification of the brain areas responsible for the emergence of visual awareness. In this framework, the present study aims at unravelling the spatio-temporal dynamics underlying conscious vision, disentangling them from confounding post-perceptual processing related to the response.

To this goal, we employed a peculiar experimental design in which both awareness and motor response are manipulated. Specifically, participants performed a GO/NOGO detection task, in which they were asked to respond or withhold responding according to the experimental condition. Critically, during the performance of the task, participants' brain activity was recorded by means of Event-Related Optical Signal (EROS) technique, which provides accurate information about brain functions both from the temporal and spatial point of view, simultaneously.

Results obtained from a small sample serving as a pilot for a registered report recently submitted showed that the Lateral Occipital Complex (LOC) plays a crucial role in conscious vision independently from the response requirement. In contrast, activity in primary visual cortex (V1) characterized the conscious condition only when the response was required.

In general, these results advocate for a central role of LOC in conscious vision, suggesting that it could represent a reliable neural correlate of visual awareness, as opposed to V1, whose activity seems to be related to post-perceptual processes involved in the requirement of report.

Author/s: Elisabetta Colombari, Giorgia Parisi, Sonia Mele, Chiara Mazzi, Silvia Savazzi

Type: Mini-talks

Where do objects categorized as slow or fast disappear? A study on 'representational momentum'

Speaker: Battaglini, Luca

Track: Attention, perception and consciousness

Abstract

The fundamental characteristics of a stimulus, such as size, contrast, texture, and volume, as well as context and emotional salience, can influence subjective perception in psychophysical tasks involving time and speed.

Recent research has shown that, in addition to object characteristics and context, expectations acquired over a lifetime can influence perception attributes. In this study, we aim to measure 'representational momentum', i.e., the judgment of the disappearance point of a moving object, using stimuli that should be implicitly categorized as 'slow' or 'fast'. We hypothesize that the implicit categorization of the stimulus as 'slow' or 'fast' may influence the task, and we expect a greater error towards the direction of movement for 'fast' stimuli, supporting the idea that the symbolic meaning of objects can also modulate 'representational momentum'. Using horizontally moving stimuli, such as a bicycle (slow object) and a racing motorcycle (fast object), we found no significant difference.

However, using vertically moving stimuli, such as a space rocket (fast object) and a church (static object), we observed, counterintuitively, a greater error in judging the disappearance point towards the direction of movement for the stimulus that should be categorized as 'slow'.

This bias is consistent with previous research explaining such an effect as a violation of expectation, conceptually similar to the size-weight illusion and the expected velocity violation illusion.

Author/s: Luca Battaglini, Marianna Musa, Giovanna Mioni

Type: Mini-talks

“Perceptual features - not emotion categorization - affect the detection of emotional faces: insights from a visual search study”

Speaker: Bucci, Erika

Track: Attention, perception and consciousness

Abstract

Humans excel in the interpretation of facial cues, which allows them to anticipate others and respond accordingly. Nonetheless, it remains unclear whether an advantage in the detection of those cues arises from the categorization of facial expressions, such as happy or angry, or from the magnitude of the deformation of the face, regardless of the emotion category.

Here, we sought to clarify this aspect by asking 52 participants to perform a visual search for emotional faces among neutral expressions. Pictures of happy and angry faces were selected from ADFES' dynamic facial expressions either at their respective -yet unequalized- maximum intensity (unmatched-intensity condition) or at an intermediate -yet equalized- intensity (matched-intensity condition) according to 11 independent raters.

We examined the effect of emotion (i.e., happy vs angry; generalized linear mixed effect models) on participants' accuracy and reaction times in both conditions. Unsurprisingly (Juth et al., 2005), happy faces are detected faster and more accurately than angry ones ($p < .001$) in the unmatched-intensity condition. However, the effect is reversed when the intensity of facial expressions is matched, with an advantage for angry faces in terms of accuracy and reaction times ($p < .001$).

Our results question the existence of a happy-face advantage in visual search tasks. Instead, a decisive role is played by the magnitude of the deformation of the face and its relationship with perceptual features. Further studies could test whether the apparent advantage of specific facial expressions reported in other tasks is explained by low-level features rather than emotional categories.

Author/s: Erika Bucci, Tommaso Maccario, Giacomo Handjaras, Giada Lettieri, Luca Cecchetti

Type: Mini-talks

An fMRI investigation on sensory-motor representations of audiovisual speech

Speaker: Rabini, Giuseppe

Track: Attention, perception and consciousness

Abstract

The interaction of sensory-motor features in the emergence of categorical audio-visual speech remains underexplored. Recent intracranial electrocorticography recordings suggest that discrete portions of dorsal premotor and motor cortices might represent acoustic phonetic features of speech. However, it is unclear whether pure acoustic or visual features are represented in these regions since these features are often described in terms of articulatory tracts.

This pilot study aimed at: (1) characterizing the interaction between sensory-motor phonological features in the psychological speech organization by comparing perceptual and categorical similarity patterns in Italian native speakers (2) test the preliminary hypothesis that audio-visual speech multimodally recruit auditory, visual and pre-/motor regions. Twenty-four participants identified and categorized audio-visual consonant-vowel signals based on phonetic or visemic features before undergoing an fMRI odd-ball task using the same stimuli.

Behaviourally, both tasks showed reliance on visual (lip-shape) information, suggesting that visual information plays a key role in speech perception and categorization despite the sensory modality speech is conveyed with. Neurally, we observed that both auditory and visual speech information recruited auditory and visual regions in the superior temporal gyrus and middle occipito-temporal junction, as well as in a portion of the pre-/motor cortex overlapping with area 55b, recently described as an area that participates in the coordination of complex behavior, regardless of specific body parts involved. These observations provide a first attempt to better characterize the nature of phonological representations by taking into account the interactions between sensory-motor features of speech and extending the research scope beyond unisensory auditory regions.

Author/s: Giuseppe Rabini, Mirko Tommasini

Type: Mini-talks

Continuity between the real and virtual body during action observation enhances motor cortical excitability

Speaker: Frisco, Francesca

Track: Attention, perception and consciousness

Abstract

The sense of body ownership (i.e., the belief that the body belongs to oneself) is fundamental in body perception, involving the integration of different sensory inputs. Virtual Reality (VR) manipulations facilitate the alteration of body ownership.

Notably, a decrease in ownership sensations occurs over the virtual body in the presence of a visual discontinuity between the hand and the body of the avatar. Recent research further revealed how bodily illusions can manipulate body ownership, concurrently leading to changes in motor cortex excitability.

Here, we hypothesized that the degree of body continuity between one's physical body and the observed virtual body may also impact motor cortex excitability during action observation. Specifically, we investigated whether observing virtual movements from a first-person perspective in different conditions of body continuity affects cortical excitability in the primary motor cortex (M1) using transcranial magnetic stimulation (TMS). Participants immersed in VR environments observed left-hand movements in three conditions that differed in the amount of body continuity between the real and virtual body (Full body; Upper Limb; Hand Detached). Motor Evoked Potentials induced by TMS pulses over the right M1 were recorded during action observation to measure motor cortex excitability. Embodiment sensations were assessed through a questionnaire.

Results showed that variation in body continuity affects embodiment sensations, along with increasing corticospinal excitability when virtual body continuity is higher (i.e., in Full-Body and Upper Limb compared to Hand Detached conditions). Embodiment sensations mediated this effect, supporting the crucial relationship between body perception and motor cortical excitability.

Author/s: Francesca Frisco, Marta Matamala-Gomez, Giacomo Guidali, Carlotta Lega, Alejandro Beacco, Nadia Bolognini, Angelo Maravita

Type: Mini-talks

Evaluating circadian pattern of executive functions through the Attentional Demands Task (AD-Task).

Speaker: Di Pompeo, Ilaria

Track: Attention, perception and consciousness

Abstract

Aim: To assess circadian fluctuations in healthy subjects in single attentional components (selective/divided) and switching between them, using the new AD-Task instrument. **Materials:** 18 participants (16 F) completed the AD-Task at different times of the day and were monitored on indices of sleep quality and sleepiness level. **Method:**

The entire experimental protocol was conducted over two days: on day 1 participants performed a brief familiarization phase with the AD-Task; on day 2 they assessed their sleepiness level and then performed the full version of the AD-Task at different times. Task execution took about 50 minutes, and performance was evaluated by considering both reaction time (RT) and accuracy indices (Hit Rate; d').

Results: All participants reported good sleep quality and stable subjective sleepiness indices. A repeated-measures ANOVA with the within-subject factors "TIME", "CONDITION" and "ATTENTIONAL DEMAND TYPE" showed an interaction effect between TIME and ATTENTIONAL DEMAND TYPE factors on all variables considered ($RT = F(3,51) = 13.958, p < .001$; $HIT\ RATE = F(3,51) = 5.362, p = .003$; $d' = F(3,51) = 14.332, p < .001$).

Post-hoc analyses revealed better performance for both RT and accuracy in selective attention than in divided attention. In addition, a good sensitivity to circadian fluctuations was more evident in divided attention, which showed greater difficulty in achieving optimal performance in the early morning and post-lunch phase, than in selective attention, which maintained a more stable and optimal performance, peaking in the late morning.

Conclusions: In the circadian context, attentional components behave differently, and the AD-Task effectively measures both selective and divided attention.

Author/s: Ilaria Di Pompeo, Martina Marcaccio, Simone Migliore, Giuseppe Curcio

Type: Mini-talks

How much information does the brain need to recognize a face? An ERP study with dynamic stimuli.

Speaker: D'Anselmo, Anita

Track: Attention, perception and consciousness

Abstract

The N170 is a reliable electrophysiological marker reflecting a brain response specifically associated with facial encoding. Although numerous studies have focused on recording cortical activity related to face perception, most of them have used images that suddenly appear at a fixation point, largely disregarding ecologically valid contexts where a face might appear gradually.

The aim of this study is to analyze the time course of the N170 during the perception of a face that gradually reveals itself to the observer. An EEG experiment was conducted, extracting event-related potentials (ERPs) elicited by faces in a group of 20 participants. In a dynamic condition, a square moved horizontally across the screen, gradually revealing (over 1 second) the full identity of a face beneath it. In a static (control) condition, a stationary square was presented and suddenly replaced by a face for 1 second.

In addition to confirming the N170 in the static condition, results reveal a negative peak of reduced amplitude around 220 ms (with approximately 20% of the face visible), followed by a second negative peak around 320 ms (about 30% of the face visible), of greater amplitude than the first peak. These findings suggest that in the brain's process of identifying a gradually appearing face, an initial partial recognition may occur based on 20% of the facial information, followed by complete recognition of the stimulus when 30% of the face is visible.

Author/s: Anita D'Anselmo, Giulia Prete, Gianluca Malatesta, Chiara Lucafò, Daniele Marzoli, Luca Tommasi
Type: Mini-talks

Sensitivity to ct-mediated affective touch and vagal reactivity: a study on patients with mild cognitive impair due to alzheimer's disease

Speaker: Zanini, Ludovica

Track: Attention, perception and consciousness

Abstract

Affective Touch (AT) is an affective tactile submodality mediated by C-tactile (CT) fibers, which respond to slow caress-like stimuli, evoking a pleasant sensation and promoting an increased Heart Rate Variability (HRV).

According to Braak's classic model, the neurodegenerative process in Alzheimer's Disease (AD) only affects the somatosensory cortices in advanced disease stages, whereas the processing of complex sensory stimuli, such as AT, may already be impacted in prodromal phases. 20 biomarker-tested patients with Mild Cognitive Impairment (MCI) due to AD and 20 age and sex matched controls were enrolled in the current study. All participants initially underwent quantitative sensory testing for the assessment of tactile sensitivity, tactile acuity, nociception, and interoception.

The classic AT protocol was then used to assess the preference, in terms of pleasantness, between CT-optimal stimulations (3cm/s) and non-CT-optimal stimulations (30cm/s). Lastly, the behavioral (in terms of pleasantness) and psychophysiological (in terms of HR and HRV) responses to 16 minutes of CT-optimal stimulations were evaluated.

No group-differences emerged in the initial screening. Despite both groups rating CT-optimal stimulations as more pleasant, a specific alteration of the response to prolonged stimulations was observed in MCI patients, characterized by a reduced pleasantness perception and by an unvaried HRV index.

The results indicate that an altered sensitivity to AT and a reduced vagal reactivity to affective stimuli may represent a prodromal marker of pathological cognitive decline.

Author/s: Ludovica Zanini, Fabrizia D'Antonio, Antonella Di Vita, Grazia Fernanda Spitoni, Cecilia Guariglia

Type: Mini-talks

Sensory habituation's role in eating behavior

Speaker: Catania, Angela

Track: Attention, perception and consciousness

Abstract

A factor that influences the sense of satiety and hunger control during food intake is sensory habituation, defined as a reduction in physiological response to the repeated presentation of food over time.

The aim of this research is to examine the relationship between perception and habituation profiles in response to stimuli of various types, not necessarily food-related, and tendencies toward disordered eating behaviors. To this end, a group of female participants aged 18 to 40, without diagnosed eating disorders (ED), was asked to complete a questionnaire measuring hyper- or hypo-sensory sensitivity (Sensory Perception Quotient, SPQ-35), a questionnaire on sensory habituation (Sensory Habituation Questionnaire, S-Hab-Q), and a questionnaire assessing ED behaviors (EDI-3). Given the frequent association between ED and altered sensory processing in individuals with autism, we also investigated autistic traits in the sample using the Ritvo Autism Asperger Diagnostic Scale (RAADS-R).

The results showed that a longer habituation time to sensory stimuli, particularly tactile, olfactory, and gustatory, was associated with higher scores on the EDI-3 subscales for drive for thinness and body dissatisfaction. Sensory sensitivity and autistic traits alone did not account for these scores.

These preliminary findings suggest that altered sensory habituation profiles may play a role in mediating ED and could represent a potential intervention target.

Author/s: Angela Catania, Alessia Santostefano, Vincenza Tarantino, Noemi Passarello, Laura Mandolesi, Massimiliano Oliveri, Patrizia Turriziani

Type: Mini-talks

The breadth of retrospective spatial attention is modulated by the vividness of the trace in visual short-term memory.

Speaker: D'Angiò, Monia

Track: Attention, perception and consciousness

Abstract

The duration and vividness of the memory trace in visual short-term memory stages remains a debated issue in consciousness studies. The present study sought to investigate which is the fate of a trace stored in visual short-term memory when time passes and how retrospective spatial attention interacts with this process.

Twenty subjects performed a change detection task in which the focus of attention during encoding was manipulated using a spatial pre-cue (i.e., left or right arrow). After the presentation of the memory array, the appearance of the retro-cue could either direct internal attention in accordance with the side of the screen indicated by the pre-cue (i.e., valid) or to the opposite side (i.e., invalid). In both valid and invalid conditions, the retro-cue could point toward a probe item that was placed at the extreme left or right (i.e., peripheral) or at the mid-left or mid-right (i.e., central) part of the memory array.

Results showed differences in accuracy at 150 ms retro-cue delay for central and peripheral items in both valid and invalid conditions, while at 600 ms and 1200 ms retro-cue delay differences in central and peripheral items were only found for the valid condition.

These results may give insights on the mechanism of retrospective spatial attention, suggesting that when time passes, the memory trace in short-term memory start to fade out, the breadth of internal attention progressively narrows, and it is no longer possible to retrieve items that are outside the focus of attention.

Author/s: Monia D'Angiò, Salvatore Gaetano Chiarella, Luca Simione, Antonino Raffone

Type: Mini-talks

The developmental trajectories of adaptive cognitive control in typically developing children

Speaker: Stefanelli, Giulia

Track: Attention, perception and consciousness

Abstract

Adaptive cognitive control (CC), a flexible interplay between reactive and proactive CC modalities, changes during development. Previous studies employed separate tasks to investigate the effect of contextual predictability on adapting distinct mechanisms of CC, including shifting, response inhibition or control interference. However, less is known about the developmental trajectories of adaptive CC in more demanding experimental environments requiring to both implement visuo-spatial attentional control and motor response inhibition. The present study delves into the developmental trajectories of adaptive CC in 126 typically developing children and pre-adolescents (4-14 years olds) based on contexts' predictability manipulation.

We used the Addy game, a cued-goNogo computerised task, in which a List-Wide Proportion Congruency manipulation was used to create Predictive (78% validity) and Non-predictive (50% validity) blocks. These were presented in fixed order across participants who were unaware about the manipulation. To assess how inhibitory control adapts to different predictive contexts 17% of the trials within each block were NoGo. Overall, we found that adaptive CC interacted with age in terms of attentional control. Indeed, a reaction time (RT) speeding-up for invalid trials occurred at all ages.

However, in preschool-aged children this implied slower RTs at valid trials, while only pre-adolescents efficiently adjusted RTs in both conditions.

However, only preschoolers showed lower noGo accuracy in predictive blocks, suggesting a reduced contextual-based response inhibition. In conclusion, for the first time we show that CC adaptation to contextual-based, implicit predictability follows distinct developmental trajectories for visuo-spatial attentional control and response inhibition.

Author/s: Giulia Stefanelli, Lisa Toffoli, Gian Marco Duma, Fiorella Del Popolo Cristaldi, Massimiliano Pastore, Vincenza Tarantino, Alberto Danieli, Giovanni Mento

Type: Mini-talks

Auditory spatial attention and music training

Speaker: Fucà, Giuseppe

Track: Attention, perception and consciousness

Abstract

Auditory spatial attention involves focusing processing resources on a specific location. Several studies addressed the issue examining different portions of the front space. Little is known about the distribution of attention throughout the whole surrounding space. Moreover, it's still unclear whether the benefits of music training observed on various cognitive functions also concern auditory spatial attention.

First, we investigated the attention effect across the whole surrounding space, using a Posner cuing task to assess the generalizability of existing attention distribution models to rear space. Second, we asked whether the spatial distribution of attention differs between musicians and non-musicians.

Participants performed a discrimination task with 6 speakers covering the 360°. Each trial consisted of a visual arrow cue, followed by an auditory target (either high/low pitch ring sound). On 2/3 of the trials, the cue was predictive of target location (valid trials), while on the remaining 1/3 the target appeared at uncued locations (invalid trials), with cue-target distances ranging between +/- 60° to +/-180°. On 6,25 % of the trials, the cue was non predictive (neutral trials).

For both groups, responses were faster for valid than invalid trials, and the distribution of attention across 360° space showed a quadratic shape with steeper speed decrease for shorter cue-target distances. Furthermore, shifting attention from the rear to the front space resulted in faster reaction times than vice-versa. Musicians were faster and more accurate in all conditions, but mainly on neutral trials.

Results may reflect a slower disengagement from the front anchor, due to a visual contribution to the spatial representation of the auditory scene. The observed quadratic shape of the attentional distribution confirms existing literature and extends its validity to the whole surrounding space. Moreover, the differences observed on neutral trials may indicate an advantage of musicians in spreading attention across the auditory scene.

Author/s: Giuseppe Fucà, Elena Gherri, Renata Galatolo

Type: Mini-talks

Inhibitory and heuristic mechanisms in voluntary rule selection

Speaker: Zivi, Pierpaolo

Track: Attention, perception and consciousness

Abstract

Sequential control of action relies on both cognitive control and decision-making processes. Flexible task control is also supported by inhibition of recently abandoned task sets so that performance is slower in N-2 task repetition sequences (e.g., ABA) versus N-2 task switch sequences (CBA). However, it is not clear whether the mechanisms supporting sequential control of task sets generalize to voluntary rule selection. Research on voluntary task-switching suggested that two competing heuristics – availability and representativeness – are actively involved in biasing task selection. The availability heuristic encourages a short-term memory-based preference toward the most active representation while the representativeness prompts a selection strategy based on a top-down, long-term, representation of sequences.

Using an ad-hoc rule-shifting paradigm, we have previously found that participants show reduced preference in selecting rules that have been recently relevant (N-2 alternation bias). To dissociate inhibitory and heuristic accounts of such a preference, we manipulated the occurrence of N-2 rule repetitions and/or the relative frequency of rules.

The preliminary results show that while rule selection seems to adjust to the base-rate frequency of rules, the occurrence of N-2 repetition sequences further modulates the N-2 alternation bias and the effect of frequency. These findings may suggest the selective contribution of inhibitory and heuristic mechanisms in voluntary rule selection.

Author/s: Pierpaolo Zivi, Anna Zigrino, Rebecca Minafra, Fabio Ferlazzo, Stefano Sdoia

Type: Mini-talks

Investigate the relationship between religiosity and non-clinical auditory hallucinations.

Speaker: Lucafo', Chiara

Track: Attention, perception and consciousness

Abstract

Auditory hallucinations (AH: hearing voices in the absence of external stimuli) are present in many psychiatric conditions, but they are also relatively common in the healthy population (4-15%). Unlike clinical AH, in the healthy population these experiences are often described as positive, non-intrusive experiences or as a way to feel connected with "someone else." We investigated the frequency and phenomenology of non-clinical AH and their potential relationship with religiosity, depression, and anxiety.

Data collected online from around 700 healthy participants aged 18 to 40 (51% believers) showed that less than 10% of the sample reported never having experienced any hallucinatory/paranormal phenomena. A hierarchical linear regression analysis on the propensity to experience non-clinical AH (step 1: demographic variables; 2: negative religiosity, e.g., fear of divine punishment; 3: positive religiosity, e.g., feeling protected by divine entities; 4: anxiety; 5: depression) showed that demographic variables explained 10% of the variance (younger age and female gender were associated with greater AH).

Regarding religiosity measures, only the negative component significantly predicted AH (positive component was non-significant), and finally, high levels of anxiety and depression were significantly associated with a greater propensity for experiencing AH. Overall, the final model explained nearly 30% of the variance, indicating a complex relationship between non-clinical auditory hallucinations and religiosity, revealing that other factors, such as anxiety and depression, play a crucial role in this phenomenon.

Author/s: Chiara Lucafo', Irene Ceccato, Gianluca Malatesta, Anita D'Anselmo, Rocco Palumbo, Nicola Mammarella, Alberto Di Domenico, Luca Tommasi, Giulia Prete

Type: Mini-talks

Selective attention on the court: a study on basketball and volleyball

Speaker: Perrone, Simona

Track: Attention, perception and consciousness

Abstract

Attention is crucial in all sports. However, sport-specific cognitive benefits remain quite unexplored.

The present research aimed to investigate selective attention benefits of expert athletes compared to non-athletes. Two studies were conducted, the first examining invasion sports, i.e. basketball players, and the second focusing on non-invasion sports, i.e. volleyball players. The Flanker task and a Visual Search task were administered to assess spatial-based and feature-based selective attention, respectively. It is hypothesized that future-based attention is particularly relevant in invasion sports to continuously identify and select teammates over opponents distinguished by specific visual features, such as jersey colours.

The results confirmed our hypothesis and revealed an advantage of basketball players in feature-based attention compared to the control group. Conversely, in the second study, no advantage was found in the group of volleyball players. In addition, there was no difference in spatial selective attention between athletes and non-athletes in either study.

In conclusion, the results showed sport-specific effects on selective attention, but only in the feature-based component.

Author/s: Simona Perrone, Luca Bovolon, Marco Petilli, Carlotta Lega, Luisa Girelli

Type: Mini-talks

Susceptibility to distracted driving: the role of personality and individual factors

Speaker: Tinella, Luigi

Track: Attention, perception and consciousness

Abstract

The study aimed to investigate associations between the Big Five personality dimensions with the susceptibility of distracted driving (i.e., engagement in voluntary distraction, attitudes toward distraction, and susceptibility to involuntary distraction) comparing samples of Australian and Italian drivers.

Distracted driving remains a significant global challenge to road safety, contributing to the occurrence of motor-vehicle crashes with serious consequences on public and environmental health. Despite efforts to explore factors underlying distracted driving, less is known on the role of the driver's personality in affecting the tendency to report distraction. Five hundred and fifty-one participants (55% females) from Australia and Italy completed an online survey including questionnaires on personality and distracted driving.

The invariance of the tested model was assessed through a multigroup path analysis considering personality traits as predictors and different facets of the susceptibility to distracted driving as outcomes, in a unique model. The effects of age, gender, and education were also controlled in the analyses.

Results showed differences among nationality groups in personality traits as well as in susceptibility to distraction. Findings also suggested positive effects of Neuroticism, Extraversion, and Agreeableness on all dimensions of susceptibility to distracted driving. Conscientiousness was found to affect attitudes toward distraction, perceived control, and perceived social norms. Finally, the tendency to report susceptibility to involuntary distraction was influenced by Openness only.

These results provide insights on the usefulness of the assessment of a personality profile to achieve road safety improvements and represent a valuable source of knowledge for the study of individual risk-exposure.

Author/s: Luigi Tinella, Alessandro Caffò, Andrea Bosco, Antonella Lopez, Sergio Traficante

Type: Mini-talks

The Deviation of Gaze Direction and the Reverted Congruency Effect: Analysis of the Eye Contact and Joint Attention Hypotheses

Speaker: Marotta, Andrea

Track: Attention, perception and consciousness

Abstract

The human ability to perceive the direction of others' gazes is fundamental for social interactions and may involve specialized attentional mechanisms. In a study utilizing a variant of the spatial Stroop task, Marotta, Caballero, and Lupiáñez (2018) observed that gaze, unlike arrows, produce a reverted congruency effect (RCE), with shorter reaction times in incongruent conditions compared to congruent ones.

Two main hypotheses have been proposed to explain this phenomenon: the eye contact hypothesis, which suggests that participants interpret an incongruent gaze as directed towards them, thereby facilitating response; and the joint attention hypothesis, according to which an incongruent gaze is perceived as directed towards the fixation point, activating a sharing of attention. To discriminate between these hypotheses, an experiment was conducted using a gaze deviated by 15° or 40° as the target stimulus. It was assumed that a 15° deviation might promote the perception of eye contact, while a 40° deviation might foster joint attention.

A greater RCE was observed in the 15° condition compared to the 40° condition, with results more consistent with the eye contact hypothesis than the joint attention hypothesis.

Author/s: Andrea Marotta, Jeanette Chacón-Candia

Type: Mini-talks

The Left-to-Right Valence Mapping affects the Posner Cueing Task: on the independent contribution of reflexive and voluntary mechanisms of covert orienting of attention

Speaker: D'Atri, Federico

Track: Attention, perception and consciousness

Abstract

Cue-to-target spatial correspondence in the Posner cueing task is known to facilitate responses under conditions of short asynchrony between a peripheral cue and a target shape. How this benefit is modulated by target properties, such as faces expressing either the most positive or negative emotion in a set, remains an open question.

We addressed this issue with the expectation that the spatial mental representation of valence from facial expressions of emotion may influence motor reactivity in a way consistent with a compatibility effect based on the left-to-right valence mapping of emotions. The results align with our expectations. Beyond a global facilitation of cue validity, the spatial correspondence between the target side and its left-to-right valence mapping captured attention, producing a larger left-to-right advantage for the most negative emotional target presented in the task (angry vs. happy face in Experiment 1, neutral vs. happy face in Experiment 2a, angry vs. neutral face in Experiment 2b).

This effect can be accounted for by a novel chronometric framework that allows the extraction of the independent contributions of two well-known encapsulated components of involuntary covert orienting of attention from response latencies: an endogenous and an exogenous latency component, the former directed towards the target and the latter towards the cue.

The results show that the left-to-right valence mapping impacts only the endogenous latency component. This supports a model of involuntary covert orienting involving strongly overlapping and intertwined reflexive and voluntary orienting mechanisms, with the latter depending on the target's properties.

Author/s: Carlo Fantoni, Federico D'Atri, Mauro Murgia, Valter Prpic

Type: Mini-talks

“Regulating my anxiety worsens the safety of my driving”: The Synergistic Influence of Spatial Anxiety and Self-Regulation on Driving Behavior

Speaker: Traficante, Sergio

Track: Attention, perception and consciousness

Abstract

Spatial Anxiety (SA) can be defined as the fear and apprehension experienced during tasks that require spatial thinking and may negatively impact the execution of daily actions. Although it has been explored in several research fields, limited research has explored the effects of SA on specific driving behaviours. In the current study, it was hypothesised that the severity of SA affects risky driving behaviours, and that this relationship is mediated by the driver's self-regulation abilities. Self-reported SA symptoms, driving self-regulation abilities, and risky driving behaviours (i.e., errors, violations, and lapses) were examined in 838 Italian drivers.

Data were analysed through linear regressions and path analysis models, controlling for sociodemographic variables. The results showed the negative effects of SA on driving errors and lapses. As hypothesised, a driver's self-regulation abilities mediated the influence of SA on driving lapses, but not on errors nor violations.

These findings suggest that the inclination to self-regulate the SA experienced while driving contribute to increase the occurrence of driving lapses. Showing specific pathways through which SA impacts risky driving, these results provide valuable insights for the development of 'driver-focused' road safety interventions and suggesting the implementation of training programs aimed to optimized drivers' self-regulation skills.

Author/s: Sergio Traficante, Luigi Tinella, Antonella Lopez, Sjaan Koppel, Elisabetta Ricciardi, Rosa Napoletano, Giuseppina Spano, Andrea Bosco, Alessandro Caffò

Type: Mini-talks

Age-related decline in spatial orienting of attention in physiological aging

Speaker: Pedale, Tiziana

Track: Attention, perception and consciousness

Abstract

Attention is a multifaceted process that involves several components, including alerting, orienting, and conflict resolution. These components have been extensively studied using the Attention Network Test (ANT), also to characterize attentional decline with physiological aging.

However, there are several inconsistencies in the literature regarding which components are most affected by aging. Here, we addressed this issue by administering the ANT to 60 healthy participants ranging in age from 62 to 90 years. Using a multivariate regression model, we asked whether increasing participant age predicts alerting, orienting, and conflict, while controlling for general participant performance in terms of both reaction times and accuracy.

For two of the three attentional components, the results showed a general and age-insensitive decline, i.e., an abolishment of the alerting effect and a large conflict effect, regardless of participants' age. In contrast, the amplitude of spatial orienting of attention was linearly predicted by increasing age. More focused analyses revealed a selective increase in the difficulty of shifting attention from the initial (central) to the target (peripheral) location as a function of increasing participant age.

Ultimately, these findings highlight the age-related difficulty in directing endogenous attention to task-relevant locations.

Author/s: Tiziana Pedale, Serena Mastroberardino, Nicola Tambasco, Valerio Santangelo

Type: Mini-talks

Behavioral and EEG correlates of implicit attention to positive and negative social words in a socio-emotional Stroop task

Speaker: Maiocchi, Carlotta

Track: Attention, perception and consciousness

Abstract

Studies based on the “emotional” variants of the Stroop task (eStroop) have shown that stimulus valence shapes response latency to salient stimuli. This modulation likely reflects the different implicit attentional capture by negatively vs. positively valenced words, with these stimulus categories being typically associated with longer and shorter response times (RTs), respectively, compared to neutral words. However, the existing evidence on the eStroop might be confounded by other semantic features of emotional words, and particularly their “social” content. It is therefore necessary to disentangle the effects of individual vs. social stimuli on implicit word processing when assessing the effect of different emotional stimuli on the eStroop task. On this basis, this study aims to examine the time course of these effects, and to investigate possible behavioral and neural differences that might correlate with more direct measures of attentional processing.

Thirty-four healthy participants underwent electrophysiological (EEG) recording while performing a socio-emotional Stroop including words of Italian language characterized by high arousal levels and differing in terms of semantic content (social/individual) and valence (positive/negative). Preliminary behavioral analyses confirm a facilitatory effect of processing positive, compared with negative, individual emotional words, and an opposite pattern when processing social emotional ones. Early and late ERP component analyses highlighted significant differences in the neural processing of individual emotional and social features compared to neutral stimuli, contributing to the observed behavioral patterns. These results provide insights into the neural circuits underlying the distinctive implicit attentional capture by social emotional, compared with individual emotional, target words.

Author/s: Carlotta Maiocchi, Claudia Gianelli, Maria Arioli, Nicola Canessa

Type: Mini-talks

Interplay between hypertension and heart rate variability in cognitive functions

Speaker: Forte, Giuseppe

Track: Attention, perception and consciousness

Abstract

Until now it has been difficult to examine the cognitive decline related to hypertension and to identify predictive variables of the progression to cognitive impairment in people with hypertension. With renaissance of heart rate variability as a marker of autonomic functionality, a series of researchers have underlined its role in cognitive functions.

In line with evidence about autonomic dysfunctions in patients with hypertension this study aims to investigate whether the autonomic response can serve as a marker for the development of cognitive impairment in hypertensives. Specifically, the role of HRV as an index of autonomic functions was tested to understand the interplay between heart rate variability and blood pressure and to determine whether there is a synergistic role in predict cognitive performance. We adopt a neuropsychological battery and measure resting HRV in people with and without hypertension.

The results evidenced the twisting association between the autonomic and cardiovascular systems on cognitive performance. A continuum from hypertension with autonomic dysfunctions to normotension without autonomic dysfunctions was evidenced.

In particular, a pattern characterized by high hypertension and low HRV could be considered as a biomarker for the development of cognitive impairment. Identifying novel vascular biomarkers of cognitive impairment may facilitate an earlier evaluation of cognitive decline in preclinical phases. Surely further studies are needed to understand this association better.

Author/s: Giuseppe Forte, Francesca Favieri, Maria Casagrande

Type: Mini-talks

Is parental overcontrol a specific form of child maltreatment? Insights from a resting state EEG connectivity study

Speaker: Lo Presti, Aurelia

Track: Attention, perception and consciousness

Abstract

Introduction: Childhood trauma (CT) includes various forms of child maltreatment, such as emotional, physical, and sexual abuse, as well as emotional, and physical neglect. Some authors have recently suggested to consider parental overcontrol as a specific form of child maltreatment. Although previous studies have reported alterations in the functional and structural architecture of large-scale brain networks in individuals with traumatic childhood experiences, the neurophysiological basis of parental overcontrol has not been adequately investigated.

To extend the current literature, the aim of the present study was to investigate the relationship between parental overcontrol and electroencephalography (EEG) functional connectivity in the Triple Network (TN) in a non-clinical sample (N= 71; 39 females, mean age 23.94 ± 5.89 SD). **Methods:** All participants self-reported maternal and paternal overcontrol, CT, and general psychopathology. EEG recordings were acquired in Resting State (RS) for 5 minutes with eyes closed, and the connectivity analysis was performed using the exact low-resolution electromagnetic tomography software (eLORETA). **Results:**

The results showed a significant positive correlation between maternal overcontrol and theta connectivity between the salience network and the central executive network. Maternal overcontrol remained independently associated with theta connectivity even after controlling for relevant confounding variables, including severity and general psychopathology. This association may reflect an increased predisposition to detect and respond to potentially threatening stimuli in the environment, which is typically associated with the experience of excessive control.

Conclusions: Our results support the hypothesis that parental overcontrol should be considered a specific form of child maltreatment and independent of the other forms traditionally investigated in the literature.

Author/s: Aurelia Lo Presti, Benedetto Farina, Claudio Imperatori, Giuseppe A. Carbone, Mauro Adenzato, Rita B. Ardito

Type: Mini-talks

The semantics of dreams: using NLP analysis to quantify dream content and its variations across individuals

Speaker: Elce, Valentina

Track: Attention, perception and consciousness

Abstract

The content of dreams appears to reflect the sleeper's experiences and concerns, but also their psychophysical well-being. We implemented Natural Language Processing (NLP) tools for the quantitative and reproducible analysis of dream content to investigate dream changes as a function of age and sex in a large cohort of participants.

Two-hundred healthy Italian individuals (87M, 18-70y) wore an actigraph and recorded their last dream experience each morning upon awakening for two weeks (1,620 reports). We trained an LSTM neural network on a subset of reports scored by four raters on 15 features, including perceptual contents, affective experience, and spatial-temporal features. The algorithm was used to predict those dimensions in the whole dataset. Moreover, we identified recurrent dream topics by measuring the cumulative frequency of semantically-related words within reports. Linear mixed-effect models were used to assess the correlation between dream features and demographic variables ($q < 0.05$, FDR correction).

We identified a negative correlation between age and the presence of social interactions and auditory experiences in dreams. Age positively correlated with visual content and spatial settings. We identified 21 recurrent topics, including work-related (20.5%) and educational (18.5%) contents, negatively-valenced affective experiences (18.5%), and animals (17.0%). References to violence and aggression increased in men and tended to decrease in women as a function of age.

NLP approaches allow for a quantitative, objective, and reproducible analysis of dream reports. We demonstrated significant dream content changes across the lifespan and as a function of sex, paving the way for further studies in clinical populations.

Author/s: Valentina Elce, Giorgia Bontempi, Bianca Pedreschi, Michele Bellesi, Giacomo Handjaras, Giulio Bernardi

Type: Mini-talks

Therapeutic Immersion: A Single-Subject Study on Virtual Reality Multisensory Experiences for Mitigating Body Disturbance in Anorexia Nervosa

Speaker: Brizzi, Giulia

Track: Attention, perception and consciousness

Abstract

Anorexia Nervosa (AN) is a mental health condition marked by reduced food consumption, intense fear of weight gain, and distorted body experience. Virtual Reality (VR) based techniques – i.e., Body-Swapping and Mirror Exposure techniques - offer promising avenues for addressing body disturbance in AN, allowing patients to embody virtual bodies varying in size and shape.

We used a single-subject experimental design (SSED) to explore the potential of virtual reality multisensory experiences for mitigating body disturbance in AN. We examine the case of a 24-year-old female hospitalized with restrictive Anorexia Nervosa, who underwent a novel body-focused VR intervention alongside the hospital's standard care. The intervention included six bi-weekly sessions, wherein the patient was immersed in a VR environment that allowed her to embody a virtual body matching a healthy weight range. Through interactions with a virtual mirror, the patient was encouraged to concentrate on the body's positive aspects and functional abilities, thinking about its significance in her past, current, and anticipated future activities (Functional Mirror Exposure). The intervention effectively reduced body dissatisfaction, negative beliefs and body misperception. These preliminary findings endorse the efficacy of using immersive, multisensory, and embodied experiences to alter body consciousness and body-self relationship.

Results then support the transformative potential of VR in improving traditional approaches to assess and alter body disturbance, both in terms of efficacy and therapeutical acceptance.

Author/s: Giulia Brizzi, Margherita Boltri, Giuseppe Riva, Rebecca Guglielmini

Type: Mini-talks

Uncovering ChatGPT's Narrative Identity through a Psycholinguistic Perspective.

Speaker: Gnerre, Martina

Track: Attention, perception and consciousness

Abstract

The present study investigates ChatGPT's self-description and world-description in both present and future contexts. A corpus of texts produced by ChatGPT was analyzed through Linguistic Inquiry and Word Count (LIWC) to detect the linguistic markers indicating self-concept, self-reflection, cognitive, emotional and social processes.

Repeated measures ANOVA unveiled significant differences. In self-description ChatGPT demonstrates a distinct sense of self, characterized by the prevalent use of first-person singular pronoun, authenticity, narrative-oriented mode of thinking (in contrast with a more analytical stance towards the world). It engages in deeper introspection and reasoning about its own identity compared to its perceptions of the external world. Unlike humans, ChatGPT displays increased confidence when projecting its identity into the future. Self-descriptions show heightened emotional expression, particularly in future-oriented contexts. Pro-social behaviour and evident social references are more frequent in self-description in the present. The prevalent use of first-person plural pronouns in future self-description suggests a perception of future identity as more interconnected with others.

These findings shed light on ChatGPT's description of itself and the world in two temporal contexts, providing valuable insights into the simulated cognitive and emotional capabilities of Artificial Intelligence.

Author/s: Martina Gnerre, Federica Biassoni

Type: Mini-talks

"Dynamical Accommodation of Overt Attention, Accuracy and Time in Modern Pentathlon Athletes during Laser Run Shooting"

Speaker: Sciarra, Dalila

Track: Attention, perception and consciousness

Abstract

Many sports require athletes to dynamically control their visual attention to achieve optimal performance, especially when under time-pressure. In this real-world eye-tracking study, we uncover the interplay between attention and performance in 11 Modern Pentathlon elite athletes of the Italian National Team during "Laser Run", which involves five blocks of shootings, each consisting of four series. In each series, athletes must score five valid shots and after that, in real competitions, they perform a run, which forces them to trade-off accuracy (how well they hit the target) and time (how fast they shoot).

Fixations acquired with a Tobii Pro Glasses 2 were time-locked to each critical shoot (when the trigger was pulled) and considered only if occurring within a single or spanning across multiple shoots. We found that higher accuracy and longer fixations increase the time to complete a shoot. However, athletes learn to dynamically adjust this trade-off between attention and accuracy across the shooting blocks, so significantly reducing their overall timings too.

Our results challenge the belief that fixation duration prior to a critical movement is predictive of performance (e.g., the quiet eye concept) and posit that attention needs to dynamically accommodate motor-actions in time-limited sport activities.

Author/s: Dalila Sciarra, Tommaso Palombi, Federica Galli, Alessandra De Maria, Dario Fegatelli, Moreno Coco, Fabio Lucidi

Type: Poster

A neurocognitive screening of the executive functions in Gambling Disorder: a preliminary study

Speaker: Angioletti, Laura

Track: Attention, perception and consciousness

Abstract

This study investigated the potential of a new executive functions assessment battery developed for evaluating cognitive-neuropsychological correlates in addictions, and its remote administration in a sample of patients with gambling disorder (GD).

The Battery for Executive Functions in the Addiction (BFE-A) comprises five neuropsychological tests aimed at measuring verbal short- and long-term memory, working memory, verbal and non-verbal cognitive flexibility, and focused attention - and a computerized Go/No-Go task modified with addiction-related stimuli to measure inhibitory control. Additionally, it includes a computerized Go/No Go task modified with addiction-related stimuli to measure inhibitory control.

The study compared results from an experimental sample of 13 GD-diagnosed patients recruited from ULSS 2 Marca Trevigiana, Servizio Dipendenze, Treviso, Italy, with a control sample of 13 healthy subjects. In the experimental sample, higher errors in verbal memory test repetition and lower word production in the verbal cognitive flexibility test were observed compared to controls. In the digitized Go/No Go task, GD reaction times were significantly longer than controls, particularly for neutral and addiction-related stimuli. Furthermore, higher impulsivity scores were found in the experimental sample compared to controls. Despite the exploratory nature of this study, the BFE-A demonstrated sensitivity in detecting alterations in memory and attentional bias observed in the inhibitory control task, alongside increased impulsivity, characterizing the executive deficits observed in GD.

These findings underscore the potential of the digital battery as a new remote neurocognitive screening tool, valid and easy to apply, capable of providing relevant information for planning structured rehabilitation interventions.

Author/s: Laura Angioletti, Michela Balconi

Type: Poster

Attentional processes in Parkinson's disease: a systematic review

Speaker: Blasutto, Barbara

Track: Attention, perception and consciousness

Abstract

Parkinson's disease (PD) is typically known as a neurodegenerative disorder affecting motor skills. It is characterized by the loss of dopamine-producing neurons in the substantia nigra and subsequent accumulation of Lewy bodies in the residual neurons. Although cognitive impairments are a significant aspect of PD, there has been limited investigation and analysis of these changes. This is despite the fact that they represent a highly disabling aspect for patients who experience them daily. In particular, attentional deficits and vigilance deficits appear to be significant determinants of the patient's quality of life. Therefore, the present systematic review aims to examine studies that have assessed the difference in these aspects, using several attentional tests, between subjects with PD and healthy controls (HC).

The systematic review was conducted in accordance with the PRISMA Statement method and 25 studies were included. The results indicate that individuals with Parkinson's disease (PD) exhibit mainly deficits in sustained attention, inhibitory control of distractors, identified as top-down deficits, and a general slowdown in reaction times. It has not been possible to identify the role played by dopaminergic therapy on attentional performance due to a paucity of studies comparing medicalized and non-medicalized patients. However, it is believed that an attention disorder may depend on alterations in dopaminergic circuits.

In light of these data, further studies should be conducted in order to gather more evidence on attentional functioning in Parkinson's and to better understand any influence of dopaminergic therapy.

Author/s: Barbara Blasutto, Ilaria Corbo

Type: Poster

Disentangling neural correlates and consequences of visual awareness through iconic memory: an EEG study

Speaker: Bonfanti, Davide

Track: Attention, perception and consciousness

Abstract

A widespread problem in studying the neural correlates of visual consciousness is the difficulty in disentangling the actual correlates of the visual experience from the neural consequences of such percepts. This study aims to elucidate the electrophysiological dynamics underlying visual experiences' consequences. To do so, a partial report paradigm was used to separate activity related to the conscious experience from that correlating with reporting.

Preliminary data has been collected from 5 participants. Stimuli consisted of six letters lasting 100 ms, circularly spread around a fixation cross, three on the left and three on the right. A specific acoustic tone immediately following the stimulus indicated if participants had to report the left or right letters. Participants had to report the correct side of the stimulus while the EEG was being recorded.

Preliminary results show that early ERP sensory components have similar amplitude across the two conditions (Report Right vs. Report Left). This is also true for the N200 component, often considered a visual awareness marker. P300, on the other hand, reaches a higher amplitude on the electrodes ipsilateral to the letters to report – i.e., left parietal electrodes show a more ample P300 in the Report Left condition.

The EEG components elicited by our partial report paradigm are comparable until the N200 across the two conditions, meaning that all the presented letters are available to consciousness. P300 differs between the two conditions, with a higher amplitude possibly reflecting an inhibitory mechanism for non-target letters, thus reflecting post-consciousness processes.

Author/s: Davide Bonfanti, Sonia Mele, Chiara Mazzi, Silvia Savazzi, Elena Bertacco

Type: Poster

Does home advantage and referee bias in association football depend on spectators?

Speaker: Colomba, Maria

Track: Attention, perception and consciousness

Abstract

In sports, the home advantage is the higher chance to win a game when playing home, while the referee bias is the referee decision bias in favor of the home team. During the pandemic period, a natural experiment occurred, due to the large number of matches played in absence of spectators.

Previous studies examined the effect of spectators on these phenomena on a relatively small number of matches; the present study aimed to explore how the presence/absence of spectators affected these two phenomena on almost 4000 football matches, from the first and second divisions of the UEFA top five ranked federations (Spain, England, Italy, Germany, France) in the 2020-21 season. As for the home advantage, the following variables were examined: distribution of match outcomes and home advantage for points; ball possession; total shots; shots on goal; corner kicks. As for the referee bias, the following variables were considered: fouls; yellow cards; red cards; penalty kicks; extra time. Chi-square tests were used to compare the distribution of match outcomes (vs. previous seasons with spectators), and t-tests to compare home vs. away data in the 2020–21 season for the other variables.

The results revealed that the absence of spectators significantly reduced the home advantage compared to previous seasons with spectators; however, a certain amount of home advantage still persists, probably due to the familiarity with local conditions and travel fatigue. The referee bias was not observed, suggesting that it mainly derives from the pressure normally exerted by spectators.

Author/s: Maria Colomba

Type: Poster

Long range contributions to temporal inversion judgements

Speaker: Buonocore, Antimo

Track: Attention, perception and consciousness

Abstract

Previous research has shown that visual stimuli presented across eye movements can distort time and space perception. Interestingly, introducing a full-field visual mask within 40 milliseconds after two brief visual events can reverse temporal judgments, even in the absence of eye movements. We explored whether the spatial characteristics of the mask could influence this temporal inversion effect. Specifically, we asked if a mask that was not superimposed on the visual stimuli was sufficient to induce the inversion illusion.

In Experiment one, participants judged the temporal order of a test/probe stimulus pair under three conditions: no mask, a full-field mask, or a partial-field mask covering only the top and bottom third of the screen, but not the stimuli location. Masks appeared at various intervals after the probe stimulus. The inversion effect was visible with both full and partial-masks when presented within 30 milliseconds of the probe. In control measurements (Experiment two), delaying the mask's presentation relative to the probe abolished the effect. Experiment three was identical to Experiment one, but this time the mask was presented either in the ipsilateral visual field as the stimuli or in the contralateral hemifield. Both positions triggered a temporal inversion effect, although weaker with the contralateral mask.

These findings suggest that the temporal inversion effect can be reliably induced also by masks not overlapping with the stimuli, indicating that the effect might be linked to a non-spatial signal, coupled with mask presentation timing.

Author/s: Antimo Buonocore, Maria Cuomo, Martina Maresca, Alessio Fracasso

Type: Poster

Objects Processing with egocentric hands: a handle-to-hand correspondence effect investigation

Speaker: Pellicano, Antonello

Track: Attention, perception and consciousness

Abstract

In a choice-reaction task, performance is typically faster and more accurate when the orientation of the graspable portion of a tool corresponds to the position of the manual response (handle-to-hand correspondence effect). According to an updated explanation in terms of “affordance activation”, the handle, visually salient or not, would activate an appropriate grasping action of the hand aligned to it. According to a different line of research, motor responses are facilitated for objects presented close to the palm of one hand relative to close to its back. In the former case, objects would become candidates for action by receiving more in-depth processing (hand functional proximity effect). In an effort to merge the two domains, the present study tested the hypothesis that tool processing in association with egocentric hands is crucial for the activation of affordances. Images of tools with the handle to the left or right were coupled with images of hands.

Participants pressed a left or right key with their left or right hand, to the picture of a left or right hand, respectively, whether aligned with the tool handle or not. The picture hands could have a grasping pose-Experiment 1, a palm pose-Experiment 2, a back pose-Experiment 3. affordance activation (and contextually handle-to-hand correspondence effect) should have been produced with grasping hands (to a greater measure) and palm hands, but not with back hands. However, the effect was also significant with hand-back and of similar size in the three conditions.

The results are in accordance with a basic directional stimulus-stimulus congruency effect (Stroop-like) generated by an abstract spatial coding of depicted hands and tools.

Author/s: Matilde Mariabarbara Torrisi, Iring Koch, Usman Shaikn, Ferdinand Binkofski, Antonello Pellicano

Type: Poster

Resisting distraction during goal setting: insight from neurophysiological and behavioral data

Speaker: Balconi, Michela

Track: Attention, perception and consciousness

Abstract

In professional settings, interruptions can frequently disrupt tasks, necessitating adaptive control processes and focused attention to meet deadlines effectively. This research explored the behavioral and electrophysiological (EEG) markers of professionals' capacity to resist distractions during a goal setting task, and their adaptability and willingness to adjust a previously determined time schedule. 33 professionals undertook the three phases of the Time for Goal task (T4G): Distractor Resistance (DR), Time Confidence Assessment (TCA) and Time-to-Action Adjustment (TAA).

Three scores were derived from these phases (DR, TCA, and TAA). During the RD phase EEG activity of delta, theta, alpha, and beta frequency bands, was recorded continuously. Participants also filled in the 10-item Big Five Inventory (BFI). The findings revealed decreased beta band power in the post-distractor phase compared to the pre-distractor phase over both frontal regions. Conversely, increased beta band power was observed in the post-distractor phase compared to the pre-distractor phase in the right temporoparietal junction (rTPJ). Correlations between the EEG workload index (calculated from the ratio of post/pre-distractor EEG data) showed a negative correlation between the DR score and EEG beta workload index in the right frontal area and a negative correlation between the TAA score and EEG alpha workload index in the rTPJ. Additionally, a negative correlation was shown between Emotional Stability trait scores and the TAA score.

This study identified a specific activation pattern associated with the ability to resist distractions, highlighting a crucial role for both the beta band and rTPJ in attentional processes and cognitive control.

Author/s: Michela Balconi, Laura Angioletti, Roberta Antonia Allegretta

Type: Poster

Skin temperature changes in response to body ownership modulation through mirror-box illusion: a preliminary EEG study

Speaker: Gorrino, Irene

Track: Attention, perception and consciousness

Abstract

Recent studies have revealed intriguing links between experimental manipulation of body ownership and changes in autonomic responses, including skin temperature changes. However, the mechanisms underlying this interaction remain unclear.

The aim of the present study is to investigate the electroencephalographic correlates of body ownership manipulation and skin temperature changes.

The Mirror Box Illusion (MBI) was applied to manipulate the sense of ownership of upper limbs, while 64-channel EEG was continuously recorded and skin temperature was measured before and after the MBI with a thermal imaging camera, along with assessments of explicit ownership judgments and proprioceptive drift.

The results showed that hands temperature significantly decreased after the synchronous compared with the asynchronous condition.

Moreover, comparison of proprioceptive drift showed a significant difference indicating a larger left-hand position displacement towards the mirror on the right in the synchronous condition compared with the asynchronous condition.

Cortical responses were analysed using cluster-based tests, and Independent Components Analysis (ICA) was used to investigate EEG-derived brain sources. Preliminary results revealed different modulations at 300 -500 ms time range between synchronous and asynchronous conditions in left and right motor cortex.

These findings not only contribute to our understanding of how changes in body perception can influence physiological responses, but also highlight the importance of multisensory integration in shaping our sense of embodiment and provide valuable insights into the underlying neurobiological mechanisms, thus opening avenues for further research in neuroscience and cognition.

Author/s: Irene Gorrino, Francesco Crottini, Gabriella Bottini, Gerardo Salvato, Giulia Mattavelli

Type: Poster

Smartphone e processi cognitivi: uno studio sperimentale sull'effetto brain drain

Speaker: Manara, Claudia Virginia

Track: Attention, perception and consciousness

Abstract

A seminal study by Ward and colleagues (2017) showed that the mere presence of the smartphone (placed on the table vs. in another room) appeared to interfere with cognitive performance ('brain drain effect', Ward et al., 2017).

Several replication attempts failed to confirm the original findings, thus questioning the very existence of the brain drain effect. The present study aimed to conceptually replicate the experiment of Ward and colleagues (2017), using the smartphone abstinence paradigm to increase its salience and, consequently, to emphasize the brain drain effect. Participants were required to hand over their smartphones to the experimenters and remained abstinent for approximately five hours, during which they could study or read.

At the end of the abstinence period, participants performed cognitive tasks after being randomly assigned to one of two conditions (the same as Ward et al., 2017): one group performed the tasks with their smartphone switched off next to them; the other group performed the tasks with their smartphone in another room. Although an increase in abstinence over time was registered [$F(2, 186) = 13.3$, $p < 0.001$; $h^2p = 0.125$], no brain drain effect emerged. Thus, the discussed brain drain effect does not seem to emerge even when the salience of the device is emphasized through abstinence.

The results are in line with studies questioning the very existence of this effect (Hartmann et al., 2020; Pardo et al. 2022).

Author/s: Claudia Virginia Manara, Serena Mingolo, Tiziano Agostini, Fabrizio Sors, Mauro Murgia

Type: Poster

Swimming with piranhas will not make you go so far, at least for what concern operant conditioning tasks: a preliminary investigation in *Pygocentrus nattereri*

Speaker: Quaresima, Desideriabruna

Track: Attention, perception and consciousness

Abstract

Most of the studies on the cognitive abilities of fish focused on models organisms adopted in behavioural neuroscience. To date, little attention has been devoted to characiformes fish and we record a lack of cognitive investigation on the piranha. In the present study, we aimed to assess whether red-bellied piranhas (*Pygocentrus nattereri*) can solve an automated operant conditioning task like the one used with mammals, birds, and other fish. Subjects underwent two colour discrimination tasks: first, fish were required to discriminate between red and green; second, fish had to discriminate between white and yellow.

We found no evidence of learning capacities after extensive training exceeding one thousand trials overall. This preliminary observation suggests that piranhas may be limited in their capacity to cope with automated operant conditioning devices. We call for a further investigation of learning abilities in characiformes fish.

Author/s: Desideriabruna Quaresima, Alessandra Pecunioso, Christian Agrillo

Type: Poster

The influence of spatial frequencies, orientation and familiarity on the integration of face stimuli

Speaker: Federico, Giovanni

Track: Attention, perception and consciousness

Abstract

When we observe an object, our visual system identifies its general shape and adds specific details to form a coherent representation. This coarse-to-fine approach involves quick processing of low spatial frequency content (LSF) to generate a basic template, which aids the integration of the more detailed high spatial frequency information (HSF). In three experiments, we explored how LSF and HSF are integrated, leveraging on the face inversion effect, whereby inverted faces are more difficult to recognize than upright ones.

In Experiment 1, eight participants determined the gender of unfamiliar faces with different orientation. Results showed that identification accuracy for HSF faces was lower than LSF or unfiltered faces. In Experiment 2, fourteen participants matched two familiar faces displayed in succession. The template and the sample shared either the same SF (congruent) or had complementary SF (incongruent). In congruent conditions, HSF templates tend to be better than LSF templates. However, in the incongruent conditions mapping a LSF sample on an HSF template was more effective only for upright faces. In Experiment 3, six participants performed the same task but with unfamiliar faces.

The overall accuracy was better for congruent than incongruent conditions, and it was not dependent on template's SF. According to the coarse-to-fine model, LSF content provides a template to integrate HSF information. However, our results challenge this view, suggesting instead a flexible encoding of SF information, depending on task and image contingencies.

Author/s: Giovanni Federico, Maria Cuomo, Alessio Fracasso, Antimo Buonocore

Type: Poster

The raw and the cooked: an oculomotor investigation of attention to food

Speaker: Guarino, Filomena Rita

Track: Attention, perception and consciousness

Abstract

In an eye tracking and pupillometry study, we investigated the factors influencing attentional capture when individuals see food items. We suggest that the two core motivational systems, namely Wanting (i.e., the desire for food and meal selection) and Liking (i.e., the subjective pleasure and arousal evoked by food), modulate attentional processes in different ways.

Moreover, we hypothesized that two key factors influencing motivation and modulating attentional capture are the preparation of the food (e.g., raw vs. cooked) and its caloric content (e.g., high vs. low). To test these hypotheses, we presented 100 food images in two blocks: Multiple images block, where 4 different food items were shown together; and, Single image block, where each food item was presented alone. Importantly, we operationalized Wanting and Liking in terms of fixation durations and pupil dilation, respectively.

Additionally, participants were asked to provide explicit ratings for each food image both in terms of Liking and Wanting. Finally, participants completed the Eating Disorder Inventory-3, allowing us to explore potential relationships between the EDRC scale and our motivational measurements. The findings revealed that both food preparation methods and caloric content significantly modulated fixation durations and pupil diameter changes. Moreover, we observed that dwell time on a food item emerged as a valid predictor of subjective ratings of 'Wanting' but not of 'Liking'.

In addition, we observed an inverse relationship between the EDRC scale and fixation durations, suggesting a potential link between unhealthy eating habits and augmented concern about the body with attentional processing of food stimuli.

Author/s: Filomena Rita Guarino, Elena Gherri, Luisa Lugli, Bruno Laeng

Type: Poster

Cognitive conflict effects on stimulus processing and consequent memory performance.

Speaker: Ciarrocchi, Nicolò

Track: Attention, perception and consciousness

Abstract

The use of controlled processes to resolve cognitive conflict can have various effects on performance in memory tests. There are two theoretical hypotheses in this regard.

According to the "competitive" hypothesis, using controlled processes to resolve cognitive conflict will impair a deep stimulus encoding, and consequently its memory.

According to the "collaborative" hypothesis, the conflict requiring the use of controlled processes would favour the encoding and subsequent memory performance of the stimuli involved in it.

The study's objective is to investigate cognitive conflict effects and interactions (i.e., stimulus and response-level conflict) on memory performance and the role of encoding level in modulating that effect using different paradigms. Specifically, we took into consideration the paradigms often used in studying cognitive conflict effects on performance (i.e., task-switching, and Flanker). The preliminary results suggest that cognitive conflict effects seem to be independent of the level of stimulus processing. The task-switching paradigm seems to nullify both stimulus and response-level conflict effects on memory performance in favour of the effect of stimuli (i.e., target or distractor).

To conclude, the further cognitive effort required by the tasks seems to hinder cognitive conflict effects on memory performance.

Author/s: Nicolò Ciarrocchi, Pierpaolo Zivi

Type: Poster

Examining size constancy dynamics in perception and action

Speaker: Mazzi, Chiara

Track: Attention, perception and consciousness

Abstract

Our brain deals with visual impressions that change continually. Nonetheless, we experience the world as fairly stable. The neural basis of size constancy, i.e., the ability to achieve a stable experience of size even if the images projected onto the retina vary with viewing distance, remains largely unknown. In this study, we explored the temporal dynamics of the neural networks responsible for the size constancy of 3D objects when the object's size is judged compared to when the object is grasped by selecting an appropriate hand-size aperture.

To this aim, we recorded electroencephalography from 64 channels while a motion capture system tracked arm movements. Furthermore, we investigated the role of multisensory integration in size constancy under conditions where vision was restricted and, as such, it did not prevail over other sensory modalities. Specifically, by systematically removing visual depth cues, we assessed whether the contribution of proprioceptive distance cues changed as a function of the visuomotor system. Preliminary results highlighted greater early components following big target objects as compared to small target objects, regardless of the task. We also found task-related differences at a later time window, revealing a P2 component greater for size judgment than grasping.

These findings provide new evidence supporting the notion that size constancy for 3D real objects at actual distances takes place at early processing stages and that early visual processing remains unaffected by task demands.

Author/s: Chiara Mazzi, Elena Franchin, Anna Benamati, Elisa Roncarà, Paola Cesari, Irene Sperandio, Sonia Mele

Type: Poster

Relationship between creativity and psychiatric disorders

Speaker: De Sandi, Angelica

Track: Attention, perception and consciousness

Abstract

Introduction. Creativity is the capacity to conceive original ideas, solutions, and new concepts, this includes divergent thinking, defined as the ability to think outside of established patterns¹. Previous studies had examined the connection between creativity and schizophrenia, but the results were heterogeneous and contradictory².

In this study, we aim to explore the association between creativity and psychiatric disorders using the Divergent Thinking Test (DTT).

Methods. 20 patients with schizophrenia (SCZ), 28 with psychiatric disorders other than schizophrenia (PDoS) and 38 healthy subjects (HS) performed the DTT, which includes five factor scores: fluidity (FL), flexibility (FS), originality (O), elaboration (E), title (T). Linear models were used for comparisons between groups.

Results. The results showed that SCZ patients performed significantly worse on DTT-total when compared HS [(mean±SE) SCZ vs HS: 72.37±4.83 vs 88.47±3.40, $p=.027$], with no other comparisons yielding significance (PDoS vs. HS: $p=.273$; SCZ vs. PDoS: $p=.775$).

Conclusions. Regarding the type of diagnosis, performance on the DTT task is significantly lower in schizophrenic patients than in patients with another psychiatric disorder, suggesting the existence of a negative association between creativity and schizophrenia.

Author/s: Angelica De Sandi, Giordano D'Urso, Edoardo Nicolò Aiello, Mariachiara Calloni, Denise Mellace, Angelica Marfoli, Gaia Del Prete-Ferrucci, Fabiana Ruggiero, Francesca Mameli, Eleonora Zirone, Barbara Poletti, Sergio Barbieri, Alberto Priori, Roberta Ferrucci

Type: Poster

The dynamic duo of reactive control: Do two reactive control mechanisms exist?

Speaker: Viviani, Giada

Track: Attention, perception and consciousness

Abstract

According to the Dual Mechanism of Control (DMC), two cognitive control mechanisms exist, proactive and reactive control. Nonetheless, our recent electrophysiological findings potentially pave the way to three mechanisms, with two of them falling under reactive control: an early one engaged before conflict based on stimulus-attention associations and a late one engaged after conflict detection to solve response conflict.

We thus preregistered a behavioural study (<https://osf.io/g2s5j/>) to explore the interplay between these reactive mechanisms in resolving conflict in a spatial Stroop task. To assess whether one exists even when the other is engaged, we manipulated them simultaneously. To do so, we manipulated the item-specific proportion congruency (ISPC), modulating early reactive control level based on the likelihood of conflict signalled by specific stimulus characteristics, and response conflict (RC), a novel manipulation modulating late reactive control level based on the relative probabilities associated to the co-activated responses, the correct and the irrelevant ones.

We then used trial-level multilevel modelling analysis to test our a-priori hypothesis that they do not only co-exist, but also interact in an antagonist way: a higher early conflict resolution would leave less response conflict remaining to be solved.

Our results supported indeed the existence of two reactive control mechanisms, but they revealed that they operated independently in an additive way.

Author/s: Giada Viviani, Ettore Ambrosini

Type: Poster

The role of the cerebellum in gaze perception and social attention: a Transcranial Magnetic Stimulation study

Speaker: Manna, Gabriele

Track: Attention, perception and consciousness

Abstract

Eye gaze is a salient social cue we easily process and attend to when encountering a face. Current evidence shows that the neural bases of eye gaze perception and attention rely on the activity of the face processing network and the social brain (e.g., Superior Temporal Sulcus) and preliminary data suggest that also the cerebellum takes part in this circuit. In the present study, we aim to investigate the role of the cerebellum in gaze perception and social attention using Transcranial Magnetic Stimulation (TMS).

Participants were presented with faces with averted gaze and asked to perform a gaze discrimination task - assessing the direction of the eye gaze - and a gaze cueing task - localizing the position of an object congruent or incongruent with the eye gaze - while TMS was delivered over the cerebellum and control areas.

Preliminary results suggest a possible involvement of the cerebellum and provide additional evidence of its fundamental role in the social brain.

Author/s: Gabriele Manna, Chiara Ferrari

Type: Poster

Upper Limb Embodiment and the influence of Haptic, Thermal and Nociceptive Feedback – A Systematic Review

Speaker: Ingenito, Alessandro

Track: Attention, perception and consciousness

Abstract

Body representation is quite plastic and may even allow to incorporate external effectors, such as tools, prosthesis, or virtual avatars into our body representation.

The process of representing these elements as parts of us is known as ‘embodiment’. Various factors can improve the possibility of embodying an effector to the upper limb: among these, tactile feedback is recently acquiring relevance. Nonetheless, the impact of tactile feedback in its different forms on embodiment of external effectors to the upper limb is still ill-defined.

To have a clearer understanding, we systematically reviewed how nociceptive, thermal, or haptic (vibrotactile, pressured and force) feedback influences the embodiment of upper limb effectors in controlled studies. Sixty-eight studies acquired from the PubMed®, Scopus®, and ACM Digital Library® databases were included to perform this qualitative evaluation. Overall, although a disparity in the number of studies encountered across the various feedback forms, haptic and thermal feedback enhance the chances of incorporating an external effector, whereas nociceptive feedback is the least impactful modality on the sense of incorporation and more studies are necessary to assess its role.

This systematic review sheds light on the importance of delivering different forms of tactile feedback to achieve the highest form of embodiment, which can be of extreme usefulness in the field of prosthesis and virtual reality.

Author/s: Alessandro Ingenito, Viviana Betti, Emiliano Ricciardi

Type: Poster

Virtual reality in affective disorders: a pilot study on cognitive performance and electroencephalographic correlates of depression

Speaker: Floris, Matilda

Track: Attention, perception and consciousness

Abstract

Depression, one of the most frequently diagnosed conditions, leads to significant cognitive deficits and comorbidity. In recent decades, scientific research has focused on biomarker identification and technological advancements like virtual reality (VR) for diagnosis support.

This study evaluates the role of theta band power recorded through a Geodesic cap during 5 minutes of resting state, linked to cognitive performance obtained in the Trail Making Test (TMT) A and B and the N-Back, performed by participants in a VR environment.

The sample consists of 15 university students with depressive symptoms ($PHQ - 9 \geq 9$) and 15 healthy controls ($PHQ - 9 \leq 5$). The results show a statistically significant difference in the number of errors made in the TMT-A ($p = .034$), while no differences were recorded in theta band power. Subsequently, a hierarchical linear regression analysis was conducted through two models, to evaluate the role of depressive symptoms and of theta band power in the prediction of the errors made in the TMT-A. The Model 1 analyzed the role of Relative Theta Power, while the Model 2 considered the Absolute Theta Power. Both models showed that only the depressive symptoms can predict errors made in the TMT-A (Model 1: $p = .030$, Model 2: $p = .020$), contrary to theta band power.

Moreover, the Akaike Information Criterion shows that Model 2 is preferable to Model 1. Overall, findings partly align with existing literature, highlighting the need for further studies.

Author/s: Matilda Floris, Claudio Gentili, Francesca Mura, Gaetano Valenza

Type: Poster

“Thinking outside the box”: Exploring the effect of Local-Global Processing Styles in Creative Generation and Evaluation.

Speaker: Esposito, Clara

Track: Attention, perception and consciousness

Abstract

Creativity is defined as a process that involves both generation and evaluation of ideas. Cognitive style refers to how people acquire, organize, and use information and is related to creativity. Amongst all cognitive styles, the explanatory power of the field-dependent (global) or independent (local) cognitive style has been widely recognized. Unlike field-dependent subjects, field-independent individuals usually show less difficulty in separating information from the surrounding context, and are generally more focused on relevant information, inhibiting attention to the environment. Through two different tasks, we explore how individuals' cognitive style influence their approach to generating and assessing creative ideas.

This study employs a multifaceted approach to assess creativity and cognitive styles, specifically through the Navon Task. In this task, participants are presented with large letters comprised of smaller letters, and are asked to identify either the large letter (global task) or the smaller letters (local task). Moreover, participants complete the Creativity Evaluation Task to evaluate the capacity for discernment between common, inappropriate, and genuinely creative ideas and the Alternative Uses Task to assess creative production by prompting participants to generate alternative uses for a common object. While in the CET participants should judge already produced ideas about alternative uses of common objects for their novelty and appropriateness, in the AUT they produce ideas which are then evaluated for originality, flexibility, and elaboration.

All tasks were digitized and administered using the PsyToolkit platform, ensuring standardized administration. Currently, the study is actively engaged in the data collection phase, wherein participants are undergoing cognitive assessments and completing the designated tasks.

Author/s: Clara Esposito, Luca Simione, Antonella Cavallaro, Emilio Saviano

Type: Poster

Art & Environment: the evaluation of beauty and meaning between art and nature, and their effects on environmental intentions and behavior.

Speaker: Naddei Grasso, Eduardo

Track: Attention, perception and consciousness

Abstract

Environmental issues represent one of the most important topics on the world's political agendas today. Specific features of art, such as its ability to evoke emotions or the space for reflection offered to the spectator, are said to differentiate this form of communication from standard climate change communication (Klöckner, 2015), functioning as an emotional motor of behavior change (Roosen et al., 2017). However, little empirical evidence exists that directly addresses the impact of art on environmental behavior (Blasch & Turner, 2015).

In the present work, we search for effects of art in addressing environmental issues. Specifically, we aim to investigate the role of visual environmental art in enhancing people's pro-environmental intentions and behavior, comparing environmental artworks with non-artistic pictures of nature. The environmental artworks concern plastic waste installations, while the pictures of nature reproduce the same scenario without the artistic component. Participants are asked to evaluate beauty and meaningfulness for each image. Before the lab session, individual differences for participants' environmental attitude are assessed. To measure intentions for pro-environmental behavior, pre-and-post exposure questionnaires are collected. Finally, participants receive a one-hundred euros lottery ticket, and they can decide to keep it or to donate it to an environmental association.

Beauty of nature can trigger positive emotions and prompt sustainable behavior, while the effect of environmental art visual imagery is still unclear. Exploring the variation between the two conditions, we expect the responses to be affected by individual differences such as environmental and recycling attitude, subjective norm, perceived control, and art interest.

Author/s: Eduardo Naddei Grasso, Claudia Scorolli, Helmut Leder, Stefano Mastandrea

Type: Poster

Does psychopathology need vision to develop? A Systematic Review of the Link Between Congenital Blindness and Psychiatric Disorders

Speaker: Battista, Martina

Track: Attention, perception and consciousness

Abstract

Sight is considered the primary sensory modality through which humans interact with and represent the world. However, several studies have indicated that the brain, to a great extent, can still develop its morphological and functional architecture even in the congenital absence of sight (*supramodality*).

Congenital blindness (CB) also causes cross-modal plastic phenomena that sustain alternative routes for perceptual and cognitive processes. While cognitive functions have been extensively investigated in CB, the effects of blindness on psychiatric morbidity remain poorly understood. In fact, CB uniquely dissects the role of vision in psychiatric conditions (PCs) implying visual representations (dysmorphophobia, phobias). This systematic review focuses on studies examining individuals who were either completely blind or had minimal light perception from birth, with the primary objective of exploring the comorbidity between CB and PCs. Following a comprehensive search (Pubmed, Scopus), 783 records were considered eligible for further screening. Preliminary findings indicate a relationship between CB and Schizophrenia (SCZ) and CB and Autism Spectrum Disorder (ASD), with other PCs being overlooked. Specifically, evidence suggests a potential protective effect of CB against SCZ, although the rarity of comorbidity cases might also be attributed to the low joint probability of both disorders co-occurring. Also, reported higher ASD prevalence in CB individuals may be influenced by confounding factors. In conclusion, further research is needed to explore the putative influence of CB on the development and maintenance of PCs.

Assessing this relationship will shed light on the comprehension of the *nature vs nurture* role in the genesis of psychopathology.

Author/s: Martina Battista, Simona Casale, Clara Gangemi, Davide Bottari, Pietro Pietrini

Type: Poster

Feeling fatigue impacts brain rhythms in post COVID-19 patients

Speaker: Mastromarino, Silvia

Track: Attention, perception and consciousness

Abstract

Background: Following contraction of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection, commonly known as Covid-19, and experiencing its symptoms for extended periods (a condition termed “long Covid”), many individuals subjectively report experiencing “brain fog” (e.g., cognitive, and psychiatric disorders, etc.). Among these symptoms, it has been observed that 20%-30% of long Covid patients assessed > 6 months after infection onset exhibit fatigue symptoms associated with poorer sleep quality, depressive symptoms, and subjective cognitive complaints.

The aim of this study was to investigate in further detail the specific alterations of brain rhythms in post-COVID subjects who did not exhibit cognitive and psychiatric disorders but primarily suffered from subjective fatigue.

Methods: Experiments were conducted on post-COVID participants approximately one year after hospitalization for Covid-19 infection. Inclusion criteria comprised a report of “brain fog,” absence of pre-existing cognitive and psychiatric conditions, and absence of current chronic organic disease. Matched healthy controls were also recruited. All participants underwent clinical/neuropsychological assessment (including fatigue assessment) and resting-state electroencephalography (rsEEG) recordings.

Results: More than 90% of all post-COVID participants showed no cognitive or psychiatric disorders, and 75% reported ≥ 2 fatigue symptoms. The post-COVID group exhibited overall lower posterior rsEEG alpha source activities compared to the Control group. This effect was more pronounced in long Covid-19 patients reporting ≥ 2 fatigue symptoms.

Conclusions: In post-COVID patients without cognitive and psychiatric disorders, “brain fog” may be associated with abnormal posterior rsEEG alpha rhythms and subjective fatigue.

Author/s: Federico Tucci, Giuseppe Noce, Silvia Mastromarino

Type: Poster

Fluctuations of Responsiveness in Minimally Conscious State patients: an EEG and ECG study

Speaker: Galiotta, Valentina

Track: Attention, perception and consciousness

Abstract

Minimally Conscious State (MCS) is a Disorders of Consciousness (DoC) characterized by inconsistent signs of consciousness and fluctuations of responsiveness.

The objective of this study was to investigate the relationship between electroencephalographic (EEG) and electrocardiographic (ECG) indicis and responsiveness in MCS patients.

We involved 15 MCS patients in a multimodal (EEG and ECG) resting-state monitoring, divided into 2 two-hours sessions (morning/afternoon). During the monitoring an auditory oddball paradigm was presented (5 times in each session) and we defined the presence of a Windows of Responsiveness (WoR) based on the variability of amplitude and latency of the P300 component of the Event-Related Potential in response to the oddball task. We defined a WoR as a moment of higher responsiveness with respect to a NoWoR (i.e., a moment of lower responsiveness).

We found a significant difference between WoR and NoWoR in Heart Rate (HR, $Z=2.21$, $p<.05$), Hearth Rate Variability (HRV, $Z=2.30$, $p<.05$) and Power Ratio Index (PRI, $Z=2.93$, $p<.05$) and a significant correlation between PRI and both HR ($R=-0.26$, $p<.05$) and HRV ($R=0.32$, $p<.05$).

According to these results, we demonstrated that HR, HRV and PRI could be suitable indices of responsiveness. These results will contribute to characterizing WoR from a neurophysiological perspective and in identifying the best moment to interact with patients, also with the support of a passive Brain-Computer Interface (i.e., a device automatically detecting covert cognitive and emotional states by recording users spontaneous brain activity without requiring any secondary tasks).

Author/s: Valentina Galiotta, Donatella Mattia, Elisa Caponera, Ilaria Quattrocioni, Jlenia Toppi, Mariagrazia D'Ippolito, Rita Formisano, Stefano Sdoia, Valentina Caracci, Angela Riccio

Type: Poster

Generalization of value-driven attention

Speaker: Ferrante, Deborah

Track: Attention, perception and consciousness

Abstract

Beyond Top-down and Bottom-up attention, growing evidence has highlighted that neutral stimuli could earn attentional priority when paired with stimuli – appetitive or aversive – that are highly relevant to the individual. This phenomenon, called Value-Driven Attentional Capture (VDAC), has been attested across a wide range of procedures.

However, little is known about how broadly this attentional priority is generalizable to similar stimuli. To this aim, we carried out a study using a new three-step paradigm: (1) through a matching-to-sample procedure, associations between pairs of abstract stimuli were established (2) one member of each pair was paired with a (high or low) monetary reward in a visual search task (3) the other member of each pair (the one that was never directly paired with a reward) was used as a distractor in another visual search task. We hypothesised people would be slower in finding the target in this latter task when the stimulus paired with the high-rewarded one (compared to the stimulus paired with the low-rewarded one) was presented as a distractor.

These results would suggest that attentional prioritization could generalize to other related stimuli and may provide a useful model to investigate the failures of cognitive control in clinical syndromes wherein the value assigned to stimuli conflicts with behavioural goals (e.g., addiction).

Author/s: Deborah Ferrante, Claudio Mulatti, Barbara Treccani

Type: Poster

Increasing emotional distancing with prism glasses: dissociated gender and adaptation direction effects on alexithymia in healthy individuals?

Speaker: Culicetto, Laura

Track: Attention, perception and consciousness

Abstract

Emotional processing is closely linked with spatial attention, which tends to prioritize emotional stimuli over neutral ones. The brain network responsible for directing spatial attention towards different sectors of the space also play a role in processing emotional stimuli. Recent evidence has identified a connection between the rightward shift in spatial attention, assessed through the line bisection task, and the challenges in comprehending one's own and others' emotional states—referred to as alexithymia.

Based on this evidence, this study hypothesized that alexithymia, might be affected through prismatic adaptation (PA), a standard protocol to modulate visuospatial attention.

A sample of 103 participants completed alexithymia questionnaires, Toronto Alexithymia Scale (TAS-20) and Perth Alexithymia Questionnaire (PAQ), in a counterbalanced order before and after a prismatic adaptation session (leftward, rightward, or neutral deviating prisms).

Results showed that leftward PA significantly increased alexithymia scores in healthy individuals, with a selective effect in women compared to men.

Our preliminary results suggest that the attentional shifts induced by leftward PA not only affect spatial tasks, but also emotional processing, particularly in how individuals perceive and interpret emotional proximity and distance. Consequently, alexithymia may be metaphorically likened to an impaired perception of emotional closeness and remoteness.

Author/s: Alessandra Falzone, Carmelo Mario Vicario, Chiara Lucifora, Laura Culicetto, Massimo Mucciardi, Selene Schintu

Type: Poster

Is the dorsal stream engaged in object shape recognition? A ccPAS Registered Report study

Speaker: Bertacco, Elena

Track: Attention, perception and consciousness

Abstract

One of the most influential models of visual information processing describes the dorsal visual pathway as not involved in object perception. However, growing evidence highlights the engagement of the dorsal stream in processing some object properties, such as global shape. Therefore, there is a lively debate concerning the role of the dorsal stream in this context.

Our work aims to disentangle the contribution of the dorsal stream to object shape recognition by strengthening V1-to-SPL dorsal stream connectivity through an individualized tractography-based cortico-cortical paired associative stimulation (ccPAS) protocol. Moreover, we will investigate whether the behavioral performance in object shape recognition is associated with the anatomo-structural (DTI) and effective (TMS-EEG) connectivity of the dorsal pathway.

Dorsal stream connectivity will be modulated using a ccPAS protocol targeting the endpoint of the dorsal stream, with an inter-stimulus interval (ISI) of 9ms. The effect will be assessed by baseline corrected Inverse Efficiency Scores (IES) values of a two-alternative forced choice match-to-sample visual discrimination task (2AFC MTS), that discriminates global spatial arrangements and local features of objects. Then, we will test if structural and effective connectivity measures of the dorsal pathway can predict the behavioral performance.

This study has been submitted as a Registered Report. Given these premises, if the dorsal pathway is involved in shape perception, we expect to observe a significant improvement in performance only in trials testing global shape processing after the ccPAS protocol. Also, we expect to find that structural and functional connectivity of the dorsal stream predict the behavioral performance.

Author/s: Elena Bertacco, Francesca Saviola, Edoardo Paolini, Agnese Tamanti, Francesca Benedetta Pizzini, Silvia Francesca Storti, Debora Brignani, Silvia Savazzi, Daniele Corbo, Chiara Bagattini, Chiara Mazzi

Type: Poster

Perceived body image in long-term mindfulness practitioners

Speaker: De Pastina, Riccardo

Track: Attention, perception and consciousness

Abstract

The body image is the conscious visual representation of body parts' size and shape, and it reflects how one's own body is perceived. A distorted body image characterizes various psychiatric disorders, such as anorexia nervosa; however, even healthy individuals show distortions, for instance in estimating the length of their limbs.

As body image, interoception, i.e., signals originating from within the body, contributes to experiencing one's own body. Findings from clinical and non-clinical populations suggest that subjects with higher interoception might represent their body more accurately. Practices which promote mind-body integration, such as the mindfulness meditation, are thought to favor interoceptive awareness. It is significant that mindfulness meditation promotes anatomo-functional changes of the insula, which is a relevant area for the interoceptive processing and the bodily representation. Many studies have been conducted on the relationship between mindfulness meditation and interoception.

However, no study has investigated whether mindfulness meditation affects the body image, although gaining a deeper knowledge on this topic might be beneficial to understand the efficacy of mindfulness in managing conditions that involve body image distortions, such as eating disorders, and body dysmorphic disorder. In light of the available evidence, the research hypothesis posits that the body image of long-term practitioners of mindfulness is more accurate.

In this study we show preliminary data on the body image of mindfulness practitioners and non-meditators, as measured with the body image task (BIT). Also, the link between practicing mindfulness meditation, interoception and body image is discussed.

Author/s: Erik Leemhuis, Riccardo De Pastina

Type: Poster

Smartphone overuse, distraction, motivation, self-regulation, procrastination and dropout: what relationship? An empirical study

Speaker: Lidia Mascia, Maria

Track: Attention, perception and consciousness

Abstract

Understanding which factors may be predictors of drop-out is a topic on which the literature has been wondering for decades. Acting preventively on the factors of academic success or failure brings with it the possibility of being able to implement effective interventions to support the student. In recent years, one factor that has taken over everyone's lives is the massive use of smartphones. On the basis of this evidence, one therefore wonders how far smartphone overuse and smartphone distraction may also be predictors of slowing down studies or even drop-out intentions. The literature points to positive correlations between smartphone overuse, distraction, procrastination and drop-out intention.

The data from our research, which was carried out on a sample of 360 male and female university students, confirm the findings of the literature. The sample of university students completed an online questionnaire consisting of the smartphone overuse scale, smartphone distraction, procrastination, motivation, self-regulation in learning and drop-out intention.

The results confirm that procrastination correlates positively with smartphone overuse, smartphone distraction and willingness to drop out. Intrinsic motivation and self-regulation correlated negatively with procrastination. Similarly, distraction and smartphone overuse correlate negatively with self-regulation.

The analyses conducted confirm the mediation of smartphone overuse and smartphone distraction in the relationship between procrastination, motivation, self-regulation and drop-out intention.

Author/s: Maria Lidia Mascia, Rachele Conti, Maria Pietronilla Penna

Type: Poster

The role of linguistic areas in perceptual and imaginative Right Ear Advantage: an rTMS study

Speaker: Rollo, Benedetta

Track: Attention, perception and consciousness

Abstract

The Right Ear Advantage (REA) occurs when participants, in the presence of two different stimuli presented in dichotic listening, are asked to report which stimulus is heard more clearly. This effect is classically explained by left hemispheric specialization for language and is also confirmed in pure auditory imagination tasks, but is absent or even reversed in patients with auditory hallucinations.

This absence of REA would be explained by altered inter-hemispheric activation of the patients' linguistic areas. 18 healthy participants were presented with a modified white noise (WN) speech illusion paradigm: a voice was presented lateralized to one ear, at the same or lower intensities with respect to binaural WN. In some trials, the voice was absent, but participants were still instructed to report in which ear they believed perceiving it. Each participant took part in two sessions, each preceded by 1 Hz repetitive Transcranial Magnetic Stimulation (rTMS) on the left and right temporal areas (TP3/TP4). The results confirmed the REA both when the voice was clearly audible (perceptual REA) and when it was not clearly audible or even absent (imaginative REA).

Moreover, an interaction emerged between the side of stimulation and the participants' tendency toward unusual and hallucinatory experiences, as measured by a standardized scale (O-LIFE). These findings suggest that the propensity for auditory hallucinations may play an important role in modulating the Right Ear Advantage.

Author/s: Benedetta Rollo, Paolo Capotosto, Rocco Palumbo, Alberto Di Domenico, Nicola Mammarella, Luca Tommasi, Giulia Prete

Type: Poster

Tailoring the description of an app promoting healthy and sustainable diet adoption: the role of regulatory focus

Speaker: Carfora, Valentina

Track: Attention, perception and consciousness

Abstract

Introduction: Digital technologies could serve as a valuable tool to encourage the Adoption of Healthy and Sustainable Diets (AHSD). **Objectives:** In this study, we tested the effectiveness of five communications promoting the download of an app that encourages AHSD. Additionally, we investigated whether regulatory focus moderates the persuasiveness of the communication used.

Method: The study, part of the PRIN PNRR 2022 DEMETRA<->ARTEMED project, was conducted in accordance with the Ethics approved by the AIP General Assembly. At the beginning of the questionnaire, we measured participants' regulatory focus (N = 401), then exposed them to one of five conditions: description (app description); growth + positive emotion (description + information about well-being and emotional satisfaction derived from app use); growth + negative emotion (description + information about well-being and emotional dissatisfaction from non-use); security + positive emotion (description + information about health and emotional satisfaction derived from use); security + negative emotion (description + information about health and emotional dissatisfaction from non-use). Subsequently, we measured participants' desire and behavior regarding app download.

Results: Individuals with low promotion focus exhibited greater desire to use the app when reading the description message compared to when reading the security + negative emotion message. Individuals with low prevention focus downloaded the app more frequently when reading the description message compared to when reading the security + positive emotion message.

Conclusions: People are more willing to use the app when the communication does not conflict with their regulatory focus.

Author/s: Valentina Carfora, Simone Festa, Sara Pompili, Italo Azzena, Andrea Scatolon, Michela Lenzi, Luciana Carraro, Patrizia Catellani

Type: Poster

Exploring the role of interoceptive and exteroceptive signals in shaping corporeal awareness in women

Speaker: Cantoni, Chiara

Track: Emotions and motivation

Abstract

Corporeal awareness, namely the consciousness of one's body and sensations, is influenced by internal and external cues that interplay to create a coherent self-representation. Specifically, interoceptive signals (physiological internal signals), are crucial in shaping our perception of the body and processing specific sensations, such as pain. Part One of this thesis explores the influence of internal signals on bodily awareness in women. Crucially, interoception in chronic pain conditions affecting women has mainly been investigated through self-report questionnaires or cardiac

interoceptive tasks. To address this gap, Study 1 examines how women with endometriosis, compared to healthy controls, process signals from three body districts: cardiac, gastric, and urinary. Since no non-invasive interoceptive task for bladder stimuli exists, a novel urinary interoceptive task is proposed to examine signal processing in chronic pelvic pain conditions, as these inputs originate from the pelvic area, the focus of these conditions. Study 2 investigates the role of breath, another interoceptive signal, in shaping corporeal awareness in healthy women, using the 'Embreathment' illusion, a virtual reality paradigm previously validated in men. Part Two focuses on how

exteroceptive cues, particularly visual cues through virtual reality, shape women's corporeal awareness and behaviours. Study 3 describes how embodying a female role model (i.e., Angela Merkel) in virtual reality can alter women's implicit and explicit attitudes towards themselves, discussing the effects of different kinds of exposure: priming (i.e., exposure to a role model through an image), and embodiment (i.e., incorporating an avatar and acting accordingly to its bodily features, "Proteus Effect"). Study 4 explores whether exposure to a successful female model can support

women's performance during a stressful virtual reality task (public speaking) by improving participants' performance, while also modulating stress-related physiological and hormonal signals (HRV, cortisol). Finally, the potential applications of these research lines in clinical and social contexts are discussed.

Author/s: Chiara Cantoni

Type: PhD prize

A Psychometric Validation of two virtual reality 360°-based tasks for memory assessment.

Speaker: Mancuso, Valentina

Track: Emotions and motivation

Abstract

Mild Cognitive Impairment (MCI) represents a critical stage between normal cognitive aging and dementia, emphasizing the need for sensitive and ecologically valid assessment tools. Traditional neuropsychological tests, while valuable, often lack the complexity and contextual richness of real-world cognitive demands. Virtual Reality (VR) technology offers a promising solution to enhance the ecological validity of cognitive assessments.

This study aims to validate two memory assessment tasks utilizing 360-degree technology to differentiate between individuals with MCI and healthy controls (HC). Eighty-two participants (41 MCI, 41 HC) completed standard neuropsychological tests and two VR tasks: an episodic memory test and a spatial memory test. The episodic memory task demonstrated strong construct validity, correlating significantly with established measures, particularly the Rivermead Behavioural Memory Test. MCI patients showed significantly poorer performance in encoding, free recall, and retrieval compared to HC.

Logistic regression analysis revealed that free recall performance was the strongest predictor of group membership. The VR task also showed sensitivity to age-related cognitive decline and correlated with both memory and executive function measures, highlighting its ecological validity. The spatial memory task did not differentiate between groups, but shows convergent validity.

These findings support the potential of VR technology in enhancing the ecological validity of cognitive assessments and its utility in detecting subtle cognitive changes associated with MCI, aligning with the growing trend towards function-based approaches in neuropsychology.

Author/s: Valentina Mancuso, Elisa Pedroli

Type: Talk in simposio

Betting on Your Feelings: The Interaction Between Emotions and Cognitions in the "Gambling Affective Task"

Speaker: Mari, Emanuela

Track: Emotions and motivation

Abstract

Gambling Disorder (GD) is a multifaceted condition arising from the interaction of clinical, cognitive, and emotional factors. Impulsivity, a pivotal construct in addiction research, is strongly associated with cognitive distortions in GD, including impulsive choices, motor disinhibition, suboptimal decision-making, and biased cognitive processing. Furthermore, emotional states, mood regulation, and affective dynamics play a critical role in the onset and perpetuation of the disorder, particularly when gambling is employed as a maladaptive coping mechanism to avoid or escape stress and life challenges.

This study investigates differences in decision-making and emotional regulation among three groups: individuals with "pure" GD, gamblers with comorbid substance use disorders, and a healthy control group. It also introduces a novel experimental paradigm, the "Gambling Affective Task," designed to explore the impact of affective priming on decision-making processes.

The findings indicate that participants placed lower bets following positive priming. Notably, individuals with comorbid substance use disorders bet significantly higher amounts than the control group, irrespective of priming type. Additionally, response times were longer in trials preceded by positive priming compared to those preceded by negative or neutral priming. These results suggest that positive affect may serve as a protective factor by decelerating gambling-related behaviors. Examining the differences between gamblers with and without comorbidities provides valuable insights into disorder-specific mechanisms and contributes to a more nuanced understanding of gambling addiction.

Author/s: Emanuela Mari, Francesca Saviola, Edoardo Paolini, Agnese Tamanti, Francesca Benedetta Pizzini, Silvia Francesca Storti, Debora Brignani, Silvia Savazzi, Daniele Corbo, Chiara Bagattini, Chiara Mazzi

Type: Talk in simposio

Dynamics in emotions: a journey through time series and stochastic processes

Speaker: Borghesi, Francesca

Track: Emotions and motivation

Abstract

Emotions are the most illusive entities, contingent on stimuli and inextricably linked moments. For centuries, literature, philosophy, and psychology have each described them individually, elucidating their physiological and behavioral characteristics.

Russell's circumplex model and Ekman's discrete emotions are all attempts to describe them in their static form. This approach leads to the loss of their temporal and transitive characteristics. In recent years, a new movement known as Affect Dynamics has emerged in psychometrics to describe emotions over time. The Experience Sampling Method is the most frequently employed experimental design. This method is a form of intensive longitudinal data collection that involves participants rating their emotions daily, weekly, or monthly. Autoregressive models are the most frequently employed mathematical models. They characterize emotions' static or dynamic nature over the long term regarding autolag or crosslag. We need to gather more information about the short-term emotional transitions when our affective state shifts. This study presents Discrete-time and space Markov processes as complementary mathematical-statistical methods to autoregressive models.

These processes are based on stochastic transition chains, which, in this case, consider the probability that the subject can transition from one emotional state to another without remembering all of the previous transitions. Both methodological approaches could delineate the dynamics of emotions as a whole.

Author/s: Francesca Borghesi, Pietro Cipresso

Type: Talk in simposio

Emotional Dynamics in Moral Decision-Making: Uncovering the Role of Proximity Using Interactive Dilemmas

Speaker: Alfeo, Federica

Track: Emotions and motivation

Abstract

A moral conflict arises when decisions or judgments involve opposing moral reasons. Studies on this topic often use sacrificial moral dilemmas to explore the mechanisms underlying decision-making processes.

In this study, interactive video versions of the Footbridge Dilemma were used to examine how proximity influences moral decisions. Each scenario, presented in the first person, aimed to evoke specific perceptions of distance between the decision-maker and the victim, using carefully designed visual representations and actions aligned with the illustrated levels of proximity. Through a within-subjects approach, 46 participants decided in each scenario whether to intervene (killing one individual) or not intervene (allowing five people to die). The effect of proximity (high, medium, low) on decision-making was investigated, with participants' choices and reaction times as outcomes. Additionally, the perception of distance and intensity of emotions were assessed both at the moment of decision and in reflecting on the unchosen option.

The results showed variations in perceived proximity across scenarios, significantly influencing decisions but not reaction times. Greater proximity elicited more intense negative emotions.

This study is the first to examine the impact of proximity on moral decisions using interactive video scenarios, providing an in-depth analysis of emotional responses associated with various distances. It offers valuable insights and serves as a foundation for further investigations, which could yield useful insights across multiple fields.

Author/s: Federica Alfeo, Antonietta Curci, Tiziana Lanciano

Type: Talk in simposio

"Slot Your Emotions": The influence of emotions in decision-making processes.

Speaker: Quagliari, Alessandro

Track: Emotions and motivation

Abstract

Several studies have investigated the psychological aspects of gambling, aiming to understand the factors that contribute to the development and maintenance of pathological gambling behavior.

The most extensively explored areas include individual responses to different gambling features, environmental influences, the emergence of comorbid psychiatric disorders, and the effectiveness of therapeutic interventions.

However, the examination of the interaction between cognitive and emotional components in decision-making processes becomes particularly socially relevant when conducted on clinical populations exhibiting impairments in both domains. Identifying the mechanisms underlying this relationship may offer valuable insights into how individuals make decisions in emotionally charged situations. In this study, conducted on a control sample, behavioral (i.e., risky choices and decision times) and physiological (i.e., EEG-ERP markers related to anticipation and feedback evaluation) correlates of near-misses were examined within a virtual reality scenario.

Prior to the immersive experience, the 59 participants underwent a mood induction procedure by viewing a video designed to elicit positive, negative, or neutral emotional states. Results indicated that participants in the negative mood condition engaged in riskier decision-making compared to those in the neutral group. Moreover, near-miss outcomes elicited neural activation patterns highly similar to actual wins, and a negative mood was associated with parietal deactivation following a loss.

This study provides new evidence supporting the utility of immersive virtual reality paradigms in gambling research, highlights the significant impact of near-misses on gambling behavior, and underscores the critical role of incidental emotions in decision-making processes.

Author/s: Alessandro Quagliari, Pierandrea Mirino, Emanuela Mari, Clarissa Cricenti, Anna Maria Giannini, Pierpaolo Zivi.

Type: Talk in simposio

The effect of regret anticipation on pro-environmental behaviour

Speaker: Quarto, Tiziana

Track: Emotions and motivation

Abstract

Several studies demonstrate how human action is the primary cause of most environmental issues. Recently, psychological research has focused on developing a deeper theoretical and practical understanding of the best intervention strategies to support environmentally friendly behaviors, attitudes, and practices. It has been noted that the anticipation of regret is a strong

inducement to act. Indeed, during the evaluation process, the decision-makers select options that will cause them the least amount of regret by using counterfactual reasoning.

The overall goal of this research is to encourage young individuals to make pro-environmental decisions by manipulating their regrets. For ten days, one EkoTok (short video) was delivered every day via an automated chat. 128 participants were gathered for the research. Following baseline measurements of environmental behavior (total and subdimensions), individuals were split into two groups. The experimental group received the EkoToks with regret anticipation, while the control group received the same EkoTocs but without regret anticipation; Environmental

behavior measurements were re-collected at the end of the experimental phase and three months later. The interaction between Group and Time was seen on: Total score ($F= 25.960$; $p<0.01$), Prosocial Behavior ($F= 8.783$; $p<0.01$), Waste ($F= 9.985$; $p<0.01$), Reuse ($F= 30.897$; $p<0.01$), Recycling ($F= 15.946$; $p<0.01$), and Activism ($F= 29.696$; $p<0.01$). The present findings may provide the scientific foundation for a creative plan to increase awareness and encourage pro-environmental behavior on a national and/or worldwide level.

Author/s: Tiziana Quarto, Aurora Bonvino, Paola Palladino

Type: Talk in simposio

The influence of guilt emotion on decisions under risk

Speaker: Gangemi, Amelia

Track: Emotions and motivation

Abstract

This paper examines the impact of guilt, a moral emotion, on decisions under risk. In two experiments we demonstrated that this emotion guides both risky and riskless choices, in the attempt to pursue the moral goal of re-establishing justice by repairing the harm caused to the victim or by expiating the offense.

In contrast to other moral emotions (e.g. anger), guilt is thus not characterized by a specific preference for risky or riskless choice. Preferences vary as a function of the option that may satisfy the moral goal, demonstrating that a complex appraisal process occurs in the background, instead of by a form of bias that the different emotions play toward decisions under risk.

Finally, in both experiments, the effect of guilt on choices prevails over well-known framing effect by Kahneman and Tversky (1981).

Author/s: Amelia Gangemi, Chiara Rizzotto, Febronia Riggio, Francesco Mancini

Type: Talk in simposio

Electrophysiological correlates of emotional word processing in primary school children

Speaker: Serio, Gianluigi

Track: Emotions and motivation

Abstract

Several electroencephalographic and psycholinguistic studies have suggested that words' emotional content influences cognitive reading processes. Emotional words produce modulations in multiple electrophysiological components and different brain regions than neutral words. However, how the emotional features of words (e.g., valence and arousal) interact to determine such effects is still a matter of debate. Furthermore, previous studies have mainly focused on adult participants, while studies in developing populations are almost absent. For these reasons, a group of typically developing primary school children (8-10 years) was tested in two emotional categorization tasks of words with different valence and arousal. The stimulus sets were built ad hoc, controlling all the main linguistic variables and keeping the difference between the assessed emotional features as high as possible.

In addition to reaction times, event-related potentials (ERPs) were recorded via electroencephalography.

The analyses focused mainly on the N400 component, which has been associated with lexical access and semantic integration processes that occur during reading in several studies. Preliminary results indicate that N400 modulations discriminate words with different valence, especially when words have a high arousal.

These results provide important clues for understanding the mechanisms of integration of emotional meaning during development and contribute to the formulation of functional and anatomical models of reading processes that also consider the emotional characteristics of words.

Author/s: Gianluigi Serio, Chiara Valeria Marinelli, Diletta Decarolis, Eugenio Trotta, Paola Palladino, Tiziana Quarto, Veronica Debora Toro

Type: Talk in simposio

Emotion and cognition: evidence from the experimental psychology for an integrated approach

Speaker: Quarto, Tiziana

Track: Emotions and motivation

Abstract

Moving away from the dualistic view of cognition and emotion as two distinct and separate mental functions, modern psychology agrees that cognition and emotion are two interacting aspects of the same process aimed at fine-tuning adaptive behaviour. Accordingly, the advent of neuroscience has revealed a high degree of overlap between the brain circuits involved in cognitive tasks and those involved in emotional tasks.

Brain areas of the frontal cortex, commonly thought of as the site of cognition, are in fact also active in response to emotionally salient stimuli, such as faces with facial expressions. Conversely, subcortical areas of the limbic circuit commonly implicated in response to emotionally salient stimuli are also involved in attention or memory tasks with non-emotionally salient stimuli. At the behavioural level, emotional states influence cognitive performance and learning, which in turn generate or modify emotional states.

In this symposium, we focus on the relationship between emotion and cognition, exploring the different contexts and modalities in which this interaction can be observed. In particular, we will show the impact of emotional processes on performance and/or brain activity during a spatial cognition task, episodic memory, cognitive control and text comprehension in different samples, including children or adults or elderly people suffering from neurodegenerative diseases.

The evidence presented highlights the importance of an integrated approach between emotion and cognition, both in basic research and in clinical and applied contexts.

Author/s: Tiziana Quarto, Paola Palladino

Type: Abstract complessivo di un simposio

Now for me, later for you: less attention to delay information is associated with more impulsive surrogate intertemporal choices

Speaker: Cannito, Loreta

Track: Emotions and motivation

Abstract

Deciding for others (surrogate decision making) is ubiquitous in everyday life as many prototypical scenarios can be found in various life domains. Previous research indicated that, when faced with monetary intertemporal choice for others, people exhibit a more impulsive choice pattern than when deciding for themselves, but still little is known about the underlying cognitive mechanism. Some evidence suggests that a critical role may be covered by the attention devoted to the amount or to the delay information, and to the role of the surrogate person.

The current study investigates how intertemporal decisions for the self differ from those made for another person, whose closeness to the participant was manipulated by identifying a friend (less close) or a family member (closer). Participants completed an intertemporal choice task for the self and the other person, while their ocular movements in various areas of interest (AOI) were recorded. Results revealed that participants exhibit a higher discounting rate (more impulsive choices) when deciding for themselves than when deciding for the other person. Also, in the “self condition”, delay information’s AOI received more visive attention than the amount information’s AOI, while the inverse pattern was detected when analyzing attention distribution during the “other condition”.

A possible explanation is that, when making decisions for themselves, people may be more likely to generate anticipated negative emotions due to waiting time required for greater rewards, and this negative emotion guides the attentive and decisional processes. Future studies should further explore the mechanism behind the self-other decision gap.

Author/s: Loreta Cannito, Tiziana Quarto

Type: Talk in simposio

The effect of emotional feedback in modulating task-switching costs

Speaker: Ricciardelli, Paola

Track: Emotions and motivation

Abstract

Recent studies showed that emotional stimuli presented in between tasks can modulate cognitive control, with reduced cognitive conflict following negative emotional stimuli. In two studies, we investigated if emotional feedback provided by in-group or out-group members modulates cognitive control.

Specifically, we asked participants to perform a task-switching paradigm in which each response was followed by neutral or emotional feedback from faces of the same age group (18-25) or of a different age (over 70). We addressed task-switching costs as a function of the feedback participants received in the previous trials. In study 1, the probability of receiving neutral or emotional feedback was 50%. In study 2, the probability of receiving emotional feedback was 25%. In both studies, the valence of the emotional feedback was manipulated across two experiments, positive (Exp.1, i.e. happy face) or negative (Exp2, sad face). Preliminary results showed that when the feedback was provided in 50% of the trials, switching costs were affected when the task was embedded in a negative emotional frame.

Results will be discussed in terms of affect-congruent modulation of cognitive control exerted by emotional feedback.

Author/s: Paola Ricciardelli, Francesca Ciardo

Type: Talk in simposio

The Influence of Emotional Stimuli on Egocentric and Allocentric Spatial Representations.

Speaker: Ruotolo, Francesco

Track: Emotions and motivation

Abstract

Emotions influence both how we perceive ourselves and the world around us (Damasio, 1994; Schwarz, 2012). However, the way individuals represent spatial information has been primarily studied in contexts devoid of emotionally salient information.

Therefore, the aim of this study is to investigate the influence of emotional stimuli on spatial cognition. In three studies, participants performed the Ego-Allo Task (Iachini & Ruggiero, 2006) which involves memorizing the position of triads of geometric objects and subsequently judging whether a target object was the one that appeared closer to the participant (egocentric task) or closer to another object (allocentric task). Crucially, in Study 1, emotionally salient images (positive vs. negative) were presented to participants either before encoding, during maintenance, or before retrieval of spatial information. In Study 2, geometric objects were replaced with emotionally salient images. Finally, in Study 3, the environment in which the Ego-Allo task was performed could have a different valence (positive vs. negative). The results showed that emotional stimuli negatively influence spatial judgments, although in different ways depending on the stages of information processing. Instead, more accurate spatial representations emerge when the environment or stimuli have a positive valence.

These results suggest that the interaction between emotions and spatial cognition is modulated by the level of spatial information processing and contextual characteristics. The complexity of this interaction has profound theoretical implications.

Author/s: Francesco Ruotolo, Tina Iachini, Filomena Leonela Sbordone, Mariachiara Rapuano, Gennaro Ruggiero

Type: Talk in simposio

Virtual Reality to assess Episodic Memory in AD patients: The Role of Emotional Variables

Speaker: Decarolis, Diletta

Track: Emotions and motivation

Abstract

One of the hallmarks of early clinical stages of mild cognitive impairment (MCI) and Alzheimer's disease (AD) is episodic memory (EM) impairment. Episodic memory refers to the ability to retrieve an autobiographical memory of events that occurred in a particular spatial and temporal context. However, most classical neuropsychological tools provide an EM assessment far from what is commonly experienced in daily life. Moreover, most research focuses on evaluating cognitive functions without taking into account emotional variables, which are strictly connected with memory.

The present study aims to assess episodic memory in AD and healthy older adults using a virtual environment, thus more similar to everyday life. Secondly, the study aims to determine whether emotional factors (neutral, positive or negative variables) can influence encoding and therefore memory performance in pathological ageing.

The protocol requires participants to explore a virtual environment, created using software called CoSpaces Edu. The pathway navigation is set on an egocentric perspective: participants watch the scene move at a fixed pace along a road and they have to remember the objects they find on the way. Three different conditions are used: objects to remember are placed next to human characters which show neutral (i), positive (ii) or negative (iii) emotions. Each participant explores two virtual environments, the neutral and the positive or negative emotions environment, randomly assigned. A free recall and a visual recognition task are presented at the end.

Preliminary results reveal the advantage of using a virtual environment for EM assessment over classical neuropsychological tasks. AD (Alzheimer's Disease) and control groups do not differ in their reactions to emotional stimuli compared to neutral ones, but there is a trend toward improvement in emotional conditions in AD participants compared with the control group.

Future developments could exploit this virtual environment not only for assessment but also for rehabilitation and therapeutic purposes.

Author/s: Diletta Decarolis, Loreta Cannito, Tiziana Quarto, Paola Palladino

Type: Talk in simposio

Comparing psychological and physiological responses to exercise in natural outdoor, urban outdoor and indoor environments

Speaker: Laezza, Luca

Track: Emotions and motivation

Abstract

Studies suggest that engaging in physical activity in natural environments, unlike urban environments, offers more significant benefits for psychological well-being (Gladwell et al., 2012; Wicks, 2022). This study assessed the synergistic benefits of nature exposure and physical activity through a randomized crossover design. Fifteen male participants ($M=28$; $SD=5$) walked for one hour in three different environments: natural (N), urban (U), and indoor (I).

Questionnaires were administered to investigate perceived exertion, emotional state, psychological restoration, and enjoyment derived from physical activity. Physiological stress indices were assessed before and after the activity, including heart rate variability (HRV), salivary cortisol, and blood pressure (BP). Repeated measures ANOVAs on partial data showed a significant environmental effect: participants reported greater relaxation, lower anxiety, enhanced psychological restoration, and increased enjoyment after physical activity in N compared to the other environments. At the midpoint of the walk, participants perceived significantly lower exertion in N compared to I. Furthermore, N was significantly associated with lower cortisol concentrations and higher HRV levels compared to I after the activity.

The results highlight the psychological and physiological benefits of a light-to-moderate physical activity session and the greater restorative potential of nature. Natural environments may promote exercise adherence and increase physical activity levels, supporting a healthy lifestyle. The final results will be discussed upon completion of data collection.

Author/s: Luca Laezza, Alessandro Fornasiero, Laura Mancini, Martina Vacondio, Margherita Brondino, Stefano De Dominicis, Margherita Pasini, Federico Schena, Barbara Pellegrini

Type: Talk in simposio

Direct and indirect effects of the reward value of observed food stimuli on motor behavior

Speaker: Bianco, Valentina

Track: Emotions and motivation

Abstract

Several studies testing cognitive control in the general population using images of food of varying palatability showed that cognitive performance was increased for high- than low-calorie food suggesting a fine-tuning of cognitive processing for foods with different salience. The interaction between dealing with different degrees of rewarding stimuli and cognitive performance highlights the critical role of the reward system in shaping perception.

Here we show evidence of direct and indirect effects of the reward value of observed food stimuli on motor behavior. In the first study we explored the behavioral and cortical excitability signatures of improved performance for high- than low-calorie food images during a food go-no task. Crucially, in this case the caloricity of the food was task-relevant. In the second study we administered an action prediction task using high- was low-calorie food objects to normal-weight and obese individuals under a fasting or a satiety state. Here, the caloricity of the observed food objects was not task-relevant.

We provided evidence of altered sensitivity to the reward value of food stimuli in obesity, despite a conserved sensitivity to hunger and of the beneficial effects of fasting, which may sharpen senses independently from individual weight. In conclusion our findings 1) confirm the improved performance when dealing with images of food with higher palatability in normal-weight participants independently from the relevance of caloricity during task instructions; 2) show evidence of reward dysfunction in obese individuals and 3) point at beneficial effects of fasting on perceptual/cognitive performance during social prediction tasks.

Author/s: Valentina Bianco

Type: Talk in simposio

Effects of viewing natural and urban scenarios in video and virtual reality on emotion regulation processes: Two experimental studies

Speaker: Vitale, Valeria

Track: Emotions and motivation

Abstract

Research has demonstrated the benefits of nature on psychological well-being, highlighting positive effects on emotions. Among the theories proposed to explain these effects, some studies focus on emotion regulation processes, suggesting that exposure to nature increases the use of adaptive strategies and reduces maladaptive ones (for a review: Vitale & Bonaiuto, 2024).

This contribution presents two studies on the effects of exposure to virtual nature (video/virtual reality scenarios) on emotions and emotion regulation strategies, following the induction of negative emotions. It is hypothesized that natural environments, due to their higher restorative potential (PRS), support more adaptive strategies (in contrast to urban environments), leading to a greater reduction in negative emotions.

The first study adopts a within-subject approach with 3 experimental conditions for the intervention (video: natural environment, historic city center, busy street) and 3 emotion measurements (pre-/post-negative induction procedure, post-intervention). With a sample of 56 participants (42 women, Mage = 28.8), a serial mediation model was tested, with experimental conditions as the predictor of post-intervention negative emotions, and with the following serial mediators: 1) PRS, and 2) adaptive and maladaptive strategies. A significant serial mediation effect was found, with PRS and adaptive strategies affecting negative emotions in the natural environment condition ($\beta = -.06$; 95% CIs = -.18, -.01; $p = .028$).

The second study (data collection ongoing) adopts a mixed design with 5 experimental groups as a between-subjects factor (virtual scenarios: arctic, island, forest, countryside, urban) and 3 emotion measurements as a within-subjects factor (same as in Study 1).

The research confirms the relevance of exposure to natural stimuli for emotion regulation processes, highlighting the potential to leverage these effects to improve well-being.

Author/s: Valeria Vitale, Marino Bonaiuto

Type: Talk in simposio

Electrophysiological correlates of food preference and risky decision-making.

Speaker: Mattavelli, Giulia

Track: Emotions and motivation

Abstract

Food is a key reward stimulus that drives human behaviour according to individual preferences. Behavioural mechanisms and neural processing underpinning food attitudes and reward values have been investigated independently from one another, but a more detailed investigation of the processes involved in individual food preferences and of the potential relationship with food and monetary reward is still lacking. The present study investigated the electrophysiological (EEG) correlates of food-related implicit attitudes and decision-making under risk with food and monetary reward stimuli.

The EEG of 43 healthy volunteers was recorded while they underwent Implicit Associations Tests (IAT) on tasty/high calories versus tasteless/low calories food (food-IAT) and flowers versus insects as control (flower-IAT), in addition to loss aversion tasks presenting participants with gain-loss gambles involving monetary or food rewards. Analyses on the IATs revealed significant differences between the congruent and incongruent condition of the food-IAT in late time-windows (400-700 ms) and in components located in the anterior/middle cingulate gyrus and caudate nucleus previously associated with emotion processing and attentional allocation to relevant stimuli. Preliminary results on the loss aversion tasks showed behavioural differences in participants' tendency to accept gambles related to food vs. money, correlating with individual food preferences, although EEG correlates were not significantly different between the two types of reward stimuli.

These findings support the role of semantic and emotional control processes in implicit food preferences, and highlight the relevance of individual attitudes in evaluating reward values of food.

Author/s: Giulia Mattavelli, Irene Gorrino, Claudia Gianelli, Nicola Canessa

Type: Talk in simposio

Exposure to Nature and Cognitive, Affective, and Social Restoration: Evidence from Real and Virtual Experiences

Speaker: Bonaiuto, Marino

Track: Emotions and motivation

Abstract

The scientific literature has widely demonstrated the restorative capacities of natural environments and the benefits of nature exposure on emotional, psychological, and physical well-being. The topic of environmental restorativeness has garnered extensive interest within the scientific community, with numerous studies investigating the underlying mechanisms and related benefits. This symposium aims to delve deeper into these aspects through four presentations focusing on the restorative potential of natural environments.

The first contribution (Mariani et al.) explores the relationship between perceptual cues of three-dimensional space, the global structural properties of an image, and perceptions of restorativeness, assessing how eight perceptual cues influence global structural properties and subsequently the perception of restorativeness.

The second contribution (Vitale et al.) presents two experimental studies investigating the effects of viewing videos and exploring virtual reality scenarios depicting various environments (natural vs. urban) on affective processes following the induction of negative emotions.

The third contribution (Laezza et al.) examines the effects of physical activity in natural, urban, and indoor environments on psychological and physiological well-being, finding greater relaxation, reduced anxiety, and enhanced psychological restoration in natural settings.

The fourth contribution (Bolognesi et al.) offers two studies exploring the impact of frequent exposure to natural environments on primary and secondary school students, highlighting a positive link between connection to nature, school and psychological well-being, and positive emotions.

In summary, the contributions present new findings on the restorativeness of natural environments, employing diverse approaches to nature exposure (direct and virtual), conceptual levels of dependent variables (cognitive, affective, social), and methods for measuring effects (physiological, self-report).

Author/s: Marino Bonaiuto

Type: Abstract complessivo di un simposio

Food challenge to neurocognitive functions: evidence from healthy and pathological populations with eating disorders

Speaker: Picazio, Silvia

Track: Emotions and motivation

Abstract

Eating is fundamental to survival and well-being and already at the dawn of experimental psychology the role of food in learning processes was recognized in seminal works of Pavlov and Skinner. In modern society, the innate urge to eat is often overridden by the abundance of nutrients. In this context eating disorders are constantly increasing and difficult to treat, thus neuroscientists have taken a renewed interest in the study of eating behaviour.

The aim of this symposium is to offer an updated view on the understanding of complex relationship between reward value, inhibitory-control, multisensory-integration and decision-making as functions of eating self-regulation. The speakers will discuss original data of on-going research conducted with behavioral, electrophysiological and functional connectivity methods both in healthy normal-weight participants and patients affected by eating disorders.

In the first talk Dr. Valentina Bianco will present behavioural evidence showing how the reward value of observed food stimuli affects motor performance in normal-weight participants and in individuals with obesity.

The presentation of Prof. Giulia Mattavelli will concern the electrophysiological correlates of implicit food attitudes and risky decision-making involving both food and monetary rewards.

The talk of Dr. Gerardo Salvato will be focused on the neurocognitive multisensory integration deficits contributing to disorders of the “corporeal” and “deciding” self in eating disorders.

Finally, Dr. Silvia Picazio will illustrate new evidence from patients with anorexia nervosa compared to healthy-participants regarding food-related inhibitory control and the specific role of fronto-cerebellar networks in these processes.

Author/s: Silvia Picazio

Type: Abstract complessivo di un simposio

Multisensory integration alterations in eating disorders.

Speaker: Salvato, Gerardo

Track: Emotions and motivation

Abstract

Individuals with eating disorders, particularly Anorexia Nervosa (AN), often experience distortions in bodily self-awareness, possibly due to difficulties integrating multisensory information. In this symposium, I will present evidence supporting the existence of this deficit underlying alterations in the corporeal self. We examined 22 women with AN alongside 22 healthy controls using the Mirror Box Illusion to assess the congruency of visual (exteroceptive), spatial (proprioceptive), and physiological (interoceptive) components when modulating the corporeal self.

In healthy subjects, these components aligned, but participants with AN exhibited discrepancies, such as decreased hand temperature and enhanced sense of agency over their hand reflection, even under control conditions. I will also provide evidence that alterations in multisensory integration of the corporeal self in eating disorders extend to the acting self. AN and obesity (OB) represent extremes on the weight spectrum, both involving risks to bodily integrity, often influenced by distorted perception of internal signals. We investigated risky decision-making in AN and OB using body-related and non-body-related cues in two versions of the Balloon Analogue Risk Task (BART). Across 160 participants (AN, OB, normal-weight controls), risk propensity decreased with increasing BMI, only in the body-related task. Healthy individuals showed a correlation between risk propensity and interoception, which was absent in AN.

OB participants displayed varied interactions between interoception and decision-making in both tasks. These findings contribute to understanding alterations in the corporeal and acting self in eating disorders, suggesting potential avenues for tailored interventions.

Author/s: Gerardo Salvato

Type: Talk in simposio

The Effects of Perceptual Cues of Three-Dimensional Space on the Perception of Scene Restorativeness: An Exploratory Study

Speaker: Mariani, Valentina

Track: Emotions and motivation

Abstract

This study investigates the relationship between perceptual cues of three-dimensional space (IPTS), the global structural properties (PSG) of an image, and the perception of restorativeness (PR), hypothesizing that eight IPTS (e.g., linear perspective, aerial perspective, texture gradient, relative height) underlie three PSG of images (i.e., openness, expansion, depth), which in turn generate PR.

The Scene-Centered Approach (SCA), in alignment with Attention Restoration Theory, posits that as individuals explore the content of an image to understand its meaning, their attention is quickly drawn to certain PSG, which are present at higher levels in images of natural rather than built environments. The challenge of this study lies in measuring these perceptual elements. For this purpose, a two-phase experimental design was developed.

In Phase 1, the relationship between certain PSG, derived from the SCA, and the PR of 8 natural scenes was investigated using two measurement methods (presentation of single images with a 7-point Likert scale vs. presentation of paired stimuli with a dichotomous scale) and two analysis methods (paired-samples T-Test and Cluster Analysis). In Phase 2, 12 natural scenes, prototypical of eight IPTS and ranked on each IPTS using a ranking method, were evaluated on levels of the three PSG found to be significant in Phase 1 (i.e., openness, expansion, depth) and on PR using a Likert scale.

With the obtained scores, applying a hierarchical linear model, we will determine whether there is a relationship between IPTS and PR, and if this relationship is mediated by the PSG of the images.

Author/s: Valentina Mariani, Luca Laezza, Margherita Pasini, Margherita Brondino, Roberto Burro

Type: Talk in simposio

The role of fronto-cerebellar networks in food challenged inhibitory control. Data from healthy normal-weight participants and patients with anorexia nervosa

Speaker: Picazio, Silvia

Track: Emotions and motivation

Abstract

The present study aims to investigate the collaborative process and interpersonal synchronization in a population of workers by comparing two working conditions: face-to-face (FTF) and remote (RW).

According to a within-subjects research design, 24 adults divided into 12 pairs will participate in both experimental conditions to investigate how work modality influences neural and physiological synchronization as well as level of cooperation. Two sessions, each lasting about two hours, are planned, having the same experimental structure characterized by two collaborative cognitive tasks. In the FTF condition, the dyad will be in the same room, while in the RW condition the participants will be in two different rooms and their interaction will be through a videoconference. The experimentation will involve the use of electroencephalogram (EEG) to measure neural activity and electrocardiogram (ECG) for cardiac activity.

The technique of hyperscanning will be used, allowing the neural and cardiac activity of two or more people to be detected simultaneously. Finally, behavioral measures and cognitive questionnaires are added to the physiological measures.

Author/s: Silvia Picazio

Type: Talk in simposio

Addressing Discrepancies in the Assessment of Emotional Granularity: Development of a Novel Method Using Open-Ended Descriptions.

Speaker: Telazzi, Ilaria

Track: Emotions and motivation

Abstract

Emotional granularity (EG), the ability to differentiate between specific emotions with a high level of complexity and precision, is commonly assessed behaviorally through experience sampling methods (ESM). Participants rate the intensity of their momentary emotions over several days, and their ratings are then used to compute an EG index via within-person intraclass correlations (ICCs). Recently, an alternative approach has been developed to code affective natural language descriptions using two indices, namely the specificity index and the nuance score. Yet, these two measures overlook some relevant aspects, such as the actual richness and variability of affective vocabulary. Moreover, preliminary findings suggested that EG as computed via ICCs is unrelated to both the specificity index and the nuance score.

The present study proposes a novel mathematical derivation of an EG index calculated from open-ended descriptions of emotional states. Moreover, we explore whether the ICCs EG index correlates with EG assessed through natural language descriptions.

Sixty females suffering from chronic pelvic pain participated in a 1-month diary study. For each pain episode, participants freely narrated their pain experience focusing on its affective correlates and rated their affective experience using a set of 14 negative emotional adjectives.

Concerning results, we expect that EG measured via predetermined adjectives will be unrelated to the specificity index and the nuance score but will correlate with our new derivation. This study may provide new evidence about the different methods commonly used in EG assessment to determine if they yield comparable results and are, therefore, equally valid.

Author/s: Ilaria Telazzi, Stefania Balzarotti

Type: Talk in simposio

Breaking Boundaries: Addressing Diversity in Methodological Approaches to the Measurement of Affective Experience.

Speaker: Telazzi, Ilaria

Track: Emotions and motivation

Abstract

The investigation of affect has become pivotal across various fields of psychological research, yet measuring affective experience poses some pitfalls. First, affective states, by their fleeting and idiosyncratic nature, are often challenging to define and capture. Second, the intricate interplay between psychophysiological changes and subjective experience has many implications for the measurement of affect. Lastly, different theoretical frameworks on emotions shape the methodology and measurement process, potentially impacting results.

This symposium addresses these issues by exploring diverse methodological approaches to measuring affective experience. The discussion comprises study design (experimental vs. ecological), data sources (biosignals vs. self-reported experience), and methods (quantitative vs. qualitative).

Initial contributes will focus on the categorization of expressive or psychophysiological responses linked to affective states. First, Martina Gnerre will discuss the vocal expression of emotions, exploring how different theoretical approaches impact measurement methods and acoustic features' analysis. Second, Monica Casella will focus on using artificial neural networks to analyze biosensor data related to affective states. Other contributes will focus on approaches that emphasizes variability and individual differences in affective experience. Caterina Vannucci will present findings on emotional complexity and intensity measured through open-ended descriptions of affect and bodily sensations using an experimental study design. Lastly, Ilaria Telazzi will compare methods for ecologically assessing emotional granularity, using both spontaneous language narrations and self-ratings of pre-determined emotional adjectives.

Overall, the symposium seeks to highlight how methodological and measurement diversity enriches our understanding of affective experiences, fostering a nuanced comprehension of underlying mechanisms across contexts.

Author/s: Ilaria Telazzi

Type: Abstract complessivo di un simposio

Capturing emotions in vocal expressions: The impact of different theoretical approaches on acoustic profiles.

Speaker: Gnerre, Martina

Track: Emotions and motivation

Abstract

Over the past two decades, the field of emotion research has experienced significant growth and diversification, resulting in a proliferation of conflicting notions and results.

This contribution explores various methodologies and tools for capturing emotions in vocal communication, guided by four prominent theoretical perspectives on emotion: basic emotions theory, dimensional approach, appraisal theory, and the theory of constructed emotion. Each theory seems to prefer distinct methodologies and vocal parameter configurations, potentially leading to divergent outcomes. Basic emotions theory employs acoustic feature identification for straightforward emotion categorization, while dimensional approach considers emotions along underlying acoustic dimensions. Appraisal theory examines how vocalizations reflect subjective evaluations, while the theory of constructed emotion advocates dynamic, context-driven analyses of spontaneous emotional expression. The resulting acoustic profiles are shaped by the underlying theoretical viewpoints, influencing how emotions are measured and acoustically represented.

An integrative framework is proposed to reconcile the four perspectives. This underscores the importance of comprehensive synthesis and further research to elucidate the complexity of emotion recognition in vocalizations, with implications for theories of emotion.

Author/s: Martina Gnerre, Federica Biassoni

Type: Talk in simposio

Exploring psychophysiological processes in stress responses: from gastric to interpersonal dynamics

Speaker: Era, Vanessa

Track: Emotions and motivation

Abstract

Stress triggers a complex cascade of physiological and psychological responses, affecting not only bodily functions like the gastrointestinal (GI) system but also cognitive processes such as self-focused attention, and eventually social interactions. Despite the common experience of stress-related GI symptoms, objective evidence on its impact on enteric functions in humans remains scarce, primarily due to monitoring challenges involving invasive methods. To address this gap, we employed non-invasive, biocompatible sensor-equipped pills in a study involving 36 participants, monitoring GI parameters during stress-inducing virtual reality (VR) scenarios. Our investigation revealed that perceived stress was associated with less acidic gastric pH, likely because of heightened sympathetic activity suppressing gastric secretion.

Moreover, scientific literature suggests that stress also enhances the focus on self-related negative affect, potentially influencing interpersonal relationships. The extent and mechanisms through which stress affects social interactions remains unexplored. In a separate study involving 49 healthy participants, we investigated the effects of stress-induced intrusive thoughts on interpersonal dynamics. Participants engaged in either a stress induction (in the form of perseverative cognition) or a control condition, and then they interacted online with another individual. Interpersonal dynamics were assessed in the forms of interpersonal physical and psychological closeness and automatic imitation. Results showed that an increased subjective perception of perseverative thoughts was associated with a reduced preference for physical closeness.

These studies provide valuable insights into psychophysiological effects of stress, elucidating its impacts on individual well-being and social behavior. Furthermore, they highlight the importance of developing non-invasive methods to further explore the underlying mechanisms.

Author/s: Vanessa Era, Arianna Vecchio, Martina Fusaro, Sofia Ciccarone, Maria Serena Panasiti, Cristina Ottaviani, Chiara Fini, Giuseppina Porciello, Salvatore Maria Aglioti

Type: Talk in simposio

Exploring the Influence of Questionnaire Length on Respondent Burden through Biosensor Data: A Multimodal Analysis Using Artificial Neural Networks

Speaker: Casella, Monica

Track: Emotions and motivation

Abstract

Psychological research frequently relies on Likert-type questionnaires to collect data on psychological traits. While cost-effective and straightforward, the cognitive effort required to complete these questionnaires and the related stress response, known as "response burden," can affect data quality.

Response burden includes factors like questionnaire length, complexity, emotional intensity, and presentation format. Our study focuses on the affective correlates of response burden by evaluating its psychophysiological effects. We measured Galvanic Skin Response (GSR) and facial electromyography (EMG) of the zygomatic and corrugator muscles during the completion of two personality tests based on the Big Five theory—one shorter with 44 items and another longer with 132 items. GSR is an indicator of arousal, defined as peripheral sympathetic activation which is linked to emotional engagement or stress. Facial EMG assesses muscle activity: in particular, corrugator muscle activation is linked to the expression of affective states with negative valence, while zygomatic activation is linked to affective states with positive valence. These measures provide insights into how the response burden impacts participants' affective states. To analyze the data, we employed multimodal artificial neural networks, which can integrate various data types, including physiological signals, response times, and direct responses. We hypothesize that there will be changes in respondent affective states due to the response burden, particularly in the latter part of the longer questionnaire.

Our approach highlights the importance of multimodal analysis when exploring complex psychological phenomena and emphasizes the need to design questionnaires that take into account the response burden and its psychophysiological correlates.

Author/s: Monica Casella, Francesca Borghesi, Pietro Cipresso, Davide Marocco

Type: Talk in simposio

From Heart to Gut: mapping cardio-gastric markers of Emotions

Speaker: Porciello, Giuseppina

Track: Emotions and motivation

Abstract

Whether we might distinguish emotional experiences by highlighting specific physiological markers is a debated question. Besides cardiac and respiratory indices, gastrointestinal (GI) signals are emerging as crucial indicators of emotional processes. However, direct evidence of this link remains elusive. To assess the impact of endoluminal markers of GI activity on emotions, we asked a group of healthy participants to ingest a pill that measured pH, pressure, and temperature of their GI tract while they were exposed to videos that consistently induced disgust, fear, happiness, sadness or a neutral state. GI markers were complemented by heart rate (HR) and heart rate variability (HRV) recordings, as well as participants' self-reported visceral sensations (gastric, respiratory and cardiac) and perceived emotions. When participants observed fearful and disgusting video clips, they not only experienced sensations related to their heart and breathing, but also felt gastric sensations, such as nausea. We also observed a clear correlation between stomach physiology and perceived emotions. Specifically, when participants viewed disgusting video clips, those with more acidic pH levels reported higher levels of disgust and fear, whereas those with less acidic pH levels reported more feelings of happiness. Additionally, changes in HRV and HR, especially related to disgusting and fearful videos, were found.

By analyzing these results in conjunction with findings from other studies we performed, we highlight how visceral signals can influence both typical and atypical affective processes, shedding light on the complex interplay between bodily sensations and emotional experiences.

Author/s: Giuseppina Porciello, Alessandro Monti, Maria Serena Panasiti, Salvatore Maria Aglioti

Type: Talk in simposio

Interoception, affectivity and cognitive processes

Speaker: Barca, Laura

Track: Emotions and motivation

Abstract

Recent years have witnessed a surge in interest in interoception, the body's internal signaling system.

This goes far beyond its well-known role in regulating our physiology and energy demands. It's now understood to be a critical factor in shaping our sense of self and how we think and feel.

This symposium delves into the complex relationships between our internal bodily sensations, emotions, and cognitive processes. By drawing on different perspectives, including cognitive sciences, the study of emotions in the brain (affective neuroscience), and the study of mind-body connections (psychophysiology), the four presentations aim to shed light on the mechanisms behind this fascinating interplay.

Ultimately, they seek to deepen our understanding of how our emotions and thoughts work together to create our unique human experience.

Author/s: Laura Barca

Type: Abstract complessivo di un simposio

Interoceptive foundations of conceptual representation

Speaker: Barca, Laura

Track: Emotions and motivation

Abstract

Over the past few decades, interoception, often referred to as the "gut feeling" aspect of being embodied, has gained recognition as a crucial building block for our sense of self and mind. Its importance extends far beyond its well-established role in regulating complex physiological processes and managing energy demands.

In my presentation, I will discuss empirical findings from our lab showing how interoception covertly affect conceptual knowledge. In the first study, we elucidate the malleability of the boundaries between different concepts - particularly emotional ones - and how their conceptual representation is shaped by individual characteristics of affectivity, and psychological stressor. By using a similarity judgement task of different concepts, we created two-dimensional "maps" of the affective space along the dimensions of affective valence and physiological arousal.

The maps provide a visual representation of the affective space and revealed gender and age-related differences, particularly along the dimension of arousal. In the second study, using a mouse-tracking paradigm, participants performed an interoceptive-exteroceptive categorization of abstract and concrete concepts varying for interoceptive grounding (emotion, philosophical, natural, artifact). Movement trajectories revealed the implicit activation of interoceptive features during the categorization of concrete-natural concepts, thus beyond the abstract-emotional ones. To account for individual variability in attending to bodily signals, participants performed a cardioception task (heartbeat counting task). Those who were more sensitive to their heartbeat were faster in conceptual categorization, particularly in the (exteroceptive) categorization of concrete-natural concepts.

Overall, our results highlight the multiplicity of dimensions involved in conceptual knowledge, including the interoceptive ones.

Author/s: Laura Barca

Type: Talk in simposio

Mental imagery amplifies the intensity and complexity of emotions and the richness of bodily sensations during simulation of experience

Speaker: Vannucci, Caterina

Track: Emotions and motivation

Abstract

As compared to verbal thinking, mental imagery acts as an amplifier since it is based on mechanisms of simulation, but it is not clear whether it may also augment emotion complexity through richer descriptions of emotion experience.

Thus, our study aimed to analyze differences in self-reported emotional experience, by comparing affect intensity and indexes of emotion complexity in response to mental images (MI) versus verbal thoughts (VT) starting from pictures paired with a word-cue (PWC). Thirty participants ($F=15$) underwent a lab-based study with a within-subject design and generated positive or negative MI and VT based on 60 PWC. They were asked to rate affect intensity and give a report of the emotions and bodily sensations experienced, and finally to regulate their emotions, after every mental representation. In response to MI (vs VT, $p<.05$), a linear mixed-effect model including covariates of task compliance and alexithymia showed that participants experienced more intense affect and used more mood words and details of bodily sensations in their reports. Negative valence led to more intense affect and richer descriptions of bodily experience, regardless of the type of mental representation generated. Instead, no significant difference in emotion regulation time was found between MI and VT, or between positive and negative trials.

We built on previous literature confirming MI leads to more intense affect. Simulation via MI, as compared to VT, and negative valence may lead to more complex emotional experiences, with no difference in the time needed to regulate emotions.

Author/s: Caterina Vannucci, Emily Holmes, Giacomo Handjaras, Giada Lettieri, Luca Cecchetti

Type: Talk in simposio

The evolution of affective neuroscience through the lens of neuroimaging

Speaker: Cecchetti, Luca

Track: Emotions and motivation

Abstract

The development of brain imaging techniques, particularly fMRI, has fueled a growing body of research on the neural correlates of affect. This field has flourished, with a vast literature investigating the relationship between in-vivo brain activity and the experience, inference, and regulation of emotions, contributing to the "rise of affectivism" (Dukes et al., 2021).

In this talk, I will present meta-analytic findings obtained from the analysis of ~65,000 brain mapping articles showing that affectivism represents ~11% of the neuroscientific literature. Despite this sizeable interest, I will demonstrate that brain imaging research is biased toward the study of a very small number of emotion categories, neglecting the full complexity of human affective experience. Recently, researchers began to acknowledge these issues and the broader question of ecological validity in emotion research using neuroimaging.

In this context, the introduction of naturalistic stimuli (e.g., movies, music, and narratives) has broadened the horizons of brain imaging research. In this regard, I will present studies from our and other laboratories demonstrating how the combination of naturalistic stimuli and advanced methods for the analysis of brain activity allowed the study of multifaceted emotional experiences, the relevance of contextual information in emotion elicitation, the dynamics and trajectories in the stream of affect, and the intricate relationship between emotions and sensory processing.

I will conclude by highlighting the aspects that still need to be addressed and the unprecedented opportunities to bridge the gap between basic research and real-world applications.

Author/s: Luca Cecchetti

Type: Talk in simposio

Beyond the Screen: A Neuroscientific Approach to Remote vs. In-Person Job Interviews

Speaker: Ciminaghi, Flavia

Track: Emotions and motivation

Abstract

In the contemporary landscape of job recruitment, characterized by an ever-growing digital presence, the utilization of digital platforms for conducting job interview simulations is becoming increasingly significant.

Nevertheless, there exists a notable gap in understanding the impact of these simulations in contrast to traditional interviews on stress management. This study aims to examine this impact through the analysis of behavioral, autonomic, and neurophysiological responses in a sample of 53 healthy adults ($M_{age} = 25.25$, $SD_{age} = 3.435$, age range: 22-35, $N_{male} = 17$, $N_{female} = 35$). Using a multi-method approach, participants were divided into two groups: one underwent a modified Digital Trier Social Stress Test (D-SST), the other a real-life simulated version (R-SST). Data on stress regulation (RegStress), resilience capacities (ResStress), reaction times, electroencephalographic (EEG) and autonomic responses were collected during interview preparation. Regardless of group, better stress regulation correlated with higher resistance.

However, the D-SST group showed higher RegStress scores, likely due to perceiving the digital scenario as less stressful. EEG analysis revealed distinct patterns between groups, indicating greater cognitive effort in the R-SST group but lower self-awareness in the D-SST group. Skin conductance response was higher in the R-SST group, suggesting greater emotional engagement.

These findings indicate varied stress responses to digital versus realistic interviews, with differing behavioural, EEG, and autonomic profiles.

Author/s: Flavia Ciminaghi, Katia Rovelli, Laura Angioletti, Michela Balconi

Type: Mini-talks

fNIRS investigation on unpredictable emotional sounds

Speaker: Baggio, Teresa

Track: Emotions and motivation

Abstract

Listening to unpredictable aversive sounds, such as screams, can induce specific neural responses, corresponding to the differential activity of emotional processing-related brain areas. Moreover, human screams have been shown to induce transient states of fear and anxiety, being linked to personal or conspecific signals of danger.

Our aim is to investigate the neural activity associated to states of fear and anxiety induced by unpredictable screams, controlled by unpredictable safe sounds, such as human laughs. Additionally, we want to test if such transient fear/anxiety states can impact the successive execution of tasks with a social valence.

The experiment procedure includes two randomized blocks for each participant, one “safe” and one “threat”, in which participants will hear unpredictable sounds (i.e. laughs and screams).

After each block participants will then execute a virtual social task, consisting in a human avatar approaching them at a constant speed. Participants will be asked to stop the approach whenever they feel the proximity with the avatar is not comfortable anymore. Anxiety and comfort rating scales will also be administered.

For the entire duration of the two blocks cortical activity of frontal and temporal areas will be measured through fNIRS, a non-invasive technique that allows to estimate the cortical hemoglobin changes.

We expect to find differential cortical activity associated to threatening sounds versus safe sounds, and a different social task response after each block, corresponding to a greater distance kept from the avatar after the threat block.

Author/s: Teresa Baggio, Ivan Patanè, Deborah Ferrante, Andrea Bizzego, Alessandro Grecucci

Type: Mini-talks

Framing Effect in Breastfeeding Promotion: The Role of Self-Efficacy, Emotions, and Information Acceptance

Speaker: Scaglioni, Giulia

Track: Emotions and motivation

Abstract

In health-related behaviors, loss-framed message should be more effective in promoting detection behaviors (such as screenings), whereas gain-framed message should be more effective in encouraging prevention behaviors (such as oral hygiene). In a pre-registered experimental study, we tested the framing effect of communication promoting breastfeeding (a prevention behavior) on attitudes and intentions to breastfeed and formula-feed. We examined the mediating roles of emotions and information acceptance, as well as the moderating role of self-efficacy.

Participants were pregnant women ($N = 282$), randomly assigned to one of three conditions in which they read messages on the benefits of breastfeeding (gain frame), the risks of not breastfeeding (loss frame), or a control message about animal facts. As hypothesized, results showed two mirrored conditional indirect effects on breastfeeding and formula-feeding intentions: loss-framed messages induced negative emotions, which reduced information acceptance, leading to worsened attitudes and intentions to breastfeed, and improved attitudes and intentions to formula-feed. Conversely, gain-framed messages induced positive emotions, which promoted information acceptance, improving attitudes and intentions to breastfeed and weakening attitudes and intentions to formula-feed. Additionally, high levels of self-efficacy mitigated the negative effects of loss framing and amplified the positive effects of gain framing.

Thus, effective promotion of breastfeeding should be framed in terms of its benefits, and women's breastfeeding self-efficacy should be empowered.

Author/s: Giulia Scaglioni, Nicoletta Cavazza, Margherita Guidetti

Type: Mini-talks

Meta-analysis of the Difficulties in Emotion Regulation Scale and its short forms: A two-part study

Speaker: Raimondi, Giulia

Track: Emotions and motivation

Abstract

The Difficulties in Emotion Regulation Scale (DERS) is the most used self-report questionnaire to assess deficits in emotion regulation (ER), composed of 6 dimensions and 36 items. Many studies have evaluated its factor structure, not always confirming the original results, and proposed different factor models.

A possible way to try to identify the dimensionality of the DERS could be through a meta-analysis with structural equation models (MASEM) of its factor structure. The MASEM indicated that a six-factor model with 32 items (DERS-32) was the most suitable to represent the dimensionality of the DERS ($\chi^2=2095.96$, $df=449$, $p<.001$; root mean square error of approximation [RMSEA] = 0.024, 95% confidence interval [CI]: 0.023–0.025; comparative fit index [CFI] = 0.97; Tucker Lewis index [TLI]=0.96; standardized root mean squared residual [SRMR]=0.04). This result was also confirmed by a confirmatory factor analysis ($\chi^2 = 3229.67$, $df = 449$, $p < 0.001$; RMSEA = 0.075, 95% CI: 0.073–0.078; CFI = 0.94; TLI = 0.93; SRMR = 0.05) on a new sample (1092 participants; mean age: 28.28, SD=5.82 years) recruited from the Italian population. Analyses and results from this sample are reported in the second study of this work. The DERS-32 showed satisfactory internal consistency for all its dimensions and correctly categorized individuals with probable borderline symptomatology.

In conclusion, the DERS-32 has demonstrated to be the best model for the DERS among all the others considered in this work, as well as a reliable tool to assess deficits in ER.

Author/s: Giulia Raimondi, Leonardo Carlucci, Marco Innamorati, Michela Balsamo, Tonia Samela

Type: Mini-talks

Satiety and food availability influence motivational and inhibitory responses towards food stimuli: a behavioural study in healthy weight participants

Speaker: Devoto, Francantonio

Track: Emotions and motivation

Abstract

In this study, we investigated the influence of appetite on automatic approach tendencies and inhibitory responses toward food stimuli and whether this effect is modulated by the actual availability of food.

Forty-three healthy weight participants (21 males) completed an approach-avoidance paradigm aimed at assessing the approach bias for food and a Go/No-Go task aimed at assessing behavioural inhibition with personalized food pictures. Participants performed the tasks in two conditions: after prolonged fasting (hunger), and after lunch (satiety). Two versions of each task were administered: one with pictures of foods that were available for actual consumption after the experiment, and one with foods that were unavailable for consumption. After task performance, the most liked high-calorie and low-calorie foods were offered, and food intake was measured.

Approach-Avoidance paradigm: we observed lower approach bias for high-calorie and low-calorie foods in the satiety vs. hunger condition, but only for unavailable foods.

Go/No-Go task: we observed no significant effect of satiety on behavioural inhibition. However, participants showed greater inhibitory capacity in response to high-calorie vs. low-calorie foods, but only for those available for immediate consumption.

After the experiment, participants ate more calories in the fasting condition, and a greater proportion of calories from low-calorie foods.

Our results suggest that satiety fails to down-regulate the approach tendencies for food when it is available for immediate consumption. This failure seems compensated by a greater behavioural inhibition toward high-calorie vs low-calorie foods that is selective for those available for immediate consumption.

Author/s: Francantonio Devoto, Margaux Girati, Eraldo Paulesu, Laura Zapparoli

Type: Mini-talks

Self-disclosure and perceived intimacy: an experimental study comparing virtual and face-to-face interactions

Speaker: Di Natale, Anna Flavia

Track: Emotions and motivation

Abstract

Context. Virtual reality social platforms (VRSPs), such as Engage VR, offer several advantages in therapeutic contexts, as they guarantee a strong sense of presence and natural interactions, while offering users a form of anonymity as they represent themselves through an avatar, reducing the importance of one's body and physical appearance in the interaction.

Objective. The goal of this study was to compare users' self-disclosure on body and food related topics and sense of intimacy with the interlocutor during interactions taking place on a VRSP or face-to-face.

Methods. Using a within-subject design, participants described positive autobiographical memories elicited by neutral, body-related or food-related words in two conditions (VRSP and face-to-face). At the end of the session, participants filled in questionnaires to measure perceived self-disclosure and perceived intimacy with the interlocutor.

Results. Preliminary data collected on a sample of 24 young healthy women revealed that self-disclosure and intimacy were lower when interactions took place on a VRSP than face-to-face. Nevertheless, when controlling participants' body appreciation, differences on perceived sense of intimacy disappeared.

Conclusion. Preliminary results need further investigations and are discussed considering methodological aspects of the experimental paradigm used.

Author/s: Anna Flavia Di Natale, Giulia Cremaschi, Fabio Frisone, Giuseppe Riva, Daniela Villani

Type: Mini-talks

Sexual Orientation and Gender Identity Differences in the Lateralization of Social and Emotional Functions

Speaker: Malatesta, Gianluca

Track: Emotions and motivation

Abstract

The Left Cradling Bias (the motor asymmetry where individuals tend to cradle infants more often on the left side of their body at a population level; LCB) has frequently been associated with right-hemispheric specialization for social and emotional processes.

Furthermore, research has consistently shown a higher prevalence of this asymmetry among females compared to males. In this study, we explored the effects of sexual orientation and gender identity on this lateral bias through an online survey with a sample of adults (485 biological females and 196 biological males) recruited via LGBTQIA+ and general university social networks. We used an imaginative cradling task to assess participants' lateral preference and standardized questionnaires to evaluate participants' sexual orientation (Klein Sexual Orientation Grid; KSOG) and the degree of perceived gender conformity with the biological sex assigned at birth (Gender Identity/Gender Dysphoria Questionnaire For Adolescents and Adults; GIDYQ-AA). The results confirmed the expected prevalence of LCB across all groups based on participants' sexual orientation, except among heterosexual males. Additionally, higher KSOG scores were associated with increased left-side cradling proportions among biological males.

These findings suggest that sexual orientation may influence cradling lateral preference in males, indicating a complex interaction between biological and psychological factors in the lateralization of social and emotional functions. Finally, LCB appears to confirm its role as a proxy for these brain functions in human behavior.

Author/s: Gianluca Malatesta, Anita D'Anselmo, Chiara Lucafò, Daniele Marzoli, Giulia Prete, Luca Tommasi, Teresiana Azzilonna

Type: Mini-talks

Cognitive Performance in Isolated and Confined Environments (ICE): The Protective Role of Emotional Intelligence during Prolonged Isolation on Merchant Ships

Speaker: Cricenti, Clarissa

Track: Emotions and motivation

Abstract

Despite the maritime environment sharing many similarities with those commonly referred to as "Isolated and Confined Environments" (ICE), particularly regarding the experience of isolation, the challenge of adaptation among maritime populations remains largely understudied. The ships serve as both workplaces and living spaces for extended periods, often leading seafarers to liken them to prisons (Exarchopoulos et al., 2018).

This dual role underscores the importance of examining the emotional and cognitive processes associated with seafarers' isolation, especially given that the majority of maritime accidents, both domestic and international, are attributed to human factors (e.g., distraction). Following the "Person-Environment-Fit" theoretical framework (Werner et al., 2002), which conceptualizes adaptation as the product of interactions between individual (intrinsic) and environmental (extrinsic) factors, this study investigates the role of emotional intelligence in buffering the cognitive effects of isolation and confinement under prolonged conditions aboard merchant ships, while controlling for additional stressors and mitigating factors. Specifically, a sample of seafarers completed assessments measuring cognitive functions (e.g., attention), affective factors (e.g., emotional intelligence), and psychophysiological variables (e.g., sleep quality), alongside cognitive performance tasks such as the Emotional Stroop Test.

The findings of this study address a specific gap in the literature, with potential implications for designing targeted interventions aimed at enhancing seafarers' adaptability and safety in ICE settings.

Author/s: Clarissa Cricenti, Alessandro Quagliari, Giulia Lausi, Francesco Buscema, Ginevra Tagliaferri, Jessica Burras, Emanuela Mari, Anna Maria Giannini

Type: Mini-talks

Do deaf or hearing children understand emotions differently in social robots?

Speaker: Cirasa, Carla

Track: Emotions and motivation

Abstract

Humanoid robots have now entered various areas of people's lives and the study of interactions between people and robots (HRI) is becoming increasingly important. Scientific research has detailed numerous characteristics that come into play in this interaction, both aspects related to the robot and to the person.

With reference to the use of social robots in schools, numerous aspects have been studied but very few studies have analyzed the interaction between social robots and specific groups of children, such as deaf children. In this feasibility study, the ability to correctly understand the emotional expressions produced by the robot in a small group of deaf children was analyzed. The study involved nine deaf children in a school context. Children were asked to watch a video and then evaluate whether the NAO humanoid robot responded to the emotions shown in the video in a congruent or incongruent manner.

The results showed that there were no differences between deaf and hearing children in recognizing emotions. Females were generally better at recognizing emotions than males. The children who correctly read the emotions in the videos were the same ones who read the emotions in the robots. This was a small study but is intended to incentivize future research in this unknown field of study.

Author/s: Carla Cirasa, Daniela Conti, Helene Hogsdal

Type: Mini-talks

Exploring the decision component of the Activation-Decision-Construction-Action Theory within the context of malingering

Speaker: Ribatti, Raffaella Maria

Track: Emotions and motivation

Abstract

The Activation-Decision-Construction-Action-Theory (ADCAT), offers a promising avenue for refining malingering detection. ADCAT is a cognitive model for high-stakes deception that employs a cost-benefit formula to elucidate the cognitive, motivational, and social mechanisms underlying the decision to lie or tell the truth. Building upon existing research, the present study aims to explore the application of the ADCAT cost-benefit analysis across different malingering scenarios, recording both initial and final decisions after the ADCAT

Decision protocol application. Results reveal dynamic shifts in participant responses, with increased feigning observed in some scenarios from initial to final decisions, while others exhibit reversals from feigning to honesty. Significant differences in ADCAT scores suggest feigners weigh honesty's advantages but prioritize feigning for benefits. Conversely, honest individuals recognize honesty's disadvantages but prioritize avoiding feigning risks, despite potential benefits. This underscores the ADCAT protocol's capacity for a cost-benefit evaluation, extending beyond binary choice. Furthermore, Discriminant Function Analyses demonstrate robust predictive power for final decisions, with EVHonesty, EVMalingering, and MMalingering significantly contributing to decision outcomes.

These findings advance our understanding of decision-making in malingering, emphasizing situational variability and multifaceted motivations.

Author/s: Raffaella Maria Ribatti, Antonietta Curci, Tiziana Lanciano

Type: Mini-talks

Linking Social Reward Responsiveness and Affective Responses to the Social Environment: an Ecological Momentary Assessment Study

Speaker: Dell'Acqua, Carola

Track: Emotions and motivation

Abstract

Social support is a key predictor of well-being, but not everyone experiences mental health benefits from receiving it. However, given that a growing number of interventions are based on social support, it is crucial to identify features that make individuals more likely to benefit from social ties.

Emerging evidence suggests that neural responses to positive social feedback (i.e., social reward) might relate to individual differences in social functioning, but potential mechanisms linking these neural responses to psychological outcomes are yet unclear. This study examined whether neural correlates of social reward processing, indexed by the reward positivity (RewP), relate to individuals' affective experience following self-reported real-world positive social support events. To this aim, 193 university students (71 % females) underwent an EEG assessment during the Island Getaway task and completed a 10-day ecological momentary assessment where participants reported their positive and negative affect (PA, NA) nine times a day and the count of daily positive and negative events.

Experiencing a higher number of social support positive events was associated with higher PA. The RewP moderated this association, such that individuals with greater neural response to social feedback at baseline had a more positive association between social support positive events count and PA. Individual differences in the RewP to social feedback might be one indicator of the likelihood of experiencing positive affect when receiving social support.

Author/s: Carola Dell'Acqua, Anna Weinberg, Connie H. Yun, Grace O. Allison

Type: Mini-talks

Mental imagery, cortical excitability and lactademia: Pilot study on Taekwondo athletes.

Speaker: Bonanno, Valerio

Track: Emotions and motivation

Abstract

In the field of studies on imagery and motor imagery is commonly understood as the process of mental execution that leads to the performance of a certain action, but which is not physically performed by the producer.

Twentyfour Taekwondo professional athletes took part in the research that included a first training phase to the training protocol. To the tabata method, The participants were then called to a laboratory where they were exposed, while sitting, to the vision of the Tabata protocol performed by their trainer, and were then asked to imagine the Tabata protocol with their eyes closed. Excitability of motor cortex and blood lactate levels were detected. The results show a change in the excitability threshold of the motor cortex after both vision and imagination of the protocol.

The values change from initial values of 53.33%, to 48.% after viewing the Tabata protocol, to 50% after imagining the Tabata protocol, to 53, 15 minutes after the end of the entire protocol. The blood lactate values also change from a baseline value of 2.08 mmol/l to '87 mmol/l after viewing the Tabata protocol, to '90 mmol/l after viewing the Tabata protocol, .07 mmol/l 15 minutes after the end of the entire protocol.

The facilitation that is obtained by observing and imagining a gesture, a movement protocol allows us to hypothesize how these techniques can have a strong potential, both in sports and rehabilitation.

Author/s: Valerio Bonanno, Giovanna Alagona, Andrea Buscemi, Roberta Monaca, Marinella Coco

Type: Mini-talks

The network structure of self-esteem: Gender, age, and sociocultural differences through network techniques

Speaker: Girelli, Laura

Track: Emotions and motivation

Abstract

Self-esteem, a fundamental aspect of an individual's perception of their own worth, has been extensively examined in psychological research. Based on a large and representative sample of 47,974 participants (mean age: 26.59 years; SD: 12.3; 61% female), and using the Rosenberg Self-Esteem Scale, one of the most widely used measures of self-esteem in psychological research, this study takes a novel approach to examine the structure of self-esteem.

Utilizing network analysis techniques, our study focuses on the complex interactions among specific components of self-esteem, while also exploring differences in self-esteem across gender, age groups, and sociocultural contexts. Diverging from traditional methods, we employ Exploratory Graph Analysis (EGA) to uncover the underlying structure of self-esteem without presupposing the existence of latent constructs.

Moreover, we utilize the Network Comparison Test (NCT), a resampling-based permutation testing method, to identify variations in the network structures across diverse populations.

Our findings shed light on the subtle dynamics of self-esteem and its expressions within different groups, offering valuable insights for understanding this complex psychological construct.

Author/s: Laura Girelli, Elisa Cavicchiolo, Fabio Alivernini, Fabio Lucidi, Marika Maganzini, Sara Manganelli

Type: Mini-talks

Effects of anticipating regret on pro-environmental behavior

Speaker: Bonvino, Aurora

Track: Emotions and motivation

Abstract

Psychological research has focused on developing a deeper theoretical and practical understanding of the best intervention strategies to support eco-friendly behaviours, attitudes, and practices. It has been noted that the anticipation of regret is a strong inducement to act. The overall goal is to encourage young individuals to make eco-friendly decisions by manipulating their regrets. For ten days, one EkoTok (short video) will be sent every day via an automated instant messaging chat. One-hundred-twenty-eight participants were recruited for the research.

Following baseline measurements of environmental behaviour (total and subdimensions), individuals were split into two groups. The experimental group (GS) received EkoToks characterized by the manipulation of regret anticipations. The control group (GC) received only informative movies. Environmental behaviour measurements were gathered once more at the post-test and follow-up, which took place three months later. The interaction between the means of the two groups during the three measurement times was seen on: Total score ($F= 25.9; p<0.01$), Prosocial Behaviour ($F= 8.7; p<0.01$), Waste ($F= 9.9; p<0.01$), Reuse ($F= 30.8; p<0.01$), Recycling ($F= 15.9; p<0.01$), and Activism ($F= 29.6; p<0.01$). At the post-test, GS has higher scores than GC on the Total score ($F= 4.7; p<0.05$), Prosocial Behaviour ($F= 4.1; p<0.05$), Consumption ($F= 8.8; p<0.01$) and Recycling ($F= 11.5; p<0.01$). Comparing the outcomes between post - test and follow-up, GS presents higher scores than GC on Total score ($F= 22.6; p<0.01$), Prosocial Behaviour ($F= 4.2; p<0.01$), Consumption ($F= 9.5; p<0.01$), Reuse ($F= 5.4; p<0.01$), Recycling ($F= 20.5; p<0.01$) and Activism ($F= 29; p<0.01$).

The study's findings provide the scientific foundation for an intervention aimed to encourage eco-sustainable behaviour.

Author/s: Aurora Bonvino, Tiziana Quarto, Paola Palladino

Type: Poster

Exploring the relationship between environmentalism and mobility: insights from the Values-Beliefs-Norms theory

Speaker: Pellegrini, Marilina

Track: Emotions and motivation

Abstract

The Values-Beliefs-Norms theory is frequently utilized in environmental psychology to explain pro-environmental actions through a causal relationship among psychological dimensions.

The theory suggests that values influence beliefs, which then shape personal norms. These factors interact and influence each other, promoting the adoption of Pro-Environmental Behaviors (PEB). However, the relationship between PEB and daily mobility choices has not been extensively researched. This study explores the relationship between environmentalism and ecological actions, such as PEB, habits, and the frequency of using sustainable modes of transportation in daily life. A total of 226 people (159 women), ranging in age from 19 to 85 years (mean 41.59, SD 14.24), completed several questionnaires independently and anonymously. Statistical analysis was used to examine the relationships among the variables, specifically through the Structural Equation Models (SEM) method. The study revealed that psychological factors, including values, beliefs, norms, and perceived behavioral control, have a significant impact on transportation frequency and habits in daily life.

This study serves as a pilot test for selecting relevant psychological constructs to explore mobility choices. It serves as a prototype for developing and evaluating new questionnaires to investigate transportation habits and frequency of use.

Author/s: Marilina Pellegrini, Riccardo Ceccato, Andrea Spoto, Mariaelena Tagliabue

Type: Poster

Exploring the Relationship between Sleep Restriction and Emotion Regulation as a Function of Depressive Traits

Speaker: Cecchetti, Luca

Track: Emotions and motivation

Abstract

Short periods of sleep restriction have been found to alleviate symptoms of depression. Among other manifestations, depression is characterized by anhedonia, a lack of enjoyment from life's experiences. According to this, individuals with depressive symptoms may exhibit less frequent or reduced reactions to positive emotional stimuli, performing paradoxically better in emotion suppression tasks.

Recent evidence suggests that after short sleep periods, potentially indicating a state of sleep restriction, healthy people show higher rates of emotion suppression failures than after long sleep periods. Based on these premises, we hypothesize that the impact of sleep restriction on emotion suppression performance will correlate with the individual's level of depression.

To test this, participants will be shown amusing videos and will be instructed to maintain a neutral expression while their faces will be recorded. Smiling will be considered a failure in emotion suppression. Each participant will complete the task twice: once after a full night of sleep, and again after sleeping 50% of their usual amount. Prior to the first experimental session, they will fill in questionnaires assessing depressive symptoms and empathy. Comparing each participant's performances between the two experimental conditions, we expect to observe an effect of sleep restriction on participants' ability to regulate their emotional reactions. Also, analyzing the performances and questionnaires' scores we will determine whether there is a correlation between emotion suppression failures and depressive traits.

This study is pre-registered and may help our understanding of how sleep restriction affects depression, as the extent of this relationship is still unclear.

Author/s: Nika Pogosova

Type: Poster

Scototaxis response in fish: an interspecific study on the role of body colour and sociability.

Speaker: Alberto Mair, Alessandra Pecunioso, Alessio Tiberi, Christian Agrillo, Denisa Pitea, Elena Aleotti, Maria Guigues

Track: Emotions and motivation

Abstract

Scototaxis test is an anxiety-like test used by behavioural neuroscientists consisting in the assessment of dark/light preference of laboratory animals. Most of the fish species have been shown to express a preference for the dark environment.

However, the majority of the investigated species has a dark body colour, thus making a clear contrast with a white/bright background. Also, while in nature fish tend to be highly social, studies in the scototaxis literature tested single fish. Individual vs. group behaviour might interact with scototaxis response. In experiment 1, we assessed the individual response to test the hypothesis that the different colours of the body might modulate the dark/light preference. We found that species with a dark body colour (*Hyphessobrycon megalopterus*) and a largely transparent body colour (*Kryptopterus bicirrhys*) strongly preferred the darker environment. Instead, the preference for darkness of a species with a luminescent part of the body (*Cheirodon axelrodi*) was less pronounced. Lastly, a species with a white body colour (*Corydoras albini*) did not prefer either a bright or a dark sector. In experiment 2, we observed the same species, but subjects were simultaneously inserted in the test tank (shoals of 20 individuals). While *H. megalopterus* and *K. bichirrhys* confirmed their robust preference for darker environments, the other two species modified their preference and selected preferentially the white compartment.

These results, taken together, indicate that scototaxis response is context-dependent, as it appears to be modulated by the body colour and the presence/absence of other conspecifics in the surrounding.

Author/s: Alberto Mair, Elena Aleotti, Alessandra Pecunioso, Alessio Tiberi, Christian Agrillo, Denisa Pitea, Maria Guigues

Type: Poster

The Effect of COVID-19 on Anxiety, Depression, and Sleep Conditions: A Longitudinal Study on a Spanish Sample

Speaker: Viola, Marco

Track: Emotions and motivation

Abstract

The aim of the study is to assess the longitudinal effect of COVID-19 symptoms on anxiety, depression, and sleep conditions in a sample of Spanish adults. The 609 individuals completed the anxiety, depression, and sleep questionnaire every 2 weeks for one year, within the period from late July 2021 to December 2022.

Data on previous COVID-19 infection prior to questionnaire administration are also available for each participant. Respondents were classified into two groups based on the presence or absence of COVID-19 symptoms. The mean age of the sample is 55 years, and 60% are female. Means and standard deviations for anxiety, depression, and sleep were calculated; these scores were tracked over time for each individual using an idiographic approach.

Differences in scores between the two groups in the presence or absence of COVID-19 symptoms were examined. A generalized linear model was implemented to model the means and standard deviations of the three scores according to group membership. A difference in depression score is highlighted, with a higher level in the symptomatic group ($t = -2.16$, $p = 0.02$). Membership in this group increases the depression score, indicating a worsening in anhedonia conditions ($\beta = 0.33$, $p = 0.04$). The presence of COVID-19 significantly increases the standard deviation of anxiety and depression ($\beta = 0.11$, $p = 0.05$, $\beta = 0.12$, $p = 0.03$ respectively), indicating fewer stable conditions.

However, nothing significant was found for sleep conditions ($\beta = -0.35$, $p = 0.14$; $\beta = 0.08$, $p = 0.26$ for mean and standard deviation respectively).

Author/s: Marco Viola, Guillaume Chevance, Rosalba Rosato, Manolis Kogevinas

Type: Poster

Contribution to the Italian Validation of the “Motivation to Have a Child Scale” (MSC)

Speaker: Cucinella, Nicla

Track: Emotions and motivation

Abstract

The Motivation to have a Child Scale (MCS; Brenning et al., 2015; Gauthier et al., 2007) assesses the motivation to have a child within the framework of Self-Determination Theory (SDT; Deci & Ryan, 2000). The scale consists of 20 items evaluating 5 types of motivation. Various studies have provided empirical evidence supporting its good psychometric properties, suggesting it could be a useful tool for investigating the motivation to have a child. However, no validated version exists for the Italian context. This research aims to evaluate the psychometric characteristics of the Italian version of the MCS. The participants are 447 young adults (74% female) aged between 18 and 30 years ($M = 22.01$, $SD = 3.27$). To evaluate the factorial structure, 3 alternative models were tested using confirmatory factor analysis. The results revealed that the five-factor correlated model showed the best fit to the data, $\chi^2(160) = 358.19$, $p < .001$, $CFI = .993$, $RMSEA = .053$ (90% C.I. .045, .060).

The scale also demonstrates good reliability, both in terms of single-item reliability indicators ρ_i (with values ranging from .50 to .88, except for item 12, $\rho_i = .37$) and composite reliability indicators ρ_c (with values ranging from .95 to .97). Overall, the findings indicate that the Italian version of the MCS can be a promising tool in SDT-based research contexts and can be used in intervention programs aimed at promoting couples' well-being.

Author/s: Nicla Cucinella, Martina Gallo, Costanza Baviera, Sebastiano Costa, Cristiano Inguglia, Francesca Liga, Sonia Ingoglia

Type: Poster

Detection of cognitive-emotional feedback in interviewer-interviewee interaction

Speaker: Piro, Alessandro

Track: Emotions and motivation

Abstract

The therapeutic goal of fostering effective therapeutic relationships involves facilitating emotional regulation processes, which are influenced by patient-therapist synchronization patterns. Numerous studies have explored these synchronization processes by combining specific measurement techniques with physiological markers such as skin conductance (SC) and heart rate (HR).

This study involves students accessing the University of Bari's Psychological Counseling Service and their respective therapists. By integrating physiological measures (e.g., HR and SC) obtained through non-invasive devices (e.g., Empatica E4 wristband) with explicit measures (e.g., emotional regulation, therapeutic alliance and overall psychological well-being), the aim is to evaluate the efficacy of the implemented interventions and the associated therapist-student synchronization patterns.

Author/s: Alessandro Piro, Antonietta Curci, Ivan Mangiulli

Type: Poster

Emotion Detection in the Banking Sector: A Pilot Study

Speaker: Borrelli, Patrizia

Track: Emotions and motivation

Abstract

Affective Computing (AC) is a branch of Artificial Intelligence (AI) that focuses on studying and developing systems and devices capable of recognizing, interpreting, processing, and simulating human emotions through computer interfaces.

Over the past decades, AC has been applied in various fields, including the banking sector, to improve user services and to assess customer satisfaction. In this context, AC applications require the system to be trained to distinguish between different emotions in response to relevant activities.

To address this need, the present pilot study developed three emotional scenarios (happiness, fear, and anger) representing typical ATM-related situations, aiming to assess whether they could induce the respective emotions in users and to what extent. Sixty participants took part in the study (50% women; $M = 26.6$, $SD = 6.03$). Results showed that the happiness and anger scenarios elicited the corresponding emotions with medium-to-high intensity ($p < .001$), while the fear scenario resulted in a low level of corresponding emotional activation.

These findings appear promising for the implementation of emotion recognition programs in customer-bank interactions through dedicated devices.

Author/s: Patrizia Borrelli, Ivan Mangiulli, Fabiana Battista, Antonietta Curci

Type: Poster

Olfactory targeted memory reactivation during sleep as a tool to modulate sleep and dreams

Speaker: Pedreschi, Bianca

Track: Emotions and motivation

Abstract

The field of dream engineering aims to develop techniques to modify nocturnal dreams systematically to investigate their significance and function. The so-called targeted memory reactivation (TMR) protocol involves pre-sleep associative conditioning, where a memory task is learned while sensory cues are presented. Presenting these cues during sleep has been shown to bias memory consolidation towards the learned content. If dreams reflect sleep-dependent memory consolidation, the hypothesis would therefore be, that TMR also influences dream content.

We developed a protocol combining an odor-based TMR with an emotional memory task and a serial awakening paradigm for dream assessment while measuring high-density EEG. This experimental protocol requires the use of different odors to be associated with specific memories, represented by distinct thematic pictures. Therefore, we performed a preliminary investigation aimed at identifying a set of distinguishable, affectively neutral, non or mildly trigeminal odors.

Eleven monomolecular odors were selected from the available literature based on their affective neutrality, distinctiveness, and chemical-physical properties. Twenty-two participants completed a standardized procedure in which they assessed each odor for its valence, arousal, familiarity, distinguishability, and trigeminal nerve sensations. Participants also reported the potential association of each odor with specific memories or semantic categories. This systematic procedure will allow us to exclude odors that may induce the reactivation of remote memories in place of those paired during pre-sleep associative conditioning. This assessment is crucial for the design and implementation of the subsequent experiments

Author/s: Bianca Pedreschi, Leila Salvesen, Ruggero Basanisi, Giorgia Mosca, Tommaso Lomonaco, Roberto Garofalo, Alberto Greco, Sarah Schoch, Martin Dresler, Giulio Bernardi

Type: Poster

Yoga, Cognitive Health, and Emotional Well-being. A Systematic Review on Healthy Young Adults

Speaker: Rizzuti, Martina

Track: Emotions and motivation

Abstract

Could yoga, with its mind-body approach, improve cognitive and emotional well-being in young adults? Research indicates that yoga provides mental health benefits, but studies on young adults are still scarce. The growing popularity of yoga among young adults - a population undergoing significant cognitive and emotional changes and adaptations - supports the importance of studying its effects on their well-being. Accordingly, this systematic review aims to investigate the effects of yoga practice on cognitive and emotional processes in healthy young adults (18-30 years old).

The review protocol has been registered on PROSPERO platform (ID: CRD42024527762). A systematic literature search has been performed on 16 March 2024 on PubMed, PsycInfo, and Scopus. The analysis considers yoga practice, both individual/group, in-person/online, with no restrictions on type or duration. The interest group comprises yoga practitioners, compared to control subjects practicing free-body exercise or with no intervention. Studies with at least one cognitive or emotional process evaluation are considered. Studies combining yoga with other activities or treatments are excluded. Literature screening, data extraction, and risk of bias assessment are independently conducted by two reviewers.

A total of 6148 articles have been extracted, of which 2172 were duplicates. From the first analysis, it appears that yoga provides cognitive and - to a greater extent - emotional benefits in young adults, regardless of the practice type.

A better understanding of yoga effects on young adults' cognitive and emotional functions can help promoting well-being and personal success in this population.

Author/s: Martina Rizzuti, Francesca Balsamo, Elisabetta Baldi, Debora Meneo, Erica Berretta, Laura Serra, Chiara Baglioni, Francesca Gelfo

Type: Poster

A Neurophysiological Approach to Emotion Recognition of Faces and Bodies: A Study on Transauricular Vagus Nerve Stimulation (taVNS)

Speaker: Leemhuis, Erik

Track: Emotions and motivation

Abstract

The accurate recognition of emotional expressions is fundamental to interpreting human behavior and, consequently, to planning and generating responses in social interactions. Visual and auditory information from the environment, along with individual-specific characteristics, underlie the interpretation of such stimuli.

Additionally, physiological state plays a key role, particularly in regulating the homeostatic balance between the sympathetic and parasympathetic systems. This exploratory study aims to investigate the effects of vagal modulation via taVNS on the ability to recognize auditory stimuli with emotional valence (anger, surprise, and fear) or neutral content, which must be matched to corresponding bodily or facial expressions.

The study further examines potential correlations between emotion recognition ability, heart rate variability (HRV), and individual characteristics and experiences assessed through self-report questionnaires. To this end, a sample of young adults participated in the study. Each participant underwent two randomized experimental sessions on different days at the same time, with one session involving active taVNS stimulation and the other involving a sham taVNS control. Preliminary findings suggest alterations in emotion recognition tasks involving body images during the stimulation condition, though overall task performance did not show significant changes.

This alteration may be attributable to interference in recognizing neutral stimuli, highlighting the need for further investigation into the relationship between vagal activity and emotional stimulus recognition.

Author/s: Erik Leemhuis, Angelica Scuderi, Maria Luisa De Martino, Mariella Pazzaglia

Type: Poster

Exploring Sex-Related Differences in Emotional Processing Through Verbal Analysis: A Study Utilizing the Toronto Structured Interview for Alexithymia and Natural Language Processing

Speaker: Laricchiuta, Daniela

Track: Emotions and motivation

Abstract

The translation of emotional experience into words is associated with language style, as narratives fully reflect emotional processes. During narration, while a symbolic verbal dimension organizes the word sequence, a sub-symbolic verbal dimension influences prosody, meter, and rhythm.

Therefore, the symbolic and sub-symbolic verbal analysis of narratives provided through an interview measuring the ability to identify and describe emotions - the Toronto Structured Interview for Alexithymia (TSIA) - represents a powerful tool for revealing emotional processing. On this basis, verbal analysis of narratives provided by men and women, interviewed through the TSIA, could be a potent tool for revealing any sex-related differences regarding emotional processing. In the present study, a small sample of healthy adult subjects of both sexes (12 men and 10 women) was recruited, and their ability to regulate, express, and identify emotions was analyzed using the TSIA and a series of self-report psychological questionnaires, such as the Attachment Style Questionnaire, the Emotion Regulation Questionnaire, the Coping Orientation to the Problems Experiences, the Beck Depression Inventory, and the State-Trait Anxiety Inventory-2. The Big Five Questionnaire was also administered for personality trait assessment. Transcriptions derived from the TSIA of men and women were analyzed using Natural Language Processing (NLP). The NLP technique allowed the extraction of various linguistic features to test the NLP actual differentiation ability between women and men based on their verbal expression of emotions. Using a Machine

Learning approach, psychological assessment was then combined with linguistic results to better interpret the descriptive features produced by NLP

Author/s: Daniela Laricchiuta, Andrea Termine, Carlo Fabrizio, Noemi Passarello, Anna Panuccio, Fabrizio Piras, Eleonora Picerni, Debora Cutuli, Laura Petrosini

Type: Poster

Moral predictors of antivaccination attitude in the Italian COVID-19 post pandemic era

Speaker: Casula, Antony

Track: Emotions and motivation

Abstract

****Background**.** Vaccine hesitancy encompasses a complex attitude intertwined with social, cognitive, and affective processes not clearly understood. We aimed to provide new insights to the field by focusing on the role of ethical appraisal in vaccine hesitancy.

****Methods**.** We utilized the Moral Foundations Questionnaire (MFQ) and a set of moral dilemmas to investigate potential links between explicit measures of moral appraisal such as moral reasoning and moral decision making and vaccine hesitancy (VH), as measured by the adult Vaccine Hesitancy Scale. Furthermore, we investigated whether Misinformation susceptibility about COVID-19 could affect the aforementioned link.

****Results**.** The MFQ results document a higher endorsement of authoritarianism in individuals with high VH than low VH, in contrast to the previous literature. The Moral dilemma results document a negative relationship between the tendency to apply incidental (but not instrumental or filler) moral dilemma resolutions and VH scores, regardless of moral judgement, emotional valence and arousal associated to the dilemmas. Additionally, a moderation effect of misinformation susceptibility about COVID-19 showed that only in highly (+1SD) and medium (but not low, i.e., -1SD) informed people VH scores are negatively predicted by the tendency to apply incidental dilemma resolutions.

****Discussion**.** These results extend current research in the field by showing that that moral decision-making and misinformation susceptibility about COVID-19 are predictors of a larger hesitancy to get vaccinated in the COVID-19 post-pandemic era.

Author/s: Antony Casula, Simona Massimino

Type: Poster

The dyadic invariance of the parent version of the Elementary School Abbreviated Math Anxiety Scale in parental dyads

Speaker: Di Leonardo, Laura

Track: Emotions and motivation

Abstract

Assessing measurement invariance is crucial for ascertaining whether observed differences in a construct genuinely represent differences between groups or arise from inconsistencies in the measurement process.

Among the various types of measurement invariance, dyadic invariance represents an important assumption to test before comparing values among individuals within a dyad. Dyadic invariance involves modeling observed and latent factors in each group into a single structure while accounting for intercorrelations between dyad members by incorporating covariances between the cross-group latent factors and item error pairs. The study aimed to examine the dyadic invariance of the parent-proxy Elementary School Abbreviated Math Anxiety Scale (Caviola et al., 2017; Primi et al., 2020) across reports provided by mothers and fathers. The parent version of the ES-AMAS (ES-AMAS-P) was administered to 550 dyads of mothers (Mage = 42.91 years; SD = 4.99) and fathers (Mage = 45.80 years; SD = 5.63) of children attending primary school (54% female). After verifying that the two-factor factor structure had a good fit in both groups, the dyadic invariance of the ES-AMAS-P between the two members of the parental dyad was assessed. Full dyadic invariance was met, indicating that the ES-AMAS-P works equally for both members of the parental dyad.

Our results corroborate the internal validity of the ES-AMAS-P and support the feasibility of administering the scale equivalently to either of the two parents.

Author/s: Laura Di Leonardo, Maria Anna Donati, Costanza Gori, Sofia Santisi, Caterina Primi

Type: Poster

The Role of the Submental Muscle in Consumer Preferences: Electrophysiological Analysis in a Virtual Supermarket

Speaker: Ferraioli, Francesca

Track: Emotions and motivation

Abstract

This study explores physiological indicators associated with consumer preferences through the use of electromyography (EMG) of the submental muscle in a virtual supermarket context. By observing 60 healthy participants in a simulated environment, the EMG of the submental muscle is analyzed to determine its correlation with preferences scores rated by participants. The submental muscle, part of the suprahyoid muscle group involved in chewing and swallowing movements, is studied for its connection with reward valuation circuits. Preliminary results suggest an increase in submental muscle activity for preferred and more appetizing products, indicating a predictive potential of this electrophysiological measure in real food choices.

This research offers new insights into the physiological bases of consumer preferences, highlighting the importance of the submental muscle as a predictive index in purchase decisions in complex environments.

Author/s: Carmelo M. Vicario, Chiara Lucifora, Francesca Ferraioli

Type: Poster

Three-Dimensional Emotions: Volumetric Videos for Psychological Assessment

Speaker: Simoncini, Gloria

Track: Emotions and motivation

Abstract

Emotions play a crucial role in shaping how individuals adapt to their surroundings. In the field of psychological assessment, skills in recognizing one's own emotions have mostly been investigated through self-report questionnaires. Such tools require individuals to have sufficient self-awareness and abstraction abilities to provide self-assessments that accurately reflect their actual competencies.

It is worth noting, however, that issues related to self-awareness, and the description and expression of emotions are features of dysregulated emotional processes, which define conditions such as alexithymia, eating disorders, and autism. To enable an ecologically valid assessment of individual emotional recognition skills, new technologies can provide valuable support. Among these, volumetric video (VV) technology is emerging as an innovative visualization method that converts real-time videos into holograms.

This process involves using multiple cameras to capture volumetric data of bodies, thus creating a three-dimensional representation of the scene. The immersive nature of these videos enhances viewer engagement, offering a unique level of experiential involvement. Leveraging VV technology, our goal is to develop a new tool for assessing individuals' ability to recognize their own emotions.

To achieve this, we have specifically developed volumetric videos depicting everyday life situations, taking into account various contextual aspects, such as setting and interaction, as well as emotional factors, including levels of arousal and degrees of valence.

Author/s: Gloria Simoncini

Type: Poster

Unveiling synaptic and transcriptomic signatures of approach behavior in medial prefrontal cortex pyramidal neurons: the involvement of excitatory neurotransmission and immune system

Speaker: Panuccio, Anna

Track: Emotions and motivation

Abstract

Approaching (AP) and avoiding (AV) tendencies are basic behavioral aptitudes in responding to rewarding and aversive stimuli, and their balancing (BA) is critical for successful adaptation to the environment. The AP tendency, associated with novelty seeking, plays an important evolutionary role in identifying new sources of reward but also heightens the risk of externalizing behaviors like attention deficit/hyperactivity disorder, and addiction.

Despite the medial prefrontal cortex (mPFC) being a crucial hub for sustaining attention towards relevant and novel stimuli in AP behavior, its specific synaptic and transcriptomic signatures have not yet been identified. In the present research, we employed an experimental model of individual differences to select a subpopulation of mice that spontaneously responded with AP or BA behaviors toward conflicting emotional stimuli, and expressed yellow fluorescent protein (YFP) in pyramidal neurons of the mPFC. Electrophysiological recordings revealed that AP mice exhibited a significantly higher frequency of spontaneous excitatory post-synaptic currents in mPFC pyramidal neurons compared to BA mice. We isolated YFP-expressing pyramidal neurons from AP and BA mice for cell-specific RNA analysis.

The transcriptomic results highlighted differential gene expression between AP and BA mice, particularly in immune system regulation pathways. Notably, AP mice exhibited overexpression of genes related to immune responses, along with changes in cell number and activation of specific peripheral and central immune cells such as CD3⁺ T lymphocytes and microglia.

Overall, our findings suggest that in the mPFC both the increased excitatory neurotransmission and the altered immune response are crucial underpinnings of the AP tendency.

Author/s: Anna Panuccio, Juliette Gimenez, Andrea Termine, Carlo Fabrizio, Giuseppe Sciamanna, Francesca Balsamo, Noemi Passarello, Marta Tiberi, Alessandro Matteocci, Marco De Bardi, Valerio Orlando, Laura Petrosini, Daniela Laricchiuta

Type: Poster

Biological Rhythms as Key Mediators in Major Depressive Disorder: Implications for Symptomatology and Treatment

Speaker: Guerrero, Claudia Savia

Track: Health and wellbeing

Abstract

Major Depressive Disorder (MDD) is a complex mental health condition characterized by persistent feelings of sadness, loss of interest, and impaired daily functioning across cognitive, social, and occupational domains. Research has consistently highlighted dysregulation of biological rhythms in individuals with depression, exacerbating depressive symptoms and impairing overall functioning. This preliminary study aims to investigate the role of biological rhythms in the heterogeneous symptomatology of Major Depressive Disorder. The sample consisted of 53 MDD patients (34 male and 19 female) who underwent comprehensive neuropsychological evaluation. The results shown significant correlations between affective symptoms of depression (HDRS) and psychosocial functioning (FAST), as well as biological rhythms (BRIAN), particularly regarding sleep, activity, and social rhythms. Additionally, affective symptoms were associated with sleep patterns (PSQI), including latency, effectiveness, and subjective sleep quality. Moreover, biological rhythms appear to mediate the causal relationship between HDRS and FAST, serving as a partial mediator in the relationship between these two variables.

Understanding the complex interplay between depression and biological rhythms is crucial for developing more effective treatment strategies. Targeting interventions to restore circadian rhythm stability, such as light therapy, sleep hygiene practices, or pharmacological agents, may alleviate depressive symptoms and enhance overall functioning in individuals with MDD.

Author/s: Claudia Savia Guerrero, Francesco Maria Boccaccio, Giuseppe Alessio Platania, Simone Varrasi, Vittoria Torre, Cettina Pirrone, Filippo Caraci, Sabrina Castellano

Type: Mini-talks

Continuous tracking of effort and confidence while listening to speech-in-noise in young and older adults

Speaker: Valzolgher, Chiara

Track: Health and wellbeing

Abstract

Reporting discomfort when noise affects listening experience suggests that listeners may be aware, at least to some extent, of adverse environmental conditions and their impact on listening experience. This involves monitoring internal states (effort and confidence). Here we quantified continuous self-report indices that track one's own internal states and investigated age-related differences in this ability. We instructed two groups of young and older adults to continuously report their confidence and effort while listening to stories in fluctuating noise. Using cross-correlation analyses between the time series of fluctuating noise and those of perceived effort or confidence, we showed that (1) participants modified their assessment of effort and confidence based on variations in the noise, with a 4 s lag; (2) there were no differences between the groups.

These findings imply extending this method to other areas, expanding the definition of metacognition, and highlighting the value of this ability for older adults.

Author/s: Chiara Valzolgher, Alessandra Federici, Elena Giovanelli, Elena Gessa, Davide Bottari, Francesco Pavani

Type: Mini-talks

Exploring Psychopathological Conditions and Birth Weight Effects in ADHD: A Preliminary Study

Speaker: Boccaccio, Francesco Maria

Track: Health and wellbeing

Abstract

Attention-Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder characterized by inattention, impulsivity, and hyperactivity, with onset during childhood. It is usually comorbid with different psychopathological conditions, resulting in a global functioning impairment.

Moreover, available evidence suggests that lower birth weight could be a risk factor for development of ADHD and its linked psychopathological features. In accordance with this scenario, the aims of this preliminary study were twofold: (1) to explore main psychopathological conditions associated with ADHD; (2) to understand the role of birth weight in predicting them. Forty-six ADHD children (41 boys, 5 girls; mean age = 8.46 ± 2.40 ; mean birth weight = 3.10 ± 0.65) were recruited via convenience sampling. The Child Behavior Checklist (CBCL) and Disruptive Behavior Rating Scale (SCOD) were administered to the children's parents. The whole sample showed borderline scores on anxious/depressed, social and attention problems, rule-breaking and aggressive behavior CBCL subscales. Additionally, clinically relevant scores on CBCL internalizing, externalizing, and total score scales were detected. Besides, birth weight was negatively correlated with internalizing and total score CBCL scales. Moreover, anxious/depressed, social and attention problems, aggressive behavior, and internalizing, externalizing, and total score CBCL scales were significantly correlated with SCOD-inattentive and SCOD-hyperactivity/impulsivity subscales.

Those with clinical scores on SCOD-inattentive and SCOD-hyperactivity/impulsivity also showed higher levels on CBCL total scores. Moreover, birth weight predicts CBCL internalizing and total scores.

The findings underscore the complexity of ADHD, highlighting its broad spectrum of psychopathological symptoms, and emphasize the significance of birth weight in contributing to neurodevelopmental challenges.

Author/s: Francesco Maria Boccaccio, Michela Bianchini

Type: Mini-talks

Fostering an Age-Friendly Sustainable Transport System: A Psychological Perspective

Speaker: Caffò, Alessandro Oronzo

Track: Health and wellbeing

Abstract

The aging population is rapidly growing across the world, with the number of people aged 65 or older projected to reach 1.6 billion by 2050. As such, it is essential to consider how to develop sustainable transport systems that are age-friendly.

This perspective proposal investigates how to foster an age-friendly transport system with a particular focus on public and sustainable transport options for the elderly. Existing transport systems are evaluated to determine their adherence to an effective age-friendly transport system in terms of three main requirements, namely affordability, accessibility, and safety. Then, a psychological perspective is introduced by considering the psycho-physical needs and preferences of the elderly as well as individual factors affecting them. Four areas are considered: (a) independence and autonomy, (b) comfort and convenience, (c) social inclusion and ageism, (d) physical health and well-being, especially injuries due to mobility and fear connected with them. Finally, a proposal is made about psychological training programs directed to both elderly users and transport workers to overcome concerns for an age-friendly transportation system.

Such programs could effectively support the age-friendly use of public transport systems simply by increasing the age-friendly skills of both users as well as transport workers.

Author/s: Luigi Tinella, Andrea Bosco, Sergio Traficante, Rosa Napoletano, Elisabetta Ricciardi, Giuseppina Spano, Antonella Lopez, Giovanni Sanesi, Angela Stefania Bergantino, Alessandro Oronzo Caffò

Type: Mini-talks

New technologies and assistive robotics for elderly: A review on psychological variables

Speaker: Smeriglio, Rossana

Track: Health and wellbeing

Abstract

The article reviews recent research on new technologies for assisting the elderly based on Artificial Intelligence: Utilities for smart houses and Ambient Assisted Living, wearable and monitoring devices, virtual and augmented reality, and assistive robotics.

These smart technological tools can reduce the isolation of older adults by assisting them in their daily activities, but without completely replacing direct interventions, and requiring human support to facilitate interaction.

In determining the effectiveness of assistive technologies, older people's perceptions of them, acceptability, and willingness to use them are key variables. Also relevant is the perception by caregivers and healthcare professionals, and the socio-cultural dimension of acceptability.

Finally, the paper presents the ethical issues related to the use of technologies with the elderly population, to ensure the autonomy, safety, and dignity of the person.

In conclusion, the challenges for the future of assistive technologies are highlighted, so that they can best be used to assist large and differentiated elderly populations.

Author/s: Rossana Smeriglio, Mariagrazia Costanzo, Santo Di Nuovo

Type: Mini-talks

Relationship between HEXACO personality traits and the academic performance of middle school adolescents

Speaker: Mottola, Francesca

Track: Health and wellbeing

Abstract

School performance has long been the focus of interest of the educational community. Numerous studies have examined the factors that influence it, exploring not only the impact of cognitive abilities, but also the role of non-cognitive factors such as personality traits.

These studies have shown that personality traits and school performance are significantly correlated. However, to date, studies that have investigated this relationship using the HEXACO model in the assessment of personality, particularly of adolescents, are still limited. In this regard, the present work aims to investigate the relationship between HEXACO personality traits and school performance in two large samples of Italian adolescents aged 10-14 years (N=714 and N=1093) using multilevel mixed models. The main results showed that: 1) Conscientiousness and Openness to Experience were the most important predictors of school performance, followed by Honesty-Mindfulness; 2) a modest effect was also present for Extroversion and Emotionality; 3) these influences occurred net of the influence of gender and class and can be generalized to first, second and third grade male and female adolescents; 5) the results were replicated in two studies.

The results of this work can add significant knowledge to the field of adolescent psychology by providing new data on how personality influences the learning dynamics and behavior of adolescents.

Author/s: Augusto Gnisci, Francesca Mottola, Ida Sergi, Marcello Gallucci, Marco Perugini, Vincenzo Paolo Senese

Type: Mini-talks

The activity is nothing without control. Promoting an active life in aging while safeguarding against potential accident risks.

Speaker: Napoletano, Rosa

Track: Health and wellbeing

Abstract

The aging population continues to grow, necessitating increased healthcare, social security, and support. In response, Active Aging (AA) initiatives have been established to foster well-being and successful aging. AA refers to the engagement in physical, mental, and social activities to improve quality of life, independence, and social participation. However, engagement in activities (e.g. walking, driving, and daily life activities) may lead to greater physical risk and injuries (e.g. falls, collisions, burns, and cuts).

Considering this, this study aims to explore potential drawbacks of AA engagement in daily activities, aiming to identify variables that could mitigate accidents and enhance safety. Alongside demographic factors (age, gender, education), predictors such as level of AA, exposure, and proneness toward risky behaviors are examined across indoor, outdoor, and driving contexts in 82 healthy older persons. A standard Bayesian multi-model approach was employed to analyze these variables in each context. In outdoor context, results showed the relationship between AA and proneness to risky behaviors; participants with greater proneness to risky behaviors showed the highest average number of accidents. In indoor context, female participants more exposed to domestic activities showed the highest average number of accidents, while male participants with greater proneness to risky behaviors showed a highest average number of driving accidents.

The comprehensive framework resulting from this in-depth investigation identifies differentiated indicators for various contexts, potentially useful for preventing aging-related accidents.

In conclusion, to decrease the risks related to engagement in activities, promotion of age-friendly environments could enhance safety and social participation for older people.

Author/s: Rosa Napoletano, Antonella Lopez, Giuseppina Spano, Luigi Tinella, Sergio Traficante, Elisabetta Ricciardi, Alessandro Oronzo Caffò, Andrea Bosco

Type: Mini-talks

Practical Driving Test Anxiety: A Study to Assess the Impact of a Specifically Designed Program

Speaker: Biassoni, Federica

Track: Health and wellbeing

Abstract

This study aimed to evaluate the effectiveness of a program specifically designed to address anxiety related to the practical driving test. A total of seventy candidates from a driving school course were selected from a larger group of 250 students based on their high test anxiety scores. These participants were randomly divided into two groups: the experimental group, which received training from a traffic psychologist, and the control group, which received additional driving lessons and a session to discuss test-related concerns with a guide instructor. The State Anxiety Scale (STAI) was used to measure anxiety levels three times: before the training/alternative treatment, immediately after, and before the driving test.

The results showed that the experimental group exhibited significantly lower anxiety levels after the training and before the driving test when compared to the control group. The study's results will provide insights into the program's efficacy in reducing anxiety related to the practical driving test.

Author/s: Federica Biassoni, Martina Gnerre

Type: Poster

A computational framework for automated detection and feature extraction of chicks' vocalisations.

Speaker: Torrisi, Antonella Maria Cristina

Track: Language, reading and music

Abstract

Animal vocalisations are pivotal for intraspecies communication and serve as indicators of welfare and social interactions. In the early days of life, poultry chicks' (*Gallus gallus*) vocalisations are crucial for hen-chick relation, offering insights into chicks' affective states and welfare. However, there is a dearth of automated vocalisation detection and recognition systems. While previous studies have identified different classes of chick calls linked to internal states, existing classification models lack systematic validation and are subject to human bias.

To address this gap, we are developing a computational framework for automated detection and feature extraction of chicks' vocalisations. Six signal processing algorithms were tested for call onset detection. The High Frequency Content (HFC) algorithm performed best with an F1 measure of 0.85. Additionally, our method for computing call offsets, combining first-order difference of energy with local minimum detection, outperformed other methods with an F1 measure of 0.94. Lastly, we designed a pipeline for the automatic extraction of audio features that have been proven to be crucial for call type classification. The extracted features encompass the call duration, F0 statistics, energy ratios of harmonics, root mean square (RMS), spectral centroid, and waveform envelope statistics.

Our computational approach utilises signal processing algorithms to automatically detect calls and extracts acoustic features to identify vocal signatures of chicks. Ongoing research will determine if distinct categories or a continuous spectrum more aptly characterise chicks' vocal production. These findings offer insights into chicks' vocal repertoire and welfare, with potential applications in behavioural studies and animal welfare assessment.

Author/s: Antonella Maria Cristina Torrisi, Inês De Almeida Nolasco, Elisabetta Versace, Emmanouil Benetos

Type: Talk in simposio

Effects of a rhythm-based intervention for reading in dyslexia: Comparing in presence and tele-rehabilitation settings

Speaker: Cancer, Alice

Track: Language, reading and music

Abstract

Based on the transfer effects of music training on the phonological and reading abilities of children with dyslexia, a computerized rhythmic intervention—the Rhythmic Reading Training (RRT)—was developed, in which reading exercises are combined with a rhythmic synchronization task.

This rehabilitation program was previously tested in multiple controlled clinical trials, which confirmed its effectiveness in improving reading in children and adolescents with dyslexia. Given the advantage of telerehabilitation methods for dyslexia during the COVID-19 pandemic, clinical research was needed to test the effectiveness of tele-training approaches by comparing their outcomes with those of face-to-face interventions.

To compare the effectiveness of telerehabilitation vs. in-presence rehabilitation of dyslexia, RRT was tested on a sample of 36 children aged 8–13 with a diagnosis of developmental dyslexia. Participants were assigned to either a telerehabilitation ($n = 18$) or an in-presence ($n = 18$) rehabilitation setting and received RRT for 10 biweekly sessions of 45 min, supervised by a trained practitioner. The results showed that both telerehabilitation and in-presence rehabilitation were effective in improving reading and rapid automatized naming in children with dyslexia and that the effects were comparable between settings.

Such results demonstrated that RRT is effective despite the administration method (remote or in-presence), thus adding evidence of its potential as a rehabilitation method for dyslexia.

Author/s: Alice Cancer, Daniela Sarti, Marinella De Salvatore, Elisa Granocchio, Alessandro Antonietti

Type: Talk in simposio

Effects of rhythm on attention at birth

Speaker: Arioli, Martina

Track: Language, reading and music

Abstract

Rhythm perception and production start very early in human ontogeny as already the foetus can appreciate rhythmic patterns (e.g., maternal movements) and produce rhythmic behaviours (e.g., Non-Nutritive Sucking, NNS). This early sensitivity to rhythm is thought to be crucial for later development of various cognitive functions, including language, but the link to attention is unclear. Here, we investigated the impact of rhythm and prenatal rhythmic stimulation on postnatal attention skills. To this end, from 29 weeks pregnant, two groups of women were enrolled in either a rhythmic (G1) or non-rhythmic (G0) stimulation protocol. Postnatal attention skills were tested at birth and 2 months. At birth we measured NNS rate in response to rhythmic vs non-rhythmic sounds, and how quickly newborns shifted their gaze in an overlap task involving a rhythmic, non-rhythmic or static central cue and a static peripheral target. This latter task was administered also at 2-months to test the long-term effects of the prenatal stimulation.

Results showed that newborns' NNS was faster while listening to rhythmic vs. non-rhythmic sounds, and, in G1, this effect increased as a function of the amount of prenatal stimulation ($p < .01$). At 2 months, all infants disengaged attention faster from the rhythmic vs. non-rhythmic S1 ($p < .001$), but only newborns in G1 showed this same effect at birth ($p = .02$). This research provides the first demonstration that prenatal rhythmic stimulation improves postnatal attention abilities, adding to earlier evidence of developmental continuity across the perinatal period.

Author/s: Martina Arioli, Alessandra Consales, Lorella Gianni, Melissa Savoldi, Valentina Silvestri, Viola Marina Macchi Cassia

Type: Talk in simposio

The Beat and Beyond: Unveiling the Roots, Development, and Applications of Human Musical Rhythm

Speaker: Cancer, Alice

Track: Language, reading and music

Abstract

From tapping our foot while we listen to our preferred music to coordinating movements with others, rhythm plays a vital role in our lives.

This symposium offers a multifaceted exploration of rhythm perception and performance, examining its evolutionary origins (phylogeny), development throughout life (ontogeny), and potential for clinical applications. Andrea Ravignani (Sapienza University of Rome) explores the evolutionary roots of rhythm, examining leading hypotheses and how studying rhythm in non-human animals can provide clues about our own rhythmic heritage. Martina Arioli (University of Milano-Bicocca) sheds light on the surprising early roots of rhythm perception, demonstrating that newborns are sensitive to rhythm and that prenatal exposure to rhythmic stimulation can enhance their attentional skills. Carlotta Lega (University of Pavia) examines how individual differences in musical reward sensitivity, intrinsic properties of musical stimuli and musical pleasure together shape individual rhythmic skills as well as interpersonal synchronization abilities. Alice Cancer (Università Cattolica del Sacro Cuore, Milan) delves into the world of rhythm-based interventions.

Her study investigates the effectiveness of a program designed to improve reading skills in children with dyslexia, demonstrating promising results in both face-to-face and tele-rehabilitation settings. By bringing together different perspectives, the symposium seeks to present a multifaceted understanding of human rhythmic abilities, showcasing its significance in our perception, development and evolutionary history.

Presenting complementary methodologies and approaches, this symposium will offer challenging perspectives on musical perception and musical production, providing new insight into the origin of human musicality.

Author/s: Carlotta Lega, Alice Cancer, Andrea Ravignani, Martina Arioli

Type: Abstract complessivo di un simposio

The origins of human rhythm: A comparative approach

Speaker: Ravignani, Andrea

Track: Language, reading and music

Abstract

Who's got rhythm? Why are we such musical, chatty animals? Human music and speech, almost anomalies for evolutionary biology, both feature rhythm among their building blocks.

Many hypotheses try to explain the origins of rhythm capacities, but few are empirically tested and compared. Because music and speech do not fossilize, the comparative approach provides a powerful tool to tap into human cognitive history. Human-like rhythm behaviors may be found across a few species. Hence, investigating rhythm across species is not only interesting to zoology, but it is key to unveil when music-like behaviors appeared in human evolution. Here, I introduce the major hypotheses for the evolution of vocal rhythmicity, which link acoustic rhythms to vocal learning, gait, breathing, or group chorusing. I suggest how integrating approaches from ethology, psychology, neuroscience, modeling, and physiology is needed. I zoom in on some crucial species which are key to test alternative hypotheses on rhythm origins. Rhythm data from marine mammals and primates suggests that comparative research can benefit from ecologically-relevant setups, combining strengths from human cognitive neuroscience and behavioral ecology. Finally,

I present human experiments where musical rhythm is created and evolves culturally due to cognitive and motoric biases. Both behavioral and neural data show an interplay between biology and culture. These results suggest that, while the full package may be uniquely human, many mammals share one or more building blocks of human rhythmicity.

These biological biases may be amplified by cultural transmission to result in human musical rhythm as we know it.

Author/s: >20 coauthors ., Andrea Ravignani

Type: Talk in simposio

The Sweet Spot of Rhythm: How Rhythm Complexity and Individual Sensitivity to Musical Reward Shape Rhythmic Skills and Interpersonal Synchronization

Speaker: Lega, Carlotta

Track: Language, reading and music

Abstract

Rhythm naturally emerges in humans from infancy and significantly impacts various cognitive functions (e.g., memory, attention) and emotional processes (e.g., emotions, sense of connection). Moreover, it is thought to modulate music reward responses through its strong movement-inducing component. Consistent evidence has highlighted the pivotal role of rhythm complexity in eliciting pleasurable responses to music, with medium complexity rhythms eliciting the highest levels of pleasure and wanting to move.

Additionally, we know that there are individual differences in how people experience reward in music-related activities (musical hedonia). This research explores the combined effects of interindividual differences in music reward responses and rhythm complexity on rhythmic skills. In different experiments, we demonstrated a strong link between musical hedonia and rhythmic ability, suggesting that participants with higher music reward are more sensitive in the performance of rhythm production and rhythm perception tasks.

Furthermore, the study establishes a novel link between rhythm complexity and rhythm perception skills: participants perceived tracks with medium complexity as more rhythmically aligned than those with low or high complexity. This suggests that music's inherent structure interacts with individual reward preferences to influence perception. Finally, the research extends to social interaction by demonstrating that musical hedonia affects not only individual rhythmic skills but also the ability to synchronize motor movements with others.

Together these results highlight the role of both intrinsic properties of stimuli (rhythm complexity) and individual reward sensitivity to music in shaping not only individual rhythmic skills but also our ability to temporally coordinate actions with others.

Author/s: Carlotta Lega

Type: Talk in simposio

Accessible reading assessment: the Italian adaptation of self-administered, open-access ROAR (Rapid Online Assessment of Reading)

Speaker: Smith, Giuditta

Track: Language, reading and music

Abstract

The number of 10-year-old boys and girls with reading comprehension difficulties increased from 57% in 2019 to about 70% in 2022 in low- and middle-income countries according to the World Bank. The effects of this literacy crisis have been worsened by the COVID-19 pandemic, which has increased learning deficits and social disparities (Bethhäuser, Bach-Mortensen & Engzell, 2023). Effective and accessible assessment tools are crucial to help reduce the current crisis related to low literacy levels in Italy where, during the pandemic, Italian second-grade pupils reported a loss of half their annual academic performance (Contini et al. 2022).

The Rapid Online Assessment of Reading (ROAR, <https://roar.stanford.edu>) is an efficient and reliable measure of reading abilities (Gijbels et al., 2023; Ma et al., 2023; Yeatman et al., 2021), approximating in-person standardized tests with high accuracy ($r=0.94$). This open-access online platform can be flexibly adapted into other languages, and several adaptations are ongoing.

We present the Italian adaptation of the Lexical Decision (LD) task of the ROAR. The task, which is embedded in a fun, animated story to ensure maximal engagement, is a forced choice LD task with words and pseudowords adhering to Italian phonotactic properties. The adaptation is currently being validated on adults and primary school children aged 6-11.

The creation of an open-access, freely available, and multilingual assessment tool which can be accessed from different countries through a unique web app is a practical alternative to resource-intensive, in-person reading assessments for both educational and research purposes.

Author/s: Giuditta Smith, Elisa Bassoli, Emily Judith Arteaga Garcia, Emanuele Casani, Marilina Mastrogiuseppe, Kyle Montville, Wainjing Anya Ma, Jason Yeatman, Sendy Caffarra

Type: Mini-talks

Alpha power reflects next word prediction of continuous speech.

Speaker: Piazza, Giorgio

Track: Language, reading and music

Abstract

Human brain employs sensory inputs to predicts future events [1]. Research has delved into linguistic expectations and alpha oscillations (8-12Hz), where alpha power modulation was linked to anticipatory mechanisms [2].

Studies that manipulated contextual constraint revealed stronger predictions associated with lower pre-stimulus alpha power than weaker predictions [3]. Yet, such results could reflect specific processes of the controlled manipulations. Here, we investigated the alpha power fluctuation in a naturalistic comprehension context. We recorded cortical activity of 25 English participants who listened to 45 minutes stories in English. Each words was assigned entropy values (GPT-2 extracted) and split into two conditions depending on contextual constraint (low entropy = predictable; high entropy = unpredictable).

We built a linear mapping model between the words' entropy and the brain signals. On this, we calculated alpha power in the time window preceding (-300ms-0ms) and following (0ms-300ms) word onsets. Results showed that, in contrast with previous research, alpha power was greater in the low entropy than the high entropy condition, with larger difference in the pre-onset time-window than the following window. This confirms that alpha power modulation reflects anticipatory mechanisms but the effect depends on the task manipulation. In task that do not prompt prediction (simple comprehension), high alpha power reflect automatic word expectation.

Conversely, when words are not predictable (same context), expectation update is likely paused, leading to a decrease in alpha power.

Author/s: Giorgio Piazza, Giovanni M. Di Liberto

Type: Mini-talks

Bouba-Kiki effect in domestic chickens: a comparative study on the origin of phono-symbolism

Speaker: Loconsole, Maria

Track: Language, reading and music

Abstract

The Bouba-Kiki effect is one of the most well-known examples of sound-symbolic association. It involves spontaneously linking the non-word "Bouba" to rounded shapes and the non-word "Kiki" to angular shapes. Although this effect is observed in preverbal infants (aged 4 to 7 months), there is no conclusive evidence yet as to whether it is an innate mechanism or dependent on experience.

This uncertainty arises because it is not possible to entirely rule out the role of factors such as infants' rapid learning ability, heightened sensitivity to statistical regularities, and the multiple sound-symbolic associations to which they are exposed during early interactions with adults.

This study adopts a comparative approach to better understand the ontogeny of sound symbolism, particularly the Bouba-Kiki effect, using the domestic chicken (*Gallus gallus*) as the model species. Forty-two three-day-old chicks were trained to navigate around a panel to obtain a food reward. Subsequently, the chicks were tested in 24 trials to determine whether they displayed a preference for navigating around one of two panels presented simultaneously: one marked with an angular shape and the other with a rounded shape. During each trial, a background sound was played, consisting of the repeated non-word "Bouba" or "Kiki".

The results showed that chicks preferentially approached the panel with the rounded shape when hearing the sound "Bouba" and the angular shape when hearing the sound "Kiki." These findings suggest the existence of an innate mechanism shared across different species.

Author/s: Maria Loconsole, Lucia Regolin, Silvia Benavides-Varela

Type: Mini-talks

Does the association between reading, writing and math disorders in learning disorders depend on a difficulty in acquiring instances?

Speaker: Marinelli, Chiara Valeria

Track: Language, reading and music

Abstract

The automatization deficit was examined in a sample of subjects with adult learning disorder (138 controls; 51 LD) and children (155 controls and 64 LD), also as a function of the type of deficit (i.e., in the memory retrieval of instances vs in the application of reading-writing and calculation procedures). The alphanumeric learning test was used for this purpose.

The results show that both controls and child and adult LD improve according to a power trend: they start the task by applying the algorithm and, subsequently, through practice and repeated exposure to stimuli, they move from a slow and controlled serial processing of the algorithm to an automated and fast performance based on the retrieval of instances from memory. This memory trace allows performance to be automated.

In addition, there is an absence of the generalization effect, indicating that learning is item-specific. In this test, there is a difficulty in participants with a deficit in instances (i.e., in the retrieval of orthographic representations and arithmetic facts), while those with a procedural deficit have performance comparable to controls. The inefficiency in forming instances is at the root of the automatization deficit and the comorbidity of LD (as hypothesized by the Multilevel Model of Learning by Zoccolotti et al., 2020).

Author/s: Chiara Valeria Marinelli, Giuliana Nardacchione, Paola Angelelli, Marco Turi, Marialuisa Martelli, Pierluigi Zoccolotti

Type: Mini-talks

Don't stop the scientific flow from data collection to Born-Open Data: Sentence parsing and repetition with the Maze Task

Speaker: Vespignani, Francesco

Track: Language, reading and music

Abstract

The present study builds on the Maze Task, a recent experimental paradigm particularly useful to study sentence processing with minimal spillover effects. Specifically, in our study, we explore how linguistic violations interact with sentence repetition.

The structure of each sentence used in the study included seven words forming a transitive sentence followed by a prepositional phrase. The study design included three conditions: correct sentences, sentences with semantic violations, and sentences with syntactic violations between determiners and nouns. We conducted online experiments with 12 participants, utilizing a Latin square design for 36 trials per condition. Each trial consisted of a two-phase process: initial non-incremental self-paced reading followed by a repetition phase within the Maze Task, where participants repeated the sentence verbatim while non-words served as distractors. This maze procedure was repeated five times per sentence. Preliminary results, including error rates and reaction times, showed high mean accuracy (approximately 98%), which likely excluded any speed-accuracy trade-offs.

Analysis using generalized linear mixed-effects models indicated increasing reaction times with more repetitions, markedly with semantic violations at the subject level. These initial findings highlight the Maze Task's potential to inform about how parsing affects working and short-term memory during sentence repetition. Our preliminary results challenges the hypothesis that repetition facilitates learning.

Importantly, the present study capitalize on open-source tools and practices, ensuring compliance with Open Science standards implementing Born-Open data, and code available on GitHub to reproduce the task.

Author/s: Boris Biondi, Francesco Vespignani, Giulia Calignano

Type: Mini-talks

How early life sensory experience affects the hierarchy of speech processing

Speaker: Federici, Alessandra

Track: Language, reading and music

Abstract

Language acquisition relies on environmental stimulations during sensitive periods. Native phonemes categorisation is acquired according to sensory experience during the first year of life. However, in case of congenital deafness, infants can rely only on visual input.

Thus, they cannot distinguish consonant couples discernible only by acoustic properties such as b and p. By testing children with cochlear implants (CIs), we assessed whether early auditory experience is needed to encode specific phonemic features. Using EEG, we measured the neural response to continuous speech processing in 37 hearing children (HC) and 32 CI children, half with congenital deafness (CD) and half with acquired deafness (AD). Only CD participants were auditory deprived during the first year of life. We employed multivariate lagged regression to estimate single participants encoding model and predict EEG based on a selection of stimulus features: sound envelope, phoneme onset, and, selectively for consonants with the same visual features (manner and place), voicing.

Preliminary results suggest that while all groups similarly benefited from phoneme onset information, voicing processing was affected by the lack of auditory input in the first year of life. Voicing improved the model to predict neural activity in both HC and AD but not in CD group, which had lower voicing gain compared to HC.

Data showed that low-level information associated with all types of phoneme onsets is encoded independently of groups' auditory experience. Conversely, encoding higher-level acoustic information displays a sensitive period in the first year of life in which functional hearing must be available.

Author/s: Alessandra Federici, Marta Fantoni, Chiara Battaglini, Giacomo Handjaras, Francesco Pavani, Emiliano Ricciardi, Elena Nava, Eva Orzan, Benedetta Bianchi, Giovanni M. Di Liberto, Davide Bottari

Type: Mini-talks

Neural synchronization with audiovisual speech relies on a sensitive period

Speaker: Fantoni, Marta

Track: Language, reading and music

Abstract

Proper sensory inputs at specific time windows are fundamental for shaping infants' development (Werker, Hensch, 2015). Temporary auditory deprivation in the first year of life can alter the ability to integrate audiovisual speech cues even if hearing is restored with cochlear implants (CI; Schorr et al., 2005).

Yet, it's unclear if neural circuitries responsible for audiovisual speech integration have a developmentally sensitive period in which auditory information is required. To investigate this issue, we measured the neural tracking of speech sound envelope (auditory-only) and associated lip movements (audiovisual) with EEG in children with congenital (CD) or acquired (AD) deafness and in hearing controls (HC). Because CD and AD groups crucially differed in their lack or presence of functional hearing in the first year of life, this allowed assessing the role of auditory experience within this phase of brain development.

Overall, lip-movement tracking was more evident in CI than in HC. Neural tracking benefited from audiovisual compared to auditory-only speech in HC and AD. The sound envelope tracking was anticipated when the speaker's face was visible at short timescales, ~30 – 150 ms, indicative of early processing. This facilitatory effect was absent in the CD group, revealing that early acoustic deprivation hindered fast audiovisual integration. However, AD and CD groups showed comparable speech comprehension enhancements with audiovisual speech, highlighting that neural adaptations to different deafness onsets can lead to similar behavioral outcomes. Hence, early acoustic experience is fundamental for developing neural circuitries subtending automatic integration of low-level audiovisual speech signals.

Author/s: Marta Fantoni, Alessandra Federici, Francesco Pavani, Giacomo Handjaras, Ivan Camponogara, Emiliano Ricciardi, Elena Nava, Eva Orzan, Benedetta Bianchi, Stefan Debener, Davide Bottari

Type: Mini-talks

Procedural deficit or in the acquisition of instances? Evidence from learning artificial grammar in adult dyslexics

Speaker: Nardacchione, Giuliana

Track: Language, reading and music

Abstract

A deficit in acquiring instances could be at the root of learning disorders and explain the difficulty in acquiring orthographic representations and arithmetic facts. Artificial grammar studies examine subjects' ability to implicitly learn rules present in strings of visual stimuli. The following study aims to understand what is the locus of the automatization deficit of dyslexics and to test whether the performance of artificial grammar depends on the learning of rules, instances or distributional properties learned during learning through learning tasks, grammatical judgment, recognition and writing. 49 dyslexics and 74 adult controls were tested.

The results show that dyslexics have learned artificial grammar and use procedural memory as much as controls. This is evident from the confounding effect of grammatical stimuli in recognition and the grammatical effect in grammatical judgment. In addition, dyslexics have acquired instances and use them, but they have unstable representations and this is evident from the better performance with items learned in both recognition and grammatical judgment and from a greater difficulty in rejecting control items with non-grammatical errors. In addition, dyslexics hyper-use distributional properties to compensate for unstable representations. In fact, dyslexics, like controls, compensate for difficulties with critical positions for more frequent bigrams in grammatical recognition and judgment and reduce errors in grammatical judgment with high-frequency bigrams more than controls.

Therefore, it is necessary to promote the use of distributional knowledge as a compensation strategy and increase learning opportunities to consolidate the learning of instances.

Author/s: Giuliana Nardacchione, Pierluigi Zoccolotti, Chiara Valeria Marinelli

Type: Mini-talks

Take Your Time: What Meter and Rhythm can tell us about Developmental Dyslexia.

Speaker: Carioti, Desirè

Track: Language, reading and music

Abstract

Rhythm and reading must be somehow related, as several studies uncovered that dyslexic individuals display poor performance in rhythmic tasks. However, the nature of the rhythm-reading relationship is far from being fully explored. The present work aims at establishing whether the disadvantage observed in participants with dyslexia has its origins in rhythmic awareness, meter reproduction and, thus, motor control, or, as proposed by Pagliarini et al. (2020), anticipatory timing skills.

To this aim, we included in our study 61 participants ($F = 35$; $M = 25$; not binary = 1; age on average = 21.6 $SD = 2.42$), 29 of them with learning disorders and related difficulties in reading, asking them to complete a rhythm discrimination task, a tapping task at different speed (60-80-100-120 bpm) and a new version of anticipatory timing task.

Data were analyzed through different logistic mixed models (GLMM) including participants as random intercept, to test whether performance in each task could classify participants as part of the experimental or the control group.

Although all tasks could discriminate the two groups, participants with dyslexia reported a minimal disadvantage ($p = 0.03$) in rhythm discrimination, while they displayed a significant ($p < .001$) deficit in fast meter reproduction and anticipatory timing. These results suggest not just that dyslexic participants have lower skills in more complex tasks that require fast procedural information integration but highlight also the role of fast sequential production of movements, supporting the cerebellar theory.

Author/s: Desirè Carioti, Camilla Figini, Carlo Toneatto, Maria Teresa Guasti, Martina Riva, Natale Adolfo Stucchi

Type: Mini-talks

Investigating the Decision-Making Process Underlying Motor Responses Through Electromyography: Assessment of Online Response Control and Response Bias

Speaker: Songhorabadi, Saman Kamari

Track: Language, reading and music

Abstract

Everyday tasks require a series of actions aimed at achieving goals, with decision-making processes guiding timing, execution, and adjustment of actions in response to changes. We investigated how decision-making processes relate to motor-control, and – in particular – to motor-response execution.

Participants completed visual lexical decision tasks where they were instructed to categorize strings of letters as words or pseudowords by pressing buttons with their thumbs. Single-trial electromyographic (EMG) traces were used to partition reaction times (RTs) into pre-motor (PMTs) and motor times (MTs). In a first experiment, participants were directed to prioritize either speed or accuracy. This speed-accuracy tradeoff (SAT) manipulation affected both PMTs and MTs, with the latter effect hinting towards the involvement of online response control mechanisms in the overall SAT effects. Pseudowords elicited slower responses compared to words, impacting both PMTs and MTs. Crucially, there was no interaction between lexicality and SAT conditions, suggesting independent underlying mechanisms.

In a second study, the proportion of pseudowords (and words) (.25, .50, or .75) was manipulated across blocks, in order to manipulate response bias, over and above the lexical status of the stimuli. Although data collection is still ongoing, the predictions point towards a reversal of the lexicality effect on MTs, when pseudowords are the most frequent stimuli, due to the reduction of the inherent uncertainty characterizing these stimuli.

In general, these results provide insight into the functional specification of the decisional elements within motor-response execution as well as links connections with response monitoring and confidence.

Author/s: Saman Kamari Songhorabadi, Simone Sulpizio, Michele Scaltritti

Type: Mini-talks

Exploiting a P300-BCI speller for language skills potentiation

Speaker: Mussetti, Giulia

Track: Language, reading and music

Abstract

An extensive literature demonstrated that non-invasive Brain-Computer Interfaces (BCI) through overt and covert manipulation of specific brain signals enable alternative ways of communication in highly disabled individuals with neurodegenerative disorders.

In particular, EEG-BCI spellers allow patients with severe loss of motor control and language abilities to by-pass the dysfunctional neuromuscular pathways and to exploit an effective route replacement for verbal communication (Rezeika et al. 2018). Moreover, recent studies demonstrated that an auditory BCI, besides supporting language communication, can boost language skills in aphasic patients with language production and comprehension impairment after stroke (Kleih et al. 2016, Musso et al. 2022). Building on this evidence, we envisaged the exploitation of a standard “row and column” BCI (Farwell & Donchin 1988) for enhancing language abilities in both normal readers and individuals with dyslexia.

We here hypothesized that an extensive use of a visual P300-BCI speller would strength visuo-linguistic and visuospatial attentional processes concurrently leading to reading improvement. We first tested our hypothesis on normal readers (BCI-L) that underwent a 4-days training with a visual EEG-BCI speller and a pre-/post-BCI reading task, in relation to 2 control groups, one undergoing a BCI training with a non-linguistic visual interface (BCI-NL), and one undergoing pre-/post reading task only (no-BCI). Language skills were assessed through a pseudo-words reading task based on the Reicher-Wheeler paradigm.

Our preliminary results indicate a reduction of RT and increase of accuracy in the pseudo-words reading task in both BCI-L and no-BCI groups, but the effects appear larger in the BCI-L group.

Author/s: Andrea Caria, Claudio Mulatti, Giulia Mussetti, Lorenzo Marin

Type: Poster

Exploring the interplay between rhythm complexity, musical pleasure, and musical hedonia in shaping rhythm perceptual abilities

Speaker: Fullone, Eleonora

Track: Language, reading and music

Abstract

Research consistently shows that rhythm complexity elicits pleasurable responses to music, with medium complexity rhythms eliciting the highest levels of pleasure and wanting to move. However, whether it predicts rhythmic skills and its association with musical pleasure and musical hedonia remains unexplored. So, in Experiment 1, we first quantified the pulse entropy of realistic musical excerpts as a measure of rhythmic complexity, while participants (N=102) rated the pleasure and the wanting to move of these excerpts .

Moreover, we explored participants' sensitivity to musical reward (i.e., musical hedonia) with the extended Barcelona Music Reward Questionnaire (eBMRQ). Results showed an inverted U-shaped relationship between pleasure and wanting to move ratings and pulse entropy, especially in participants with higher musical hedonia levels. In Experiment 2, participants (N=210, independent sample re-analysis) completed a Beat Alignment Test (BAT) in which they have to detect misalignments between a superimposed metronome and realistic musical excerpts (the same of Experiment 1) and completed the eBMRQ questionnaire. Results showed that medium pulse entropy (i.e., medium complexity) tracks were perceived as more rhythmically aligned, suggesting that rhythm complexity predicts rhythmic skills.

Additionally, higher scores on the eBMRQ questionnaire correlated with better rhythm perception, linking musical hedonia with rhythmic abilities.

Overall, our results underscore the complex relationship among intrinsic properties of stimuli, such as pulse entropy, individual reward sensitivity, and musical pleasure, and how all together intertwine to shape rhythmic perception abilities.

Author/s: Eleonora Fullone, Giorgio Lazzari, Laura Ferreri, Carlotta Lega

Type: Poster

Intersecting Identities: Gender and Bilingualism in Shaping Conflict Management Styles

Speaker: Hu, Zhimin

Track: Language, reading and music

Abstract

Conflict is an inevitable aspect of human life, and the manner in which it is managed critically influences the outcomes of such situations.

Extensive research has demonstrated that culture, personality, and situational factors shape individuals' preferences for conflict management styles. Despite the fact that women constitute 50% of the global population and 60% of individuals are bilingual or multilingual, scant research has explored how these two demographics influence conflict management styles and their interaction. To address this gap, we validated and updated the Rahim Organizational Conflict Inventory-II at a mid-sized U.S. university and subsequently administered it to 390 American participants via Prolific. The sample size was determined a priori based on a pilot study. Our main analyses included a MANOVA to assess overall preferences for conflict management styles and linear regressions to examine differences in specific styles. The findings reveal that gender significantly impacts conflict management preferences, with males showing a higher preference for a dominating style and a lower preference for avoiding conflicts than females. Notably, the gender disparity in the avoiding management style was less pronounced among bilinguals compared to monolinguals. These results provide new insights into the complex interplay between gender, bilingualism, and conflict resolution.

Understanding these differences can enhance awareness and facilitate the reduction of tension in interpersonal communications. Future research should investigate these phenomena in different national contexts and extend the findings to multilingual populations.

Author/s: Zhimin Hu, Mark James, Eduardo Navarette

Type: Poster

The role of visuo-spatial attention in the parafoveal semantic processing

Speaker: Bandiera, Valentina

Track: Language, reading and music

Abstract

The aim of the current study is to investigate the role of visuo-spatial attention during semantic information processing in parafovea. In this study, the Rapid Visual Parallel Presentation (RPVP) paradigm was used.

The RPVP provides the simultaneous presentation of two words for 150 ms, one in fovea (W1) and one in parafovea (W2), matched by length in letters and adult written frequency. Half pairs of words were semantically related (SR) and half was semantically unrelated (SU). A probe (consisting of a red asterisk) appeared in half of the trials (i.e., 20 SR and 20 SU), at the end of the W2, at 0 ms interval from the word's disappearance. Participants had to read both words aloud and press the button when the probe was detected. Vocal reaction times (vRT) for W1, accuracy on W1 and W2 and RT to probe (pRT) were measured. The results shown shorter vRT and higher reading accuracy in SR as compared to SU pairs of words. Moreover, the probe detection RT were shorter when the stimuli were SR.

Data can be discussed according to the zoom-lens model. In particular, we hypothesized that the semantic relationship could facilitate the probe detection in the parafovea, allowing an expansion of the attentional gradient and a faster detection of the probe target.

Author/s: Valentina Bandiera, Lisa S. Arduino, Silvia Primativo

Type: Poster

Beyond Dichotomies: the Semantic Gradient in a Picture-Word Stroop Task

Speaker: Di Pietro, Irene

Track: Language, reading and music

Abstract

In the verbal Stroop Task, the interference induced by irrelevant information was observed to have a graded impact on the Stroop Effect, dependent on the strength of semantic relationships between relevant and irrelevant stimulus dimensions (i.e., Semantic Gradient).

While some studies have shown the predictive power of continuous similarity measures at the item level, others have oversimplified semantic processes neglecting their continuous nature. Typically, this involves dichotomizing semantic similarity by merely contrasting weakly related words with strongly related ones or manipulating membership within a semantic category. However, to fully understand the graded impact of conflicting semantic information, it is crucial to employ continuous measures of semantic similarity.

To address this gap, we used text-based distributional models to extract a continuous measure of semantic similarity between concepts and explored its effect on vocal response latencies in a Picture-Word Stroop Task, where participants name pictures while ignoring the superimposed words. Remarkably, our preliminary findings unveiled a negative linear effect of continuous semantic similarity on naming performance, even after controlling for orthographic and association similarities as well as other low-level confounders at both the word and picture levels.

Understanding this gradient of interference through continuous measures, while controlling for other variables, can enhance our comprehension of linguistic mechanisms and shape the development of more precise theoretical frameworks, depicting word meanings as distributed representations within a continuous mental space.

Author/s: Irene Di Pietro, Giada Viviani, Marco Petilli, Antonino Vallesi, Marco Marelli, Maria Montefinese, Ettore Ambrosini

Type: Poster

Cognitive and reading profiles of healthy older adults. A preliminary investigation combining neuropsychological assessment with multimodal digital recordings

Speaker: Pirrelli, Vito

Track: Language, reading and music

Abstract

Reading plays an important role in functional maintenance, preserving significantly cognitive functions in ageing individuals and allowing people to keep up to date, ensure continuous training for a complex task, and experience emotions.

To investigate the relationship between normal ageing and reading skills, we tested a novel experimental protocol that combines measures of visual crowding (MEC: Facchin et al. 2019; and BReViS: Facchin et al. 2023), measures of sustained and selective attention, working memory, and processing speed provided by the Symbol Digit Modalities Test (SDMT: Nocentini et al. 2006), with the online assessment of reading fluency by means of “finger-tracking data” (ReadLet: Ferro et al. 2018, Crepaldi et al. 2020). ReadLet evidence consists in the recorded (oral) reading of a connected text displayed on a tablet touchscreen, time-aligned with the recording of the movements of the reader’s index finger concurrently underlining the same text (known as “finger-point reading”). We applied the protocol to a cohort of neurologically healthy older adults aged 65-75 (38 women, mean age: 68.6, 23 men, mean age: 69.3), with an above-average schooling background (mostly high school graduates), hosted in long-term care facilities in the province of Milan (Pegoraro et al. 2023).

We propose a detailed analysis of the observed correlations between reading performance on ReadLet and cognitive performance on MEC, BReVIS and SDMT. Convergent and complementary evidence suggests that many factors can contribute to reading decline, with specific aspects of cognitive decline differentially affecting the processes involved in a complex, multi-sensory cognitive task such as reading.

Author/s: Vito Pirrelli, Roberta Daini, Marcello Ferro, Alessandro Lento, Claudia Marzi, Andrea Nadalini, Sara Pegoraro

Type: Poster

Mixed transcortical aphasia after stroke: a single case report with advanced disconnectomic analyses

Speaker: Bellin, Irene

Track: Language, reading and music

Abstract

Mixed transcortical aphasia (MTA) represents an uncommon aphasic syndrome, characterized by severe deficits in both comprehension and production across oral and written linguistic modalities. Individuals affected by MTA typically demonstrate retention of repetition abilities, often manifesting as echolalia. In the present single case study, we report the case of a woman who presented with MTA symptoms after a left hemisphere ischemic stroke involving perisylvian areas. She presented, as expected, with poor comprehension and reduced spontaneous production abilities, while repetition was preserved for words, short sentences, and numbers. Notably, her reading abilities remained intact, in contrast with several previously reported MTA cases.

We describe in detail her linguistic performance with an extended quantitative evaluation, as well as a qualitative assessment of non-verbal cognitive abilities. To further assess the brain-behavior relationship, we employed recently developed lesion-based approaches for probabilistic estimation of white matter disconnections to reveal which white matter tracts are likely related to the reported pattern of language impairment. The results showed a major disconnection of the left arcuate fasciculus, left inferior fronto-occipital fasciculus, left inferior longitudinal fasciculus, left optic radiation, and anterior commissure.

The observed impairments of the patient in the repetition of long sentences and of numbers exceeding three digits might hence be explained based on the disconnection of the arcuate fasciculus' long and posterior branches, affecting short-term memory. Conversely, her preserved ability to repeat limited verbal material is supported by the intact anterior branch of the left arcuate fasciculus.

Author/s: Irene Bellin, Arianna Menardi, Serena De Pellegrin, Antonio Luigi Bisogno, Carlo Semenza, Maurizio Corbetta, Antonino Vallesi

Type: Poster

Reduced fMRI Functional Connectivity of Language-Related Cerebellar Regions of Schizophrenia Patients

Speaker: Biondi, Margherita

Track: Language, reading and music

Abstract

Schizophrenia (SZ) is one of the most debilitating psychiatric disorder, in which the crucial role of cognitive deficits has been increasingly identified. However, the neural correlates underlying these impairments are still largely unknown. The cerebellum, conventionally tied to motor functions, is now recognized as a key region for cognition, and evidence of cerebellar abnormalities has been associated with SZ cognitive impairment. However, within-cerebellum spontaneous functional interactions are often overlooked.

The present study explored the resting state functional connectivity (rsFC) within the cerebellum and its link to cognition in 74 SZ patients and 74 matched healthy controls (HC). A new multi-domain task battery (MDTB) cerebellar parcellation was applied. In addition, we investigated the relationship between SZ patients' rsFC and their symptoms, as assessed with the Positive and Negative Syndrome Scale (PANSS).

SZ patients exhibited significant differences in cerebellar connectivity compared to HCs, particularly in regions involved in attention, language, and memory. Correlations between connectivity values and affective symptoms were identified. Distinct connectivity patterns were found in post-hoc analysis when splitting SZ patients in three sub-groups based on their vulnerability to hallucinatory phenomena: non-hallucinating and low-hallucinating patients showed higher cerebellar rsFC than high-hallucinating patients, especially in language- and motor-related areas, suggesting a gradient of cerebellar connectivity alterations corresponding to hallucination vulnerability.

Our results provided novel insights into cerebellar abnormalities in SZ, highlighting the role of within-cerebellum connectivity in cognitive deficits. The observed connectivity patterns in language-related regions might contribute to understanding linguistic mechanisms and auditory verbal hallucinations in SZ.

Author/s: Margherita Biondi, Marco Marino, Dante Mantini, Chiara Spironelli

Type: Poster

'Despite the noise, I can see what you mean': audiovisual speech in different noisy situations

Speaker: Gastaldon, Simone

Track: Language, reading and music

Abstract

Everyday listening conditions are very often far from the quiet settings provided in the laboratory when studying spoken language processing. Daily communication via speech often happens through noisy channels, e.g., phone call with a bad line or face-to-face in a crowd. In such noisy contexts, mouth movements and face cues facilitates comprehension, likely by exploiting predictive processing as well (Peelle & Sommers, 2015). Interestingly, speech-motor neural substrates seem to be particularly engaged when processing speech in noise (Skipper et al., 2017).

Here we delineate a research project that aims at studying how the brain adapts to different noise sources – e.g., vocoding is not a real life-like noise source, while superimposed multi-talker babble is – and what is the role of audio-visual and audio-motor abilities. While their EEG is recorded, participants will attend to audio-video stimuli of a person uttering sentences, which can be semantically constraining towards a final target word or not. Noise type will be manipulated. To understand prediction and integration processes in familiar and unfamiliar noisy contexts we plan to analyze: 1) oscillatory power in the alpha, beta, and gamma ranges, before and after the target word, 2) connectivity between auditory, motor and visual regions, 3) phase coherence between EEG and audio envelope and mouth movements. We plan to also collect behavioral measures related to individual abilities in lip-reading, audiovisual integration, and audio-motor synchronization.

The research aims at understanding how audio-visual and audio-motor individual abilities contribute to predicting and comprehending speech in familiar and unfamiliar noise.

Author/s: Simone Gastaldon, Flavia Gheller, Giorgio Piazza, Francesco Vespignani, Francesca Peressotti

Type: Poster

Does the brain employ mouth movements to predict upcoming words?

Speaker: Piazza, Giorgio

Track: Language, reading and music

Abstract

Humans possess remarkable abilities to comprehend spoken language during face-to-face interactions. This can occur thanks to the brain's ability to take advantage of linguistic and extra-linguistic cues to continuously integrate incoming information and predict elements at various levels [1]. Previous research has shown dissociable neural signatures of meaning and sound predictions of upcoming words [2]. Moreover, it has been reported an improvement in the processing of multisensory signals, where visual mouth cues were combined with speech, compared to auditory input alone [3].

However, the extent to which observable mouth movements influence predictions during naturalistic speech remains largely unexplored. This study investigates the impact of audiovisual integration on predictive mechanisms, focusing on whether mouth movements contribute to predictions. EEG data will be recorded from 25 Italian participants watching continuous Italian narrative videos with the mouth visible or covered with a grey rectangle. We will examine the linear mapping between brain signals and visemic (visual respective of phonemes) and semantic surprisal. Surprisal is a measure of how surprising an element is within its context.

This will allow us to shed light on whether 1) words are predicted differently depending on the availability of mouth cues, 2) articulatory information conveyed through visemes influences prediction, and 3) these phenomena persist even when the mouth is not visible.

[1] Bar (2009). *Philos Trans R Soc Lond B Biol Sci*. <https://doi.org/10.1098/rstb.2008.0310>

[2] Heilbron et al. (2022). *PNAS*. <https://doi.org/10.1073/pnas.2201968119>

[3] Crosse et al. (2015). *The Journal of Neuroscience*. <https://doi.org/10.1523/JNEUROSCI.1829-15.2015>

Author/s: Giorgio Piazza, Simone Gastaldon, Francesco Vespignani, Sara Carta, Giovanni M. Di Liberto, Francesca Peressotti

Type: Poster

Personality and Cognition in Aging: a Network Analysis Approach

Speaker: Vicentin, Stefano

Track: Life cycle (e.g., development and aging)

Abstract

Aging has traditionally been viewed as a process marked by unidirectional decline, often associated with cognitive losses and personality/psychosocial impoverishment. Furthermore, these dimensions have frequently been studied in isolation, as if they were separate compartments.

The dedifferentiation hypothesis suggests that while aging does not lead to a decline in individual characteristics, but to a reorganization characterized by increased integration and reduced specialization across domains. To explore this hypothesis, we analyzed 31 cognitive and psychological measures from a network perspective. A dataset of approximately 1,000 participants was divided into three age groups: Young Adults (18–36 years), Middle-Aged Adults (36–60 years), and Older Adults (60–100 years). First, we used Exploratory Graph Analysis (EGA) to identify how these measures clustered into different communities within each age group. Then, we compared the three networks using the Network Comparison Test (NCT).

Results showed that Middle-Aged and Older Adults, compared to Young Adults, displayed a reduced number of clusters or communities in which variables tended to group (four domains instead of six). This finding suggests reduced specificity and increased dedifferentiation, especially among cognitive and mental health-related variables. The NCT confirmed significant structural differences between the three networks, with the Older Adults' network exhibiting the lowest connectivity strength among its variables.

Overall, these findings suggest that the structure of personality and cognition genuinely changes with age. Rather than reflecting decline, these changes represent a reorganization and optimization of available resources to effectively meet the new challenges of older age.

Author/s: Stefano Vicentin, Giorgia Cona

Type: Talk in simposio

Personality architecture in healthy aging

Speaker: Gobbo, Silvia

Track: Life cycle (e.g., development and aging)

Abstract

Traditional personality theories postulate that it has a universal structure with a limited set of traits. In particular, the HEXACO model groups them into six. However, an often overlooked aspect is that personality does change across the lifespan. Aging indeed brings to retiring from work and to increasing sanitary issues.

Those factors, in turn might bring to abrupt or gradual retirement from active life. Although dimensional changes in personality with aging were reported in the literature, structural changes in the number of personality traits with aging still remain unknown. Few studies attempted to investigate this matter: however, none of them questioned the universality and the stability of the structure. Thus, the present project was designed to investigate the personality structure of elderly retired participants. We selected a sample of over 65 retired participants without neurological pathologies and we administered them two questionnaires commonly used to investigate personality structure (i.e. HEXACO 60-item questionnaire e HEXACO adjective scale) together with a set of validation criteria and a well-being questionnaire (i.e. BEN-SSC).

Data was analysed through both an Explorative Factor Analysis (i.e. EFA, the gold standard analysis used in these cases) and an Explorative Graph Analysis (i.e., EGA). The latter was developed in the context of network analysis to calculate the number of communities underlying a set of variables.

Results reveal differences in personality traits in elderly compared to younger adults both in terms of dimensional shift of personality traits and personality structure, suggesting a wide change and reorganisation of personality in elderly.

Author/s: Daniele Luigi Romano, Silvia Gobbo

Type: Talk in simposio

The effect of social and occupational withdrawal on the personality structure in young adults.

Speaker: Scandola, Michele

Track: Life cycle (e.g., development and aging)

Abstract

Social and occupational withdrawal in young adults can lead to reduced executive functions (Jin & Suk-Hyun Hwang, 2024), reduced white matter density at the bilateral inferior parietal lobule (IPL), the right anterior insula (AI), the posterior temporoparietal junction (pTPJ), the left posterior superior temporal sulcus (pSTS), the dorsomedial prefrontal cortex (dmPFC) and the rostralateral prefrontal cortex (RLPFC) (Nakagawa et al., 2015).

Risk factors that appear to contribute to social isolation include situations of poverty, emotional problems and impulsivity, substance abuse, disability and poor health.

Such changes may alter personality structure and reduce its dimensionality. Therefore, a large battery of questionnaires was used to collect data on demographic and work-related aspects, social support both traditional and online, mental health, self-efficacy in work and learning, and personality dimensions using the Hexaco Adjective Scale (Romano et al., 2023).

The results show how the dimension of personality structure is closely related to participation in work and school activities, and how it is also related to the dimensions of social network and psychopathological aspects.

Author/s: Maria Esposito, Martina Pastorelli, Michele Scandola

Type: Talk in simposio

Altered resting-state functional connectivity of the salience network in Autism: preliminary findings

Speaker: Attanasio, Margherita

Track: Life cycle (e.g., development and aging)

Abstract

Individuals with autism spectrum disorder (ASD) show impairments in communication and social interaction and patterns of restricted and stereotyped behaviors and interests. Literature suggests that alterations of functional connectivity (FC) in brain networks may contribute to the manifestation of the clinical features of ASD. In our study, we focused on the Salience Network (SN), as playing a crucial role in the integration of external sensory information with internal emotional and bodily information.

Using the Autism Brain Imaging Data Exchange II we investigated the resting-state FC of the target structures of the SN and its association with autism symptomatology in 29 ASD individuals compared with 29 typically developing (TD) individuals. Our seed-based connectivity results indicate alterations, both in increased and decreased FC, in the ASD group compared to TD individuals, involving brain regions implicated in the integration of sensory and social information, regulation of attention, emotion processing, and internal states. Finally, we found that the clinical features of ASD are mainly associated with an atypical FC of the anterior insula and the engagement of dysfunctional mechanisms for emotional and social information processing.

These findings expand the knowledge about the differences in the FC of SN between ASD and TD, highlighting atypical FC between structures that play key roles in social cognition and complex cognitive processes. Such anomalies could explain difficulties in processing salient stimuli, especially those of a socio-affective nature, with an impact on emotional and behavioral regulation.

Author/s: Margherita Attanasio, Monica Mazza, Ilenia Le Donne, Anna Nigri, Marco Valenti

Type: Talk in simposio

Mapping Selective Gray Matter Variations in Autism Spectrum Disorder via Bayes fACTor mOdeliNg

Speaker: Liloia, Donato

Track: Life cycle (e.g., development and aging)

Abstract

Structural magnetic resonance imaging techniques such as voxel-based morphometry (VBM) have identified heterogeneous gray matter variations in individuals diagnosed with autism spectrum disorder (ASD) compared to typically developing controls. However, it remains unclear whether and to what extent disorder-selective brain variations occur in this spectrum.

This research gap, along with the observation that other clear-cut clinical conditions exhibit similar neuroanatomical features, poses a significant challenge in translating neuroimaging findings to clinical practice. In our study, we adopted a novel meta-analytic reverse inference approach (i.e., Bayes fACTor mOdeliNg) to assess the presence of selective neuroanatomical patterns associated with ASD. We analyzed VBM data from the BrainMap and MEDLINE databases, encompassing 849 published experiments. These experiments covered 132 psychiatric and neurological disorders, involving more than 40,000 subjects and 16,572 recorded foci of gray matter variation. Our analysis identified specific clusters of variation in the parietal, occipital, and cerebellar areas, showing a selectivity value of 90% or higher in ASD.

These findings not only enhance our understanding of ASD pathophysiology but also highlight potential targets for future neuroimaging-based interventions in clinical settings.

Author/s: Donato Liloia, Franco Cauda, Lucina Q. Uddin, Jordi Manuella, Lorenzo Mancuso, Roberto Keller, Andrea Nani, Tommaso Costa

Type: Talk in simposio

Multivariate pattern analysis of EEG data reveals prolonged encoding of visual information in autism

Speaker: Marsicano, Gianluca

Track: Life cycle (e.g., development and aging)

Abstract

Autism spectrum disorder (ASD) is linked to a hyper-focused visuo-attentional style, impacting higher-order affective and social domains. To disentangle the neurocognitive signatures underlying such attentional anomalies, we recorded EEG in typically developing children (TD; N=20) and in children with ASD (N=19) during a visuo-spatial attentional task where attention was exogenously captured by a large (zoom-out) or small (zoom-in) circular cue in the visual field before the onset of a target at different eccentricities.

We performed Multivariate Pattern Analysis (MVPA) of EEG data during both the cue-locked time window, aiming to unveil the spatio-temporal neural dynamics involved in scaling the visuo-attentional focus, and during the target-locked period, aiming to uncover potential repercussions on stimulus processing. Cue-locked MVPA unveiled that, differently from TD individuals, the ASD group showed a temporally sustained and spatially diffuse significant decoding of the cue neural response even after the target onset, suggesting a delayed extinction of cue-related neural activity. Crucially, this delayed extinction of the cue-neural response predicted an aberrant hyperfocusing of visual attention at the behavioural level. Target-locked MVPA results highlighted a hyper-focused attentional profile in ASD individuals, revealing an earlier and stronger processing of target neural responses in zoom-in trials.

These findings provide evidence for a temporally and topographically overrepresented processing of visual input in ASD individuals, which can constitute one of the main factors contributing to their unique neurocognitive profile.

Author/s: Gianluca Marsicano

Type: Talk in simposio

Parsing autism heterogeneity by non-core features: developmental and neurobiological implications

Speaker: Mandelli, Veronica

Track: Life cycle (e.g., development and aging)

Abstract

The current diagnostic criteria for autism spectrum disorder (ASD) focus on the characteristics individuals share in terms of social-communicative difficulties and the presence of restricted and repetitive behaviors. However, phenotypic heterogeneity in non-core features, such as early language, intellectual, motor, and adaptive functioning (LIMA), is among the most prominent aspects that distinguish different functional types of autistic individuals. Furthermore, heterogeneity in LIMA features may be crucial in explaining the variability we observed in biology, outcomes, and treatment responses.

In this work, we parsed autism heterogeneity using non-core LIMA features to aid in distinguishing types of autisms characterized by peculiar developmental trajectories, and distinct underlying biology. Applying stability-based relative cluster validation analysis to a large (n=615) publicly available dataset of clinical tests measuring LIMA features in young autistic children (24-68 months), we can identify two robust and replicable clusters with high generalization accuracy (98%). These clusters identify two subtypes of autism (e.g., type I vs type II) with opposite functional profiles defined by relatively high versus low LIMA feature scores. Furthermore, the subtypes exhibit different developmental trajectories throughout the early years of life, and they are sensitive to significant differences in functional and structural neuroimaging phenotypes and their relationships with gene expression.

Finally, to promote future applications of our stratification model in research settings, we implemented a free online tool to help distinguish autism type I from autism type II.

Author/s: Veronica Mandelli, Ines Severino, Lisa Eyler, Karen Pierce, Eric Courchesne, Michael V. Lombardo

Type: Talk in simposio

Psychophysiological Markers in Autism Spectrum Disorder: Current Evidence and Clinical Perspectives

Speaker: Liloia, Donato

Track: Life cycle (e.g., development and aging)

Abstract

Autism spectrum disorder (ASD) comprises a heterogeneous group of neurodevelopmental conditions that pose a major public health challenge due to their increasing prevalence and the need for early diagnosis. Extensive research is currently focused on identifying susceptibility and diagnostic psychophysiological markers for these conditions using neuroimaging and other advanced computational methodologies. However, the current body of knowledge is sparse, and the development of robust, reliable, and valid psychophysiological markers remains an open challenge.

This symposium features a series of talks designed to present recent experimental evidence demonstrating the potential clinical value of various psychophysiological approaches in autism research. It also introduces new data and cutting-edge analyses aimed at deepening our understanding of the complex psychophysiology associated with ASD. Each talk will be conducted by a junior researcher, distinguished by hands-on technical expertise and a proven track record of peer-reviewed publications in clinical psychophysiology. The symposium will cover the use of functional magnetic resonance imaging (fMRI), structural magnetic resonance imaging (sMRI), electroencephalography (EEG), and clinical testing via cluster analysis.

Author/s: Donato Liloia

Type: Abstract complessivo di un simposio

Artificial Intelligence-Driven Motor Pattern Analysis for Early Mild Cognitive Impairment Screening: The E-Move Project

Speaker: Simeoli, Roberta

Track: Life cycle (e.g., development and aging)

Abstract

In recent years, there has been growing interest in exploring alternative, objective, and transparent measures as adjuncts to conventional diagnostic tools in the field of clinical and rehabilitative cognitive neurodegeneration. This interest stems from promising findings regarding the application of artificial intelligence (AI) systems for motor pattern analysis, which offer insights into the underlying conditions, their potential prognostic trajectories, and improvements in diagnostic methodologies.

The E-move project is positioned within this research paradigm and proposes the integration of AI systems and wearable technologies to enhance early screening and rehabilitation strategies within the domain of neurodegeneration, with a specific focus on Mild Cognitive Impairment (MCI). E-move is conceptualized as a screening tool that amalgamates conventional psychodiagnostic assessments with novel objective and transparent measurements. These measurements are acquired and analyzed through AI systems that interface with data streams from inertial sensors, cameras, and other pertinent devices. This approach aims to discern subtle alterations in cognitive behavioral patterns and spatial movement, which are correlated with the progression and precursors of MCI.

The incorporation of AI systems in this context holds promise for the development of advanced neuropsychological assessment protocols, thereby facilitating clinicians in devising more efficacious and timely interventions.

Author/s: Roberta Simeoli, Maria Luongo, Nicola Milano, Davide Marocco

Type: Abstract complessivo di un simposio

Cognitive Reserve and Assistive Technologies: Challenges and Solutions for Successful Aging

Speaker: Taurisano, Paolo

Track: Life cycle (e.g., development and aging)

Abstract

We aim to investigate and deepen our understanding of the critical connections between cognitive reserve, aging, and assistive technologies in the context of mental health for the elderly. Cognitive reserve refers to the brain's ability to compensate for age-related cognitive decline, offering a valuable means to delay the symptoms of dementia. However, supporting this reserve requires a comprehensive strategy that includes a healthy lifestyle, cognitive engagement, education, and social participation.

Moreover, integrating assistive technologies like smartwatches can significantly support cognitive reserve and help prevent cognitive decline. These technologies provide tailored prompts, feedback, and support, adapting to each individual's capabilities and preferences. Insights from existing literature and our research provide a foundation for exploring the importance of incorporating cutting-edge methods and advanced technologies to address age-related cognitive decline, paving the way for new possibilities in cognitive health during aging.

Author/s: Paolo Taurisano, Chiara Abbatantuono, Daphne Gasparre, Madia Marika Biasi, Maria Fara De Fara

Type: Talk in simposio

E-Health: Technologies and Innovations for Active Aging

Speaker: Taurisano, Paolo

Track: Life cycle (e.g., development and aging)

Abstract

This symposium is dedicated to exploring the profound impact of technological innovation on cognitive health through various areas of intervention. The first presentation will explore artificial intelligence methods for early screening and continuous monitoring of neurocognitive disorders in adults and the elderly.

The second presentation will focus on using robotics to assist individuals with mild cognitive impairment (MCI) and dementia, highlighting both the potential and the challenges this technology presents for daily caregiving.

The third presentation will shift to assistive technologies and their role in preserving cognitive reserve and promoting active aging. It will examine how these technologies can enhance the well-being and independence of older adults.

The fourth presentation will cover neuromodulation techniques, exploring their application in both healthy individuals and those with MCI, while considering the benefits and ethical implications of this innovative approach.

By offering these diverse perspectives, the symposium aims to promote a comprehensive understanding of technologies for cognitive health and to foster dialogue on potential research and advances in the field of elderly health and neurocognitive disorders.

Author/s: Paolo Taurisano, Davide Marocco, Davide Rivolta, Onofrio Gigliotta, Valerio Manippa

Type: Abstract complessivo di un simposio

Temporal gamma tACS and auditory stimulation affect verbal memory in healthy adults

Speaker: Manippa, Valerio

Track: Life cycle (e.g., development and aging)

Abstract

Research suggests a potential of gamma oscillation entrainment for enhancing memory in Alzheimer's disease and healthy subjects. Gamma entrainment can be accomplished with oscillatory electrical, but also sensory stimulation.

However, comparative studies between sensory stimulation and transcranial alternating current stimulation (tACS) effects on memory processes are lacking. This study examined the effects of rhythmic gamma auditory stimulation (rAS) and temporal gamma-tACS on long-term memory (LTM) and working memory (WM) in 74 healthy individuals. Participants were assigned to two groups according to the stimulation techniques (rAS or tACS). Memory was assessed in three experimental blocks, in which each participant was administered with control, 40 Hz, and 60 Hz stimulation in counterbalanced order.

All interventions were well-tolerated, and participants reported mostly comparable side effects between real stimulation (40 Hz and 60 Hz) and the control condition. LTM immediate and delayed recall remained unaffected by stimulations, while immediate recall intrusions decreased during 60 Hz stimulation. Notably, 40 Hz interventions improved WM compared to control stimulations. These results highlight the potential of 60 Hz and 40 Hz temporal cortex stimulation for reducing immediate LTM recall intrusions and improving WM performance, respectively, probably due to the entrainment of specific gamma oscillations in the auditory cortex.

The results also shed light on the comparative effects of these neuromodulation tools on memory functions, and their potential applications for cognitive enhancement and in clinical trials.

Author/s: Valerio Manippa, Michael Nitsche, Marco Filardi, Davide Vilella, Gaetano Scianatico, Giancarlo Logroscino, Davide Rivolta

Type: Talk in simposio

A systematic review and meta-analysis on the effectiveness of cognitive interventions in healthy ageing

Speaker: Pegoraro, Sara

Track: Life cycle (e.g., development and aging)

Abstract

Even when healthy, ageing is associated with a gradual and unavoidable decline in various cognitive functions. These cognitive changes affect older adults' quality of life, well-being, and life expectancy, causing significant welfare political implications worldwide. In this context, cognitive training and stimulation have become valuable interventions to prevent age-related cognitive decline in healthy elderly.

This systematic review and meta-analysis aimed to outline different available instruments of cognitive intervention and to quantify their effectiveness for cognitively healthy elderly.

Pubmed, Scopus, and Web of Science online databases were searched for eligible studies on cognitive interventions for cognitively healthy older adults (age >60). We screened 297 studies. Interventions were single- or multi-domain cognitive training or stimulation, administered individually or in groups, in presence or at a distance, technology-, paper-and-pencil-, or music-based. We considered cognitive outcomes assessed by standardised neuropsychological screening tests before and immediately post-intervention, compared with an active or passive control group. The presence of a follow-up assessment was also investigated.

The analysis revealed the presence of two influential points and no outliers. The estimated overall effect size was 0.25 (95% CI = [0.08, 0.42]). The omnibus test of model coefficients was significant ($p < 0.001$), while the test for residual heterogeneity resulted as not significant ($p = 0.371$), so homogeneity between studies can be assumed.

Our preliminary results suggest the effectiveness of cognitive interventions, compared to control group activities, in enhancing global cognitive functioning in the healthy elderly population.

Author/s: Sara Pegoraro, Giorgia Tosi, Laura Veronelli, Marianna Delussi, Fulvia Campo, Daniele Luigi Romano, Elvira Brattico, Roberta Daini

Type: Mini-talks

Brain Topology Underlying Executive Functions Across the Lifespan: Focus on the Default Mode Network

Speaker: Menardi, Arianna

Track: Life cycle (e.g., development and aging)

Abstract

While traditional neuroimaging approaches to the study of executive functions (EFs) have typically employed task-evoked paradigms, resting state studies are gaining popularity as a tool for investigating inter-individual variability in the functional connectome and its relationship to cognitive performance outside of the scanner.

Using resting state functional magnetic resonance imaging data from the Human Connectome Project Lifespan database, the present study capitalised on graph theory to chart cross-sectional variations in the intrinsic functional organisation of the frontoparietal (FPN) and the default mode (DMN) networks in 500 healthy individuals (from 10 to 100 years of age), to investigate the neural underpinnings of EFs across the lifespan. Topological properties of both FPN and DMN were predictive of EF performance, but not of a control task of picture naming, providing specificity in support for a tight link between neuro-functional and cognitive-behavioural efficiency within the EF domain. The topological organisation of the DMN, however, appeared more sensitive to age-related changes relative to that of the FPN. Because the DMN matures earlier in life than the FPN, it is more susceptible to neurodegenerative changes and because its activity is stronger in conditions of resting state, the DMN might be easier to measure in noncompliant populations and in those at the extremes of the life-span curve, namely very young or elder participants.

Here, we argue that the study of its functional architecture in relation to higher order cognition across the lifespan might, thus, be of greater interest compared with what has been traditionally thought.

Author/s: Arianna Menardi, Milena Spoa, Antonino Vallesi

Type: Mini-talks

Dream recall and content in Rapid Eye Movement (REM) Sleep Behavior Disorder patients

Speaker: Bontempi, Giorgia

Track: Life cycle (e.g., development and aging)

Abstract

****INTRODUCTION:**** Previous work suggested that idiopathic REM Sleep Behavior Disorder (iRBD) may be associated with alterations in dream content, including more aggression as compared to healthy control (HC) individuals, and in dream recall frequency (DRF; *i.e.*, the number of dreams recalled in a given timespan). However, several studies failed to replicate these findings, questioning their reliability. Aim of our study was to explore potential differences in DRF and dream content between iRBD and HC participants.

****METHODS:**** Participants (iRBD=15, HC=15) filled out retrospective questionnaires assessing their Attitude Towards Dreams (ATD), DRF, nightmare frequency, and aggressiveness, affective valence, and arousal of dreams in the previous three months. Subsequently, participants wore an actigraph and recorded a report of their last dream experience each morning upon awakening for two weeks. Afterward, reports were classified as either contentful dreams, dreams without recall of content, or no dreams.

****RESULTS:**** Retrospective measures highlighted higher aggressive contents in iRBDs compared to HCs ($p<0.01$), while no differences were found in nightmare frequency, affective valence, or arousal. Retrospective and report-based DRF measures identified no between-group difference. However, our iRBD sample showed lower ATD scores in comparison to HCs ($p<0.01$). Such a difference may represent a relevant confound, as previous work demonstrated a strong correlation between ATD and DRF.

****CONCLUSIONS:**** Our study provides further evidence supporting dream content alterations in iRBD. Future dream content textual analyses will allow us to detect and quantify specific indices characterizing iRBD dreams, investigating their possible correlation with individual symptoms.

Author/s: Giorgia Bontempi, Elena Capriglia, Gaetano Malomo, Michele Terzaghi, Giulio Bernardi, Valentina Elce
Type: Mini-talks

Measuring Subjective Vitality and Depletion in older people from a SDT perspective: a dual country study

Speaker: Dawe, James

Track: Life cycle (e.g., development and aging)

Abstract

As the global elderly population grows research increasingly focuses on their well-being and quality of life, aspects that are often impacted by a perceived loss of energy and fatigue. To describe individuals' energy dynamics, Self-Determination Theory (SDT) recently proposed a dual-process model based on two constructs: Subjective Vitality and Depletion. The present study aims to validate the Subjective Vitality/Depletion Scale (SVDS), an SDT instrument based on this model. A sample of 726 older adults (over 65) from two countries USA and Italy (343 USA and 383 Italy; 51.1% females; age range = 65 - 95 years; Mage = 72.57, SDage = 6.49) completed the SVDS, the Big Five Inventory 2 – Extra Short Form (BFI-2-XS), and the 12-item Short Form Health Survey (SF-12). Confirmatory factor analyses of the SVDS support the SDT hypothesis that Subjective Vitality and Depletion are two distinct, yet related constructs.

Full measurement invariance for the scale was achieved across gender and age subgroups, while partial scalar invariance was established across different countries, suggesting some specific influence of cultural factors. Correlations with BFI-2-XS and SF-12 support the SVDS convergent, discriminant, and nomological validity.

In conclusion, we provided evidence that the SVDS based on SDT is a valid and reliable instrument for assessing Subjective Vitality and Depletion among the elderly. Vitality and Depletion appear to be constructs that are conceptualized and interpreted consistently across elders with diverse characteristics and cultures.

Author/s: James Dawe, Andrea Chirico, Tommaso Palombi, Fabio Lucidi

Type: Mini-talks

Risk factors and dementia: a preliminary analysis of potential

Speaker: Riggio, Febronia

Track: Life cycle (e.g., development and aging)

Abstract

Dementia is a term that refers to a group of neurological disorders characterized by severe cognitive decline, which interferes with daily activities. According to the World Health Organization (WHO), dementia is a global public health priority. In addition to prevalence, risk factors for dementia include age, family history, cardiovascular risk factors, smoking, excessive alcohol consumption, and low educational level (risk of disease decreased by approximately 17% for each year of education).

Moreover, the type of work can influence the probability to developing dementia. According to literature, engaging in mentally stimulating work is associated with better cognitive functioning as individuals age. This hypothesis could be supported by the concept of “cognitive reserve”, a protective factor which refers to the neural reserve built over life span. The aim of this study was to describe the socio-demographic profile and the prevalence of risk factors among a sample recruited at Department of Neurology, Policlinico G. Martino, Messina, Sicily, Italy.

Socio-demographic and clinical data were collected and assessed. The sample consisted of 102 subjects, (m=41, f=61), with an average age of 75.5. during the anamnestic stage, a semi-structured interview was conducted to collect the information of interest to our study. Afterward, the Addenbrooke's Cognitive Examination - III (ACE-III) and Mini-Mental State Examination (MMSE) were used as the neuropsychological examination. The data were analyzed using Jamovi software. Preliminary analysis results confirmed that education and occupation type are predictors of cognitive performance. The study of these characteristics is useful to early diagnosis of neurodegenerative diseases.

Author/s: Febronia Riggio, Massimo Mucciardi, Massimo Raffaele, Chiara Rizzotto, Amelia Gangemi

Type: Mini-talks

The Effect of Creativity on Cognitive Reappraisal Effectiveness: An Experimental Study in a Sample of Older Adults.

Speaker: Telazzi, Ilaria

Track: Life cycle (e.g., development and aging)

Abstract

Emotion regulation (ER) has been acknowledged as an important factor for older adults' well-being. Recently, it has been suggested that creativity may play a role in the effectiveness of cognitive reappraisal, an adaptive form of ER. The present study aims to test whether creativity is linked to greater effectiveness in the use of cognitive reappraisal in a sample of older adults.

A preliminary sample of 43 healthy older adults (age range 62-100) living in nursing homes was randomly assigned to either the experimental group (who completed a primer creativity task) or the control group (who completed a filler task). After this first step, all participants performed an ER task, involving the observation of thirty images (neutral or negative). Each image was preceded by an instruction to either watch or use positive reappraisal. After watching each image, the participants were asked to rate their affective experience (valence and arousal plus a list of emotional labels).

Results showed that the experimental group reported less unpleasantness and less intense negative emotions when using positive reappraisal compared to the control group while observing negative images. However, no significant differences between groups were found concerning self-reported arousal.

Overall, these findings support a significant effect of creativity on the use of cognitive reappraisal in older adults: Creativity seems to improve the effectiveness of this ER strategy in decreasing unpleasantness of negative stimuli. Providing new evidence about the links between creativity and ER, the results of this study hold significant implications to foster healthy aging.

Author/s: Ilaria Telazzi, Stefania Balzarotti, Barbara Colombo

Type: Mini-talks

What role does sleep play in the development of cognitive reserve? A systematic review on the effects of sleep modulation in animal models

Speaker: Balsamo, Francesca

Track: Life cycle (e.g., development and aging)

Abstract

Individuals' responses to aging or neuropathological insults vary due to factors affecting the central nervous system's structure and function. Cognitive reserve, shaped by life experiences, helps protect the brain from neuronal damage. Modifiable lifestyle factors like sleep can enhance cognitive reserve, counteracting age- or disease-related brain changes. Sleep impacts cognitive domains, and sleep disruptions or disorders could pose neurodegenerative risks. The present work explores how positive or negative sleep modulations affect cognitive functions and neuromorphological mechanisms in rodents, aiming to understand its role in cognitive/brain reserve development.

The systematic review, performed according to PRISMA-P guidelines, was registered on Prospero (Registration ID: CRD42023423901). All articles published until June 2022 were considered and the search was performed on four databases: Pubmed, Scopus, Web of Science, and Embase. The search strategy utilized terms related to sleep, rodents, and cognitive functions.

Out of the 28,666 articles found on databases, 142 met the inclusion criteria.

The data, divided by species (mouse/rat), were analyzed based on cognitive domains (learning, memory, executive functions, and attention) and sleep manipulation types (REM, total, or circadian alteration, with enrichment or deprivation), and duration (acute or chronic).

Data revealed a significant cognitive decline after sleep deprivation, particularly in the memory domain, while other domains exhibited varied results. Regarding this, limited studies on REM sleep enrichment via medication hinted at enhanced memory performance. These findings confirm that sleep modulation affects cognitive and neuromorphological processes, underscoring the importance of sleep as a critical factor in modulating brain/cognitive reserve.

Author/s: Francesca Balsamo, Debora Meneo, Erica Berretta, Chiara Baglioni, Francesca Gelfo

Type: Mini-talks

Metacognitive awareness of lip-reading gains in young and older adults

Speaker: Giovanelli, Elena

Track: Life cycle (e.g., development and aging)

Abstract

In this study we targeted metacognition of lip-reading benefits in older and younger adults listening to a visible talker in noise. We explored individuals' awareness of the advantages of lip-reading under the form of improved confidence and reduced listening effort. Additionally, we examine whether this metacognitive awareness changes with age, investigating differences in metacognitive indexes and participants' self-evaluation of their actual listening improvements. Using a virtual reality hearing-in-noise task, older and younger adults listened to an avatar whose visibility was modulated adjusting the opacity of a panel.

We measured real and perceived improvements, confidence improvement, and effort reduction as participants switched between different visibility conditions. Both age groups showed similar real improvements, revealing an underlying effective audio-visual integration. Moreover, comparable improvements in confidence suggested a lip-reading gain that impacts listening beyond mere performance, irrespective of age. The only group difference was found in effort reduction, which was smaller for older adults when lip visibility was greater, particularly among those with lower lip-reading abilities. Despite both groups displayed a consistent awareness of lip-reading gains, older adults may face greater challenges in audio-visual listening, which may interfere with their willingness to use lip-reading as a strategy in their everyday life.

Effort, therefore, may be considered more than an index of how much resources are deployed in a task, becoming an internal feeling that may concur in deciding whether to implement adaptive behaviors, with important consequences on the design of interventions aimed at ameliorating older adult's quality of social interactions.

Author/s: Elena Giovanelli, Benedetta Desolda, Chiara Valzolgher, Elena Gessa, Francesco Pavani, Tommaso Rosi

Type: Poster

Neuropsychological and emotional-behavioral changes in children's development after COVID-19

Speaker: Marfoli, Angelica

Track: Life cycle (e.g., development and aging)

Abstract

Objectives: Sars-Cov-2 infection had a significant impact on the psychological well-being of children and led to negative effects on their mental health. Although children affected by COVID-19 had milder symptoms compared to adults, impairments in neuropsychological and emotional development were noted.

The main aim of this study was to detect possible changes in the neuropsychological and emotional-behavioral development of children after Sars-Cov-2 infection.

Methods: 40 patients aged 8 to 9 years were divided into two groups: children who had contracted SARS-Cov-2 infection (CG) and children who had not contracted infection (NCG). The BVN 5–11 instrument was used to assess cognitive domains. Data on changes in emotional-behavioral development were collected through a parent questionnaire.

Results: The Wilcoxon signed-rank test revealed a significant change in mood only in the CG participants ($p = 0.019$). The neuropsychological performance of the two groups on BVN 5-11 sub-items was below the cutoff of clinical significance.

Significant positive correlations were observed between Naming on visual presentation and Reading time ($p = .006$), and Phonemic fluency and device use time ($p = .030$). Positive statistically significant correlations were also found between Mood and Free behavior ($p = .000$) and between Mood and peer Interaction ($p = .013$).

Conclusions: Sars-Cov-2 infection had a negative impact on the emotional development of children who were infected with the virus. The neuropsychological functioning of the pediatric population was influenced by psychosocial variables that played a protective role in children's cognitive development.

Author/s: Angelica Marfoli, Edoardo Nicolò Aiello, Giulia Speziale, Denise Mellace, Angelica De Sandi, Barbara Poletti, Beatrice Curti, Giulia De Luca, Gabriella Pravettoni, Daniela Chieffo, Sergio Barbieri, Alberto Priori, Roberta Ferrucci

Type: Poster

Promoting geropsychology. A memorandum for research, policies, education programs, and practice for healthy aging

Speaker: Consiglio, Anna

Track: Life cycle (e.g., development and aging)

Abstract

The aim of this viewpoint paper is to synthetically report the state of the art at a global level on research, practice and assessment, policies, and training in clinical psychology of aging and more specifically in geropsychology.

The main sources of information were: 1) the most recent reviews of the literature available in the scientific literature, 2) the resources on the internet referable to professional and academic associations dealing with the topic and, 3) the laws, policy initiatives and funded programs that are aimed at the diffusion and applications of mental health in aging. The results of the present study are patchy. Although the importance of enhancing resources for the promotion of geropsychology has long been declared, the development process seems very slow and the adaptation of academic training at master's and doctoral levels in most developed countries - those that for demographic reasons and attitude should be more sensitive to the issue, does not seem to have consolidated, yet. Collaboration among diverse professionals is crucial for providing integrated and comprehensive care to older adults that addresses their physical, psychological, and social needs. In 2024, the year the APA has approved the expected revision of its APA guidelines for psychological practice with older adults,

The present work would aim to be an updated, comprehensive memorandum highlighting the importance of prioritizing mental health in older adults by promoting health in general and disease prevention strategies, ensuring equitable access to mental health services integrated into primary care and designed for ageing.

Author/s: Anna Consiglio, Antonella Lopez, Andrea Bosco

Type: Poster

Bodily processing shapes social cognition across the life cycle: impact on empathy and theory of mind

Speaker: Canino, Silvia

Track: Life cycle (e.g., development and aging)

Abstract

Interoception, the perception of the body's physiological condition, underlies fundamental emotional and cognitive processes. However, how the conscious representation of bodily signals influences the understanding of others' minds remains unclear. This study aims to investigate whether individual differences in the interoceptive processing, in terms of interoceptive accuracy (IAcc), sensibility (ISe), and awareness (IAw), shape core processes underlying social cognition (i.e., empathy and Theory of Mind, ToM) across the lifespan.

The study involved 189 healthy individuals grouped by age: 32 children (7-10 yrs), 55 adolescents (12-14 yrs), and 100 adults (18-55 yrs). They completed tasks probing affective/cognitive ToM and empathy, IAcc (heartbeat tracking task), IAw (accuracy-confidence correlation), and an ISe questionnaire.

IAcc negatively correlated with affective ToM in adults and cognitive empathy in adolescents, possibly because enhanced abilities in perceiving the inner body result in stronger boundaries between themselves and others from adolescence onwards. IAw was negatively associated with empathy only in children, highlighting developmental differences in metacognitive awareness of bodily signals. Conversely, ISe consistently showed a positive correlation with empathy across all age groups, indicating a stable trait-like representation.

These findings support embodied and multifaceted models of social cognition, suggesting specific connections between social cognition and interoceptive dimensions at different life stages. Moreover, they are consistent with evidence suggesting the discrepancy between interoceptive dimensions.

Given the presence of social cognition and interoceptive difficulties in disorders like autism and schizophrenia, these insights could also prove valuable for clinical applications, such as creating personalized interventions for different stages of life.

Author/s: Silvia Canino, Valentina Torchia, Erica Dolce, Simona Raimo, Liana Palermo

Type: Poster

Inhibition changes across the lifespan: experimental evidence from the Stroop task

Speaker: Troisi, Giovanna

Track: Life cycle (e.g., development and aging)

Abstract

Individuals constantly exert inhibitory control over their thoughts and behaviors to plan actions that compete with habits and impulses. Cognitive inhibition enhances the selection of task-relevant stimuli and is closely related to neural changes that occur across the lifespan.

Since few studies have focused on the entire lifespan, this study aimed to assess cognitive inhibition abilities in a sample of 425 healthy participants (age range: 7-88 years) using the Stroop task.

The participants were grouped according to age into children, adolescents, young adults, adults, middle-aged adults, and older adults. A series of ANOVAs considered Group as the independent variable and Performance indices as the dependent variables.

The children did not show an interference effect (stroop effect), likely due to the lack of an automated reading process as a consequence of ongoing brain maturation. Adolescents and young adults performed significantly faster than older adults did. The results indicate that response speed reaches its peak during adolescence and young adulthood and then slightly decreases until older age. Nevertheless, compared with the other groups, only older adults showed significant differences in the Stroop effect, suggesting that inhibitory abilities remain relatively consistent throughout adulthood but rapidly worsen in recent years due to the physiological decline in cognitive and brain functioning associated with aging.

Author/s: Giovanna Troisi, Giuseppe Forte, Francesca Favieri, Maria Casagrande

Type: Poster

The influence of psychological factors on functional status in fibromyalgia

Speaker: Mellace, Denise

Track: Life cycle (e.g., development and aging)

Abstract

Background ** Fibromyalgia is characterized by chronic, widespread pain that is often accompanied by fatigue, sleep disturbances, and cognitive and mood impairment. Pain is a complex and multidimensional experience that significantly impacts personal, social, and professional functioning. Psychological factors known to be associated with chronic pain include catastrophizing and self-efficacy in managing the painful condition.

This study examines the influence of chronic pain and related psychological factors on functional outcomes in fibromyalgia patients.

Methods ** 91 Italian patients with fibromyalgia were examined using an online questionnaire including instruments such as the Numerical Rating Scale (NRS), the Brief Pain Inventory (BPI), the Pain Self-Efficacy Questionnaire (PSEQ), the Pain Catastrophizing Scale (PCS), and the 12-item Short Form Survey (SF-12) questionnaire.

Multiple regression models were conducted, using the Interference subscale of the BPI and the physical and mental components of the SF-12 as outcomes, and the NRS, PCS and PSEQ scales as predictors.

Results ** In our models, both PCS and PSEQ were significant predictors of BPI-Interference (PCS: $\beta=.29$; $p=.001$; PSEQ: $\beta=-.36$; $p<.001$); NRS and PSEQ significantly predicted SF-12-Physical score (NRS: $\beta=-.32$; $p<.001$; PSEQ: $\beta=.50$; $p<.001$); PCS was found to be the only significant predictor of SF-12-Mental scores ($\beta=-0.53$; $p<.001$).

Conclusions ** Psychological dimensions such as catastrophic thinking and self-efficacy have been shown to play a critical role in determining the daily functioning and health status of fibromyalgia patients, independent of the impact of pain intensity.

Author/s: Denise Mellace, Edoardo Aiello, Angelica De Sandi, Angelica Marfoli, Sofia Allegri, Benedetta Ticozzelli, Maurizio Vergari, Fabiana Ruggiero, Francesca Mameli, Eleonora Zirone, Barbara Poletti, Daniela Chieffo, Gabriella Pravettoni, Alberto Priori, Sergio Barbieri, Roberta Ferrucci

Type: Poster

The Protective Role of Cognitive Reserve in Mediating Depressive Symptomatology in Patients with Multiple Sclerosis

Speaker: Biasi, Madia Marika

Track: Life cycle (e.g., development and aging)

Abstract

Cognitive impairment (CI) in Multiple Sclerosis (MS) affects between 40 and 65 percent of people with MS (pwMS), impacting memory, attention, information processing speed, and language (Amato et al., 2010). High levels of depression worsen cognitive symptoms: pwMS with depression perform poorly in working memory or information processing speed (van Geest et al., 2019). However, some studies have found that greater Cognitive Reserve (CR) protects against CI in pwMS (Santangelo et al., 2018).

Therefore, the aim of this study was to investigate the correlations between depression and sustained attention, working memory, and semantic fluency in a cohort of Italian PwMS, considering the effect of CR.

187 PwMS (W= 130; mean age=42.0 years; SD = 12.5), from the Bari University Hospital, underwent testing for semantic fluency (Word List Generation [WLG]), sustained attention and working memory (Paced Auditory Serial Addition Test [PASAT]), Cognitive Reserve level (Cognitive Reserve Index questionnaire [CRIq]), and depressive symptomatology (Beck's Depression Inventory [BDI]).

Statistically significant correlations emerged between WLG and CRIq, PASAT and CRIq, WLG and BDI, PASAT and BDI. GLM mediation analyses revealed that the direct effects of depression on PASAT and WLG scores were not statistically significant ($p > .05$). In contrast, the indirect effect ($BDI \rightarrow CR \rightarrow PASAT$ and $BDI \rightarrow CR \rightarrow WLG$) was significant ($z = -2.29$, $p < 0.05$; $z = -2.49$; $p < 0.05$).

These results suggest that CR mediates the relationship between depressive symptomatology and information processing speed, sustained attention, and verbal fluency.

Author/s: Madia Marika Biasi, Paolo Taurisano, Alessia Manni, Romina Barberio, Eleonora Gentile, Damiano Paolicelli

Type: Poster

Assessing User Experience in older adults: a valid and tailored evaluation tool

Speaker: Bruni, Francesca

Track: Life cycle (e.g., development and aging)

Abstract

As novel techniques for engaging with systems emerge within virtual reality, it becomes crucial to evaluate their impact on user experience. Several tools are available for assessing user experience, computer interfaces, or displayed content (e.g. Brooke 1996, Lewis 1995, and Sauro and Dumas 2009), as well as the sense of presence within an environment (e.g., Lessiter et al 2001). However, few measures are tailored to assess the interactions prevalent in 360° environments and among older users. Many of these lack the adaptability required to evaluate evolving interaction paradigms in VR environments, especially those designed for hardware input devices or use cases. Moreover, these measures often are not in line with the advancements in technology and shifts in user demographics.

We aim to create a psychometrically valid questionnaire that can be tailored to different input devices, aiding in the evaluation of virtual reality experience quality in older adults. Through a literature review, we identified key variables for fostering positive user experiences. Subsequently, we devised a customizable questionnaire capable of accommodating the needs of older adults and new interaction modalities, addressing the challenges. This questionnaire will undergo psychometric analyses to validate its reliability and sensitivity in VR environments, enabling researchers to employ a validated instrument when evaluating novel interaction forms in virtual reality.

We will delineate the development process of this questionnaire designed to assess subjective user experiences. The final questionnaire will be presented at the conference, providing researchers with a valuable tool for assessing the aspects of user experience in VR.

Author/s: Francesca Bruni, Valentina Mancuso, Elisa Pedroli

Type: Poster

Cognitive reserve and attachment styles in young adults. Two preliminary studies.

Speaker: Chiappetta, Denise

Track: Life cycle (e.g., development and aging)

Abstract

BACKGROUND: A positive relationship between secure attachment styles and satisfying interpersonal relationships, along with better emotional regulation in adulthood, is well-established. These factors are also significant contributors to cognitive reserve (CR), which is associated with healthier cognitive, physical, and emotional aging.

However, the potential connection between attachment styles and CR, and the possibility of identifying this relationship in young adults, remains underexplored. **AIMS:** This paper presents two studies aimed at investigating the relationship between attachment styles and CR. Self-report measures of CR and attachment styles were combined with a structured interview focused on attachment figures at various life stages.

In Study 2, physiological data were also collected. **METHODS:** Study 1 included 47 participants (ages 19–29), while Study 2 involved 28 participants (ages 18–22). In both studies, participants completed self-report assessments of CR (CoRe-T) and attachment styles (ECR-S). Additionally, participants took part in an interview examining significant relationships across different life phases. In Study 2, biofeedback was used to measure physiological responses during the interview. **RESULTS:** Differences in CR proxies were observed across attachment styles, with a significant positive relationship between secure attachment styles and higher scores in CR-related variables. Skin conductance levels also varied according to attachment styles; individuals with more anxious attachment styles exhibited higher levels of physiological activation during the interviews.

Additionally, the use of emotional language differed by attachment style. These findings suggest potential applications in preventive and therapeutic settings.

Author/s: Denise Chiappetta, Laura Natarella, Chiara Rossi, Luca Milani, Barbara Colombo

Type: Poster

Correlations between gustatory, olfactory, cognitive function, and age in healthy women

Speaker: Sanna, Fabrizio

Track: Life cycle (e.g., development and aging)

Abstract

Aging is a progressive physiological degeneration associated to a decline in chemosensory processes, cognitive abilities, and reduction in synaptic plasticity. Biological bases of ageing are still not completely understood, and many theories have been proposed.

This study aimed to evaluate the occurrence of age-related changes affecting the chemosensory function (gustatory and olfactory) and general cognitive abilities and their potential associations in women. To this aim, 319 women (age range from 18 to 92 years) were recruited and divided into four different age groups: 18-34 years, 35-49 years, 50-64 years, and ≥ 65 years. Our results confirm that in women gustatory, olfactory, and cognitive functions decline, though in different manner during aging. Olfactory and cognitive function showed a slight decline along the first three age-classes with a dramatic decrease after age 65 years, while gustatory function decreased more gradually. Olfactory and gustatory deficits may have a high degree of predictivity for general cognitive function as well as for specific cognitive subdomains such as visuospatial/executive abilities, language, memory, and attention.

Our study highlights the importance of using chemosensory assessments for the early diagnosis of cognitive decline and for the development of appropriate personalized risk prevention strategies.

Author/s: Fabrizio Sanna, Carla Masala, Maria Paola Castelli, Rafaela Mostallino, Francesco Loy

Type: Poster

Adapting to change: developmental, clinical and ecological perspectives on learning-based cognitive control

Speaker: Toffoli, Lisa

Track: Memory

Abstract

Cognitive control (CC) is a crucial tool for adaptation in daily life (Diamond, 2020; Moffitt et al., 2011). While traditionally viewed as a top-down mechanism (Diamond, 2020; Miyake & Friedman, 2012), recent evidence shows that implicit learning shapes CC in a bottom-up manner, optimizing cognitive resources based on environmental changes (Abrahamse et al., 2016; Braem & Egner, 2018). This aligns with the Dual Mechanism Model (DMC) (Braver, 2012), suggesting that individuals adopt reactive or proactive control strategies depending on implicit situational demands. Despite its importance, few studies have explored learning-based CC development. Existing findings suggest that it stabilizes early in typical development and may be atypical in neurodevelopmental conditions such as ADHD (Gonthier et al., 2021; Cai et al., 2018).

In this presentation, using a neuro-constructivist framework (Karmiloff-Smith, 1992), I investigate learning-based CC from a clinical, developmental, and ecological perspective. Study 1 examines typically developing children (N=149, 5-14 years) using a Flanker task and cued-goNogo. Results show stable CC development in the Flanker task, while the cued-goNogo – which entails greater cognitive load – reveals optimal learning-based CC only from adolescence. The multi-centric Study 2 replicates these tasks with ADHD children (N=154), showing no deficits in learning-based CC, but a lack of improvement under increased cognitive load. Finally, Study 3 explores how digital content affects preschoolers' (N=42) learning-based CC using high-density EEG. Previous studies found negative short-term influence of digital exposure on CC, but cognitive engagement could potentially mediate these effects. Indeed, results reveal that children exposed to cognitively engaging cartoons show enhanced behavioral and neural learning-based CC compared to those watching passive content.

Overall, these findings carry theoretical and practical implications for neuropsychology and education.

Author/s: Lisa Toffoli

Type: Keynote talk

Extraction of statistical regularities to generalise episodic information into conceptual knowledge

Speaker: Santacroce, Federica

Track: Memory

Abstract

We constantly extract regularities from experience, creating conceptual memories to organize knowledge. Previous studies have often focused on previously consolidated knowledge, here, we have investigated the process of transforming new contextual information into generalized knowledge.

40 participants watched a TV series (encoding) and then performed a semantic task requiring them to quantify the relationship between pairs of characters in the series on a horizontal line (retrieval). 20 performed the task after each episode (explicit group), while the other half only after completing the series (implicit group). We constructed a subjective social map with the participants' judgments and an objective one by evaluating several parameters through a nested model. Next, we tested the similarity between the subjective and objective maps by identifying the crucial parameter. Finally, we assessed whether the addition of episodic material increased the similarity between the maps in the explicit group.

We found a significant similarity between the subjective and objective maps (Mantel-correlation= 0.7; $p < 0.001$). Furthermore, the physical co-occurrence of the characters (second hierarchical level) was the key parameter in the construction of the subjective map ($r = 2.663738$; $p < 0.001$). Finally, the amount of episodic material (episodes 1-5) significantly improved the similarity between subjective and objective maps ($r = -2.433113$; $p < 0.001$).

It turns out that we construct social maps by keeping track of the interactions between characters in a narrative and that their physical presence is crucial. With the addition of episodes, the semantic map becomes more stable and objective. This confirms that the process of creating meaning from events emerges and is consolidated through repetition and integration.

Author/s: Federica Santacroce, Annalisa Tosoni, Carlo Sestieri, Davide Di Censo, Giorgia Committeri

Type: Talk in simposio

Predicting False Memories with Data-Driven Computational Models: The Role of Visual and Semantic Similarity in the DRM Paradigm

Speaker: Rodio, Francesca Maria

Track: Memory

Abstract

The Deese-Roediger-McDermott (DRM) paradigm consists of presenting participants with word lists and subsequently testing their memory of those words. It has been observed that words semantically similar to those memorized tend to be erroneously recognized as part of the previously memorized list. While the role of semantic similarity in generating false memories is well-established, less is known about whether and to what extent visual similarity contributes to this phenomenon.

To investigate this question, we adopt a data-driven computational approach to independently quantify visual similarity and semantic similarity for linguistic and visual stimuli. These stimuli are presented in three DRM variants to test their effects on the generation of false memories.

Our results show that false memories consistently increase for new words and images that are visually and semantically similar to those presented in the memorized lists, with a greater extent of visual and semantic similarity in the DRM with images and words, respectively. These findings indicate that both visual memory and semantic memory are involved in memory distortions, regardless of whether the information is presented in visual or linguistic format.

Author/s: Francesca Maria Rodio, Marco Petilli

Type: Talk in simposio

Pseudogeography

Speaker: Gatti, Daniele

Track: Memory

Abstract

Geographical knowledge requires a tight binding between spatial and linguistic information (i.e., memorizing a city's name and its absolute spatial position on a map). Here, we probed whether this binding can be traced back to systematic language-to-space statistical mapping.

Results from two computational experiments based on more than 40.000 cities across 5 European countries revealed systematic language-to-space regularities as indexed by both basic surface-level (i.e., letters and bigrams composing the city name) and deeper (i.e., as extracted from a distributional semantic model) linguistic information. Next, to test whether these statistical regularities influence geographical judgements, we asked human participants to judge the geographical location of never attested but linguistically plausible strings of letters (pseudocities). Results from two behavioral experiments indicate that participants' performance align with the prior language-to-space binding.

These findings not only attest the presence of systematic regularities between language and space, but also indicate that humans rely on these prior regularities when exploring new spaces.

Author/s: Daniele Gatti, Luca Rinaldi, Tomaso Vecchi

Type: Talk in simposio

The impact of information entropy on meaning extraction from orthographic units.

Speaker: Bonandrini, Rolando

Track: Memory

Abstract

Prior to each session, both students and therapists complete a series of self-report measures on the aforementioned constructs. Additionally, baseline physiological measures are recorded using the Empatica E4 wristband while participants watch a neutral video. These baseline measurements are subsequently compared to those collected during the actual therapy sessions. Following the initial session, both parties complete a follow-up survey to assess therapeutic alliance and emotional regulation. To investigate the trajectory of the student-therapist relationship over time, this process is repeated during the first, third, and fifth sessions. Consistent with previous research, the findings reveal a pattern of increasing synchronization within dyads across sessions, as evidenced by both physiological and explicit measures.

Author/s: Rolando Bonandrini, Marco Marelli

Type: Talk in simposio

"Do you remember if you took your luggage?" An Immersive Study on Action Complexity and Memory Distortion

Speaker: Mitaritonna, Danilo

Track: Memory

Abstract

This study investigates the influence of memory encoding modality (2D vs. virtual reality) and action complexity on the generation of false memories. Previous research has shown that observers tend to "fill the gap" of missing details in memory through mental simulations triggered by action observations (Papenmeier et al., 2019; Iani et al., 2018).

Participants watched segments of videos depicting ten complex actions presented in either backward+central or central+forward sequences, using both 2D and immersive VR encoding modalities. Then, they completed a recognition task involving images from the backward, central, and forward part of the actions. Results showed that both the observed action segment (backward+central vs. central+forward) and action complexity significantly predicted recognition accuracy for previously seen images. Furthermore, a significant three-way interaction between encoding modality, stimulus type, and action complexity on reaction times emerged, suggesting that both encoding P.O.V. and action complexity modulate recognition and retrieval processes.

These findings support the emergence of false memories via event completion processes and highlight the role of action complexity in shaping memory biases, with critical implications for legal contexts that rely on eyewitness testimony.

Author/s: Danilo Mitaritonna, Mara Stockner, Teresa Limata, Francesco Iani, Monica Bucciarelli, Giuliana Mazzoni

Type: Talk in simposio

(Im)moral memories: how morality and guilt shape our past and future memories

Speaker: Stockner, Mara

Track: Memory

Abstract

Autobiographical memory (ABM) is fundamental for our identity and the maintenance of a positive self-concept and thus, can be characterized by distortions (Conway & Pleydell-Pearce, 2000).

Preliminary evidence has shown that memories of immoral actions can be distorted and elicit a so-called “immoral amnesia” that may also be one of the underlying mechanisms of the persistence of immoral behavior (e.g., Kouchaki & Gino, 2016). On the other hand, guilt, a morally relevant emotion, has been linked to prosocial behavior. The present study proposes a new theoretical framework that investigates the mechanisms of immoral memory distortions and, for the first time, of Episodic Future Thinking (EFT), hypothesizing the underlying key mechanism of guilt.

In particular, this study investigates the phenomenology and reported characteristics (e.g., vividness of memory, guilt related to the action) of, both past and future, moral and immoral events, with the hypothesis of replicating the so-called “immoral amnesia” also for EFT. Finally, a prosocial decision-making task will provide a first experimental contribution to the proposed theoretical framework, illustrating whether and how the narration of immoral or moral actions impacts decision-making. The results will be discussed in the light of the theoretical and practical implications.

Author/s: Mara Stockner, Jessica Talbot, Gianmarco Convertino, Danilo Mitaritonna, Giuliana Mazzoni

Type: Talk in simposio

Autobiographical Memory: Advances in Research and Practical Implications

Speaker: Marselli, Giulia

Track: Memory

Abstract

Autobiographical memory (AM) plays a fundamental role in the development of an individual's identity and in maintaining a positive self-concept. However, it can be characterized by distortions, and its functioning may be altered by various factors.

The symposium begins with the presentation of a new tool to measure individuals' beliefs about how memory works. The practical implications of misinformation in this area will be discussed, as reducing the gap between experimental contexts and real-life scenarios is essential for ensuring that scientific findings and practical applications are useful and meaningful for people.

For this reason, the discussion will continue with the presentation of studies that examine distortions in AM from various perspectives, considering their daily-life implications. We will start by discussing the accuracy of memories through two studies: on one hand, research investigating the mechanism of encoding and the creation of false memories; on the other hand, a study that uses a tool to distinguish between true and false autobiographical memories.

Next, we will analyze the distortion of a particular type of memory: those related to immoral actions. Finally, we will address the validation of a new tool for evaluating AM. Through this tool, we will explore AM failures in two groups: elderly individuals with pathological aging and traumatized people (bereaved parents).

In conclusion, the symposium aims to provide an overview of current research directions on autobiographical memory, both in experimental settings and in daily life.

Author/s: Giulia Marselli, Teresa Limata

Type: Abstract complessivo di un simposio

Beliefs about Memory Functioning: An Exploratory Analysis in the Italian Population

Speaker: Convertino, Gianmarco

Track: Memory

Abstract

We present the first investigation of beliefs regarding human memory functioning within the Italian population, by adopting a newly developed tool: the Italian Memory Belief Questionnaire (IMBQ).

Research conducted in other countries has shown that beliefs about memory significantly vary among both professional and non-professional individuals, suggesting the existence of gaps in the dissemination of scientific knowledge. To assess beliefs of Italian laypeople about memory functioning (e.g., eyewitness testimony, suppression of traumatic memories, factors that influence recall), 301 native Italian participants completed the IMBQ.

Participants also responded to a metamemory question to examine whether awareness regarding false memories could differentially predict broader memory beliefs. An exploratory factor analysis identified 3 latent factors within the dataset: eyewitness testimony and memory reliability, trauma and memory recall, and elements that enhance memory. Additionally, the study shows that many Italians endorse the possibility of controversial concepts about human memory (e.g., repression), regardless of their awareness about existence of false memories. Conversely, participants who are aware of the limitations of human memory understand the potential inaccuracies of memory in eyewitness contexts.

These findings are discussed in terms of the dissemination of the current scientific knowledge about human memory and the related misinformation, particularly in clinical and forensic settings.

Author/s: Gianmarco Convertino, Mara Stockner, Jessica Talbot, Michela Marchetti, Danilo Mitaritonna, Marta Vicario, Giuliana Mazzoni

Type: Talk in simposio

Is the Flashbulb Memory Checklist a Valid Tool to Distinguish True from False Autobiographical Memories?

Speaker: Battista, Fabiana

Track: Memory

Abstract

The correct identification of memory accuracy is one of the most important issues in legal psychological studies and, in general, for the legal context. In proceedings in which is not possible to have objective evidence, witnesses' memories are fundamental to try to reconstruct the crime.

Data show that oftentimes wrongful convictions are due to the acceptance of inaccurate testimonies (i.e., memories) as true. This occurs because of two problems. First, legal practitioners do not always know scientific literature and, consequently, draw from their own experience the criteria to evaluate if a testimony is reliable. Second, despite the numerous studies conducted on false memories (i.e., spontaneous and induced) and on individual differences and true vs false memories, it is still debated whether and how specific memory characteristics can help in differentiating true memories from false memories. The literature on flashbulb memories provides a significant contribution to the debate, as it focuses on the qualitative and phenomenological evaluation of emotional and/or traumatic autobiographical memories, such as testimonies.

The Flashbulb Memory Checklist is a validated tool for measuring the flashbulb characteristics of autobiographical emotional events, such as peripheral, idiosyncratic, and sensorial details. All these details are typical of vivid and detailed real memories of emotionally impactful experiences significant for oneself and others, contrary to false memories.

The aim of the present contribution is to present a study investigating the possibility of applying the Flashbulb Memory Checklist for discriminating true from false accounts, with the hypothesis that true memories exhibit more peripheral, idiosyncratic, additional, and irrelevant details as compared to false memories. Practical implications for the legal field will be discussed.

Author/s: Fabiana Battista, Antonietta Curci, Ivan Mangiulli, Tiziana Lanciano

Type: Talk in simposio

Temporal memory for complex events

Speaker: Frisoni, Matteo

Track: Memory

Abstract

Remembering when events occurred is a key component of episodic memory, but the neurocognitive mechanisms underlying this ability remain poorly understood. In a series of studies, we investigated the role of prior knowledge and event representation on temporal memory for complex events.

Different groups of participants were asked to report when short video clips extracted from a previously encoded movie occurred on a horizontal timeline representing the duration of the video. When participants watched the entire movie, they were more accurate in placing the video clips. In contrast, watching the movie without the ending resulted in a systematic bias in temporal memory, with participants increasingly underestimating the time of occurrence of the video clips as a function of their proximity to the missing part of the episode. Further experiments show that the direction of this automatic effect depends on which part of the movie is deleted in the encoding session, consistent with the inferential structure of the memory schema, and does not depend on consolidation or reconsolidation processes. Finally, an EEG study aimed to identify the oscillatory dynamics underlying these processes in another group of participants performing the same type of task. Using multivariate analyses, we found an electrophysiological signature of temporal memory precision in the high beta/low gamma band, highlighting the contribution of a widespread network of right-lateralized regions.

Overall, these findings shed new light on the underlying mechanisms that support temporal memory for complex events.

Author/s: Matteo Frisoni

Type: Talk in simposio

The embodiment of time: exploring the link between bodily states and temporal experience

Speaker: Teghil, Alice

Track: Memory

Abstract

Substantial evidence supports a causal influence of bodily signals on the experience of time. Here, a series of studies will be presented investigating how interoceptive and sensorimotor processing affect time perception from the range of seconds to the long-term representation of memories across time.

First, evidence will be discussed supporting a dynamic perspective on mechanisms involved in processing multiple-second durations, showing that individual differences in interoceptive processing predict timing abilities specifically when the external context is not informative on elapsed time. Data from neuroimaging and neuropsychological studies show that this relation is supported by specific brain correlates, involving the insular cortex and its connectivity with a sensorimotor network responsible for the integration of interoceptive and exteroceptive information. Further evidence suggests that interactions between sensorimotor regions and the medial temporal lobes also support the retrieval of temporal information from memory. Finally, recent findings from a task-based fMRI study will be presented, showing that memories for one's own life events, but not general semantic memories, are organized according to a sagittal mental timeline, supporting a crucial role of sensorimotor experience related to walking and running in the development of the temporal organization of autobiographical memories.

Overall, these findings shed light on how different dimensions of temporal experience are rooted in bodily states, and highlight the need to investigate further how information afforded from interoceptive and exteroceptive channels interact in building our representation of time.

Author/s: Alice Teghil

Type: Talk in simposio

The link between space and time along the human cortical hierarchy

Speaker: Fortunato, Gianfranco

Track: Memory

Abstract

In humans, very few studies have directly tested the link between the neural coding of time and space. Here we combined ultra-high field functional magnetic resonance imaging with neuronal-based modeling to investigate how and where the processing and the representation of a visual stimulus duration is linked to that of its spatial location.

Results show a transition in the neural response to duration: from monotonic and spatially-dependent in early visual cortex, to unimodal and spatially-invariant in frontal cortex. This transition begins in extrastriate areas V3AB, and it fully displays in the intraparietal sulcus (IPS), where both unimodal and monotonic responses are present and where neuronal populations are selective to either space, time or both. In IPS, space and time topographies show a specific relationship, although along the cortical hierarchy duration maps compared to spatial ones are smaller in size, less clustered and more variable across participants.

These results help to identify the mechanisms through which humans perceive the duration of a visual object with a specific spatial location and precisely characterize the functional link between time and space processing, highlighting the importance of space-time interactions in shaping brain responses.

Author/s: Gianfranco Fortunato, Valeria Centanino, Domenica Bueti

Type: Talk in simposio

Time perception: from sensation to memory

Speaker: Teghil, Alice; Micillo, Luigi

Track: Memory

Abstract

Although no dedicated organ or sensory system exists to perceive time, temporal processing is essential to cognition at many levels, from sensory discrimination to the ability to mentally project oneself in the past and future.

These processes extend across different temporal scales, ranging from milliseconds to seconds, days and even years. Despite the key role of time perception in cognitive processing, a comprehensive picture of how different levels of temporal representation are integrated is still missing. In this symposium, a set of findings from behavioral, neurophysiological and neuroimaging studies will be presented addressing mechanisms involved in time perception at different processing levels and timescales, and their interaction.

Starting from neural processes involved in the intrinsic representation of time, evidence will be presented on how modality-specific and multimodal brain regions support a hierarchical representation of millisecond durations. Following presentations will offer insights on the contribution of physiological activation induced by emotional stimuli in shaping our perception of durations, and on the role of bodily and sensorimotor processing in building our representation of time from the range of seconds to the organization of memories of one's own life. Finally, the symposium will address how prior knowledge and reconstructive processes allow the emergence of temporal features of experiences in episodic memory.

Overall, these studies demonstrate the presence of both common and specific mechanisms supporting the representation of time at different scales and processing levels, and provide insight on how these phenomena may be understood within an integrated framework.

Author/s: Alice Teghil, Luigi Micillo

Type: Abstract complessivo di un simposio

Validation of a new Italian tool for the Autobiographical Memory (MA-Self) assessment

Speaker: Cerasetti, Martina

Track: Memory

Abstract

Autobiographical memory (AM) is fundamental to social functioning and individual development. According to Tulving (2002), it enables mental time travel to the past and future, contributing to the acquisition of a coherent representation of the "self." AM is a multidimensional construct comprising an episodic autobiographical component (supporting the retrieval of specific episodes from one's past) and a semantic autobiographical component (supporting the retrieval of general personal information).

Despite the importance of this construct, a review of the literature on psychometric tools revealed the lack of a calibrated and standardized battery for assessing AM in the Italian population that provides measures of episodic and semantic AM concerning the concept of Mental Time Traveling. To address this gap, we reviewed the MA-Self test (Autobiographical Memory of the Self; Pierucci et al., 2023) to obtain a second validation study on the Italian population. The MA-Self includes:

1. Episodic AM, for past and future events;
2. Semantic AM (referring to both remote and recent past); and
3. Memory for public, non-personal events (a control scale).

The study involved 241 participants, including 193 healthy controls, 21 patients with Mild Cognitive Impairment (MCI), and 27 clinical participants (bereaved parents), balanced for gender and evenly distributed across age groups.

All participants completed the MA-Self and a battery of validated neuropsychological tests. This contribution will present the psychometric properties of the tool.

Author/s: Martina Cerasetti, Giulia Marselli, Maria Casagrande, Carmen Belacchi, Virginia Pierucci, Giuliana Mazzoni, Manuela Berlingeri

Type: Talk in simposio

What is the role of physiological activation in shaping temporal representations?

Speaker: Micillo, Luigi

Track: Memory

Abstract

Temporal representations are fundamental for delving into our daily lives, yet they are susceptible to distortion from various factors, including emotional experiences. This distortion is often attributed to physiological activation, where heightened arousal can accelerate our internal clock, leading to an over-estimation of time. Despite the abundance of studies delving into the association between physiological arousal and time perception, the findings remain fragmented and inconclusive.

Here we would like to explore the relationship between physiological activation and temporal processing. Our study immersed participants in emotional situations, and recorded the fluctuations of their physiological responses as they navigated into timing tasks. Analyzing Heart Rate Variability and Skin Conductance Response, we sought to decode how arousal is intertwined with perception of time.

Our participants watched three emotional videos and performed three temporal tasks. Their physiological response (SCR and HR) was recorded during the task. The Data Analysis involved participants' physiological reactions to the emotional stimuli compared to a resting baseline.

The results showed that negative stimuli were associated with greater physiological response, as well as to a greater dilation of temporal performance when temporal task were presented during the emotional immersion.

Our findings show the impact of emotions and physiological responses on temporal distortions. With these insights, we seek to deepen our understanding of how emotional experiences mold time perception. By elucidating the intricate interplay between physiological arousal and temporal representations, we aim to inspire future research aimed at unraveling the complexities of human time perception.

Author/s: Luigi Micillo, Nicola Cellini, Fiorella Del Popolo Cristaldi, Mariagrazia Capizzi, Giovanna Mioni

Type: Talk in simposio

Eight memory researchers grappling with the study of their own autobiographical memory

Speaker: Sotgiu, Igor

Track: Memory

Abstract

This contribution aims to offer a critical review of the studies conducted by eight eminent memory scholars who empirically investigated the functioning of their own autobiographical memory: Francis Galton (1822-1911), Madorah Smith (1887-1965), Alan Baddeley (1934-), Richard White (1935-), Marigold Linton (1936-), Willem Wagenaar (1941-2011), Steen Larsen (1944-1999) and Dorthe Berntsen (1962-).

Taken together, these eight scholars assessed the ability to recall their personal past by means of a wide range of procedures including cued recall tasks, which are commonly used in laboratory studies of autobiographical memory, and free recall tasks and personal diaries, which are commonly used in naturalistic studies of the same topic. In the course of the conference presentation it has been emphasized how the rigor and temporal duration of the self-studies targeted by the present work have made it possible to obtain relevant, and probably unique, knowledge on some of the main topics animating the contemporary debate on autobiographical memory; these include forgetting, accuracy and phenomenology of personal memories, memory organisation and memory contents.

Finally, the limitations, strengths, and future research directions of self-studies of autobiographical memory are discussed.

Author/s: Igor Sotgiu

Type: Talk in simposio

How has the outbreak of the COVID-19 pandemic shaped our autobiographical memories?

Speaker: Rossi Arnaud, Clelia

Track: Memory

Abstract

The COVID-19 pandemic forced governments to trace the contacts and places visited by those infected. This process of event reconstruction was designed to influence the transmission of the virus and relied primarily on the retrieval of personal memories of infected individuals. In our study, we investigated whether participants could provide contact tracing details and whether their memories were influenced by important events during the early stages of the pandemic.

Participants had to complete an online form describing each day of the two weeks between the 27th of February 27 and the 12th of March 2020, providing as much information and detail as possible. We chose this particular period because, among other reasons, it included the day on which the Italian government became the first Western governing body to issue a decree to begin the Covid-19 lockdown. Using a linear mixed model, the results showed that participants were indeed able to report a large amount of information about people and places, and that recall was modulated by the occurrence of pandemic-related events (such as the suspension of all courses and the start of the national lockdown).

We also observed a standard priority effect. Overall, our findings show how emotional salience can reshape autobiographical memory by prioritising the recall of details associated with stressful COVID-19-related events.

Author/s: Clelia Rossi Arnaud, Serena Mastroberardino, Pietro Spataro, Alessandro Santirocchi, Federica Alessi, Aicia Naser, Maria Chiara Pesola, Vincenzo Cestari

Type: Talk in simposio

The Reminiscence Bump and the Self: Five studies on autobiographical memories for positive and negative events

Speaker: Curci, Antonietta

Track: Memory

Abstract

Several studies have shown that people persistently remember both public and private events experienced during adolescence and early adulthood, particularly of positive emotional content. Across five studies, this paper investigates the Reminiscence Bump (RB) for memories for positive and negative public events (Studies 1 and 2), private events (Study 3), events related to musical experiences (Study 4), and cross-cultural events (e.g., China and the United States) (Study 5).

Participants were asked to retrieve either a positive or a negative memory, to indicate their age at the time of the event (Age of Encoding), and to provide secondary measures of vividness and rehearsal of the event (Studies 1 and 3), and emotional intensity (Studies 2 and 4). Overall, 10,000 memories were approximately collected. The results show that positive memories were generally older in time than negative ones, but RB emerged for both positive and negative memories.

Furthermore, an RB effect was observed earlier for memories of positive public events (< 15 years) than for negative public events (20-40 years), while no difference was found for memories of private events or musical experiences (15-25 years). Chinese respondents showed a later RB than Americans. The results support the role of autobiographical memory in the construction and development of the Self.

Author/s: Antonietta Curci, Fabiana Battista, Tiziana Lanciano

Type: Talk in simposio

Exploring Gender Disparities in Memory Capacity: Insights into Varied Brain Circuit Utilization

Speaker: Cavezza, Diletta

Track: Memory

Abstract

Memory capacity refers to the limited quantity of information that short-term memory can hold, proposed by Miller to be around 7 ± 2 elements. In contrast, long-term memory is believed to have an unlimited capacity, though this holds true primarily for information that can be rehearsed, rather than spontaneously encoded. In this study, we investigated the neurobiology of memory capacity during spontaneous encoding in female and male subjects. Employing a behavioral task to investigate object memory span in mice, we discovered that both female and male mice exhibit a short-term memory (STM) capacity of 6 objects.

However, while male mice retain all objects in long-term memory (LTM), females remember only 4 objects when tested after 1 or 24 hours. Interestingly, STM is completely disrupted in male mice, but not in females, when subjected to a memory interference procedure. Through a combination of imaging techniques and brain manipulation approaches, we observed that female mice display increased activation of the ventral median thalamus (VMT), whereas males hyperactivate the dorsal hippocampus (dHP) when presented with 6 objects to remember. Notably, optogenetic or chemogenetic inhibition and activation of the VMT-dHP pathway in female and male mice, respectively, reverse the sex-dependent memory phenotype.

These findings highlight a subcortical-cortical circuit sensitive to biological sex differences, which regulates the amount of information spontaneously transferred from STM to LTM.

Author/s: Diletta Cavezza, Alessandro Treves, Alvaro Crevenna, Elvira De Leonibus, Giulia Torromino, Karel Ježek, Maria De Risi, Marilena Griguoli, Vittorio Loffredo

Type: Talk in simposio

Neuronal encodes of a memory-based schema during a transitive Inference task: evidence from primate prefrontal cortex activity

Speaker: Ramawat, Surabhi

Track: Memory

Abstract

Relational inference using previously memorized information is one of the aspects of intelligence in humans and non-human animals. Provided that the premises $A > B$ and $B > C$ are well memorized, the subject is able to infer that $A > C$. This ability to use overlapping information and extend it to deduce a novel relationship forms the basis of Transitive Inference (TI) capability.

To solve these deductions, the role of memory, especially working memory (WM) is crucial. Previous neurophysiological studies have described the pattern of neuronal activity from the Prefrontal Cortex (PFC), an area involved in WM, being modulated while an abstract mental schema of ranked items is accessed during a TI task. However, the question of how the neuronal encoding of the individual items subtending this schema is shaped by learning the reciprocal relationships is relatively unexplored. In this study, we address this question by investigating the single-neuron activity recorded from the dorsolateral PFC of 2 monkeys as they learned a 6-item ranked series ($A > B > C > D > E > F$) and solved TI problems. Each session comprised two consecutive phases: the learning phase, when the monkeys learned the reciprocal relationships (e.g., A vs B , B vs C , etc.), and then the test phase, requiring logically inferring novel relationships (e.g., B vs D).

Our results confirmed that the behavioral performance during the learning and the test represents the acquisition and recall of a schema, while the encoding of this schema is differently represented by neuronal activity from learning to test.

Author/s: Surabhi Ramawat, Fabio Di Bello, Valentina Mione, Pierpaolo Pani, Emiliano Brunamonti, Stefano Ferraina

Type: Talk in simposio

Recognition memory in Down syndrome: evidence from yes/no and forced-choice testing

Speaker: Costanzo, Floriana

Track: Memory

Abstract

Recognition memory tests are pivotal in the examination of episodic memory. The paradigm commonly utilizes two primary testing formats: the yes/no and forced-choice tests. The yes/no paradigm typically involves participants being presented with a series of stimuli and later asked whether each stimulus was previously encountered (yes) or not (no). The forced-choice paradigm presents participants with pairs of stimuli, requiring them to select the stimulus that was previously encountered among distractors.

The literature suggests that yes/no recognition tests rely more on recollection compared to forced-choice tests, and that the hippocampus plays a selective role in supporting the recollection process. Individuals with Down syndrome (DS) often exhibit deficits in episodic memory, which are hippocampal related. The study examined recognition memory using yes-no and forced-choice procedures in children and adolescents with DS and typical developing controls (TD) in order to determine whether the recognition memory deficit in DS was dependent upon the type of recognition test used. We employed two distinct testing methodologies and the same stimulus materials (including both verbal and non verbal items). The performance of 14 individuals with DS (mean chronological age = 14.5 years) was compared to that of 22 TD controls (mean chronological age = 6 years). Results revealed impairments in both recognition memory tasks in children with DS, indicating difficulties in discriminating between familiar and novel stimuli.

Understanding the specific nature of episodic memory deficits can provide valuable insights into the underlying neurobiological mechanisms and interventions tailored to enhance episodic memory in individuals with DS.

Author/s: Floriana Costanzo, Stefano Vicari, Elisa Fucà, Marta Marcopoli

Type: Talk in simposio

The macaque prefrontal cortex implements a mixed coding scheme driven by cell types for choice retention in working memory

Speaker: Ceccarelli, Francesco

Track: Memory

Abstract

For decades, several studies using a wide range of approaches attributed a pivotal role to the prefrontal cortex (PFC) for maintaining multiple information during memory periods in working memory (WM). However, there is still a heated debate about the neural schema involved in WM maintenance of information over time, with the classical doctrine proposing a persistent coding mechanism and static population scheme as opposed to more recent evidence that argues in favor of a transient coding mechanism and dynamic population scheme.

Using a strategy task where two macaques had to implement an abstract response strategy and subsequently hold their choice in WM during a delay period preceding the execution of the choice-based action, we investigated the coding scheme implemented by cell type populations (GABAergic interneurons and pyramidal neurons), previously classified. Furthermore, to evaluate the specificity of the coding scheme investigated during the memory period, we analyzed an additional epoch of the task following the execution of the choice-based action. We first found that both cell types contributed to maintaining the choice information in the WM period, with a surprisingly greater contribution from the interneuron population. Next, we applied a machine learning algorithm to assess the similarity of the population activity patterns over time. We found that PFC implemented a mixed coding scheme: static for pyramidal neurons and dynamic for interneurons.

Such stability for pyramidal neurons was memory-period specific and then switched to a dynamic scheme thereafter, whereas interneurons maintained a continuous dynamicity even after the memory period.

Author/s: Francesco Ceccarelli, Aldo Genovesio, Fabrizio Londei, Francesco Siano, Giulia Arena

Type: Talk in simposio

Understanding Memory: Implications from neuronal to clinical populations

Speaker: Ceccarelli, Francesco

Track: Memory

Abstract

Memory incorporates the abilities to generate, recall, and store active and manipulable representations that are the functional backbone for planning goal-directed behavior, supporting a wide range of cognitive processes such as logical reasoning, learning, and problem-solving. A multidisciplinary approach incorporating both animal models and human subject studies guarantees in-depth investigation of the neuronal substrates and the distributed network of areas that underlies such a pivotal cognitive process.

This symposium aims to present recent findings that provide novel insights into how neuronal populations and complex behavioral tasks in different areas are involved in distinct memory processes. Ceccarelli will discuss how distinct cell types in the macaque prefrontal cortex express mixed temporal coding properties to maintain a choice representation in working memory. Cavezza will talk about the mouse thalamus-hippocampus pathway involvement in multiple-item memory consolidation and how distinct activation patterns are implicated in gender differences in memory capacity. Ramawat will discuss how single neurons in the macaque prefrontal cortex contribute to learning hierarchical relationships between items and how the memory retention and recall of such relationships facilitate logical inference of new relationships during a transitive inference task. Finally, moving into a clinical approach, Costanzo will discuss how core tasks for identifying hippocampus-dependent memory dysfunctions in Down's syndrome children can reveal different memory profiles.

Cognitive deficits that impact such fundamental memory mechanisms are pivotal in disorders such as schizophrenia and Down's syndrome. The symposium can advance the basic and clinical knowledge needed to explore interventions aiming at addressing memory symptoms in such pathologies.

Author/s: Francesco Ceccarelli

Type: Abstract complessivo di un simposio

Collateral effects: the role of sensorimotor simulation on the creation of false memories

Speaker: Mazzoni, Giuliana

Track: Memory

Abstract

The main assumption for our studies on perception and memory for actions is that the observation of an action creates a sensorimotor activation/resonance that creates a mental representation of that action that is 'moved forward' in time. The prediction is thus that seeing a person getting ready to perform an action might also create, after a delay, the memory of having seen the forward part of the action.

The same effect should not be observed for backward parts of the action. Specifically, memory for actions have been investigated using images representing an actor acting on a series of objects of common use. Participants in a first experiment saw a series of photos of actions being performed on objects (eg. blowing one's nose) and 15 minutes later performed a recognition task. At recognition, they were presented with photos representing backward and forward moments of the action they saw at encoding. Results have shown that participants tended to accept as 'seen' photos of the forward parts of the action seen, rather than photos of backward parts of that action, confirming the hypothesis. In a pilot study, we have also explored the role of temporal distance between encoding and recognition.

Results have shown that 3 days after encoding participants did no longer tend to accept as 'seen' forward photos more than backward photos, indicating that the effect is short-lived.

Author/s: Giuliana Mazzoni, Danilo Mitaritonna, Francesco Iani, Mara Stockner, Monica Bucciarelli, Teresa Limata

Type: Talk in simposio

Contextualizing action prediction in the social cerebellum

Speaker: Urgesi, Cosimo

Track: Memory

Abstract

Social interactions require predicting and anticipating others' actions from observation of their movements. Several studies have shown that observer's motor system is activated by observing others' actions (motor resonance) and is sensitive to subtle kinematic cues that may allow understanding of the overarching intention.

However, the context in which actions are embedded may support social prediction during observation of incomplete and ambiguous actions. The cerebellum is involved in generating and updating the internal models subserving the prediction of sensory events and may play a major role in context-based action prediction. I will present a series of studies in which the role of cerebro-cerebellar networks has been explored in contextualized action prediction and motor resonance.

First, I will present the results of behavioral and single-pulse Transcranial Magnetic Stimulation studies showing that contextual information may shape motor resonance and is continuously integrated with kinematics to predict the overarching action intention. Then, I will present the results of neuropsychological and neurostimulation studies showing a specific role of the cerebellum in supporting contextualized action predictions. Finally, the translational implications of the involvement of cerebellar processing in social perception will be exploited by testing the effects of either congenital (e.g., pediatric non progressive ataxia) or acquired (e.g., infratentorial brain tumors) cerebellar alterations on action prediction.

The results pave the way for an integrated neuromodulation/neurocognitive training of social perception abilities based on the specific computations exerted by the cerebellum.

Author/s: Cosimo Urgesi

Type: Talk in simposio

Digital actions: a new challenge for embodied cognition

Speaker: Craighero, Laila

Track: Memory

Abstract

It has long been understood that the goal of an action influences its execution. For instance, when we grasp a bottle, the position of our fingers changes depending on our intention—whether to pour, move, or throw it. We are unaware of these subtle differences in execution, just as we are unaware that observing the same actions activates our sensorimotor system in a congruent manner. This automatic, subliminal motor replication of the observed action enables us to recognize others' intentions. The greater the skill in performing the observed action, the better the ability to predict the outcomes of others' actions.

Today, a significant number of daily actions are no longer performed in the physical world but through interactions with mobile phone screens. While newer generations have developed the ability to perform these activities directly in the digital realm, older generations, accustomed to performing them in the physical world, must adapt and learn. This generational difference is crucial for studying the formation of new sensorimotor connections, which are active both during the execution and perception of digital actions.

Understanding how digital advancements affect sensorimotor and cognitive processes is a necessary challenge for contemporary behavioral neuroscience. However, the literature on this topic remains limited. The few experimental data available show significant generational cohort differences in kinematic parameters and screen interaction effectiveness, as well as in the ability to recognize others' digital actions.

Author/s: Laila Craighero

Type: Talk in simposio

False Memories for Touch: the role of the Misinformation Effect

Speaker: Puleo, Federico

Track: Memory

Abstract

False memories have significant consequences in the forensic field, especially in the evaluation of testimony about actions and events involving physical contact (e.g., harassment). However, there is a gap in the literature on this topic that the present study aims to fill by investigating the effect of misinformation in the formation of false memories about touch.

A total of 112 participants watched a video depicting an interaction between a professor and a student that included physical touch. Afterwards, participants performed a free recall task and answered questions about the interaction, in particular about touch (body part touched, duration and intensity). The next day, one group of participants was presented with a suggestive report (stating that the professor was known to harass students during office hours), while another group received a neutral report (describing the professor's teaching activities). Immediately afterwards, participants performed another free recall and again answered questions about touching and inappropriateness/severity of action. Additionally, measures of executive functioning and interrogative suggestibility were collected.

The results confirm the role of the misinformation effect on the production of false memories, particularly regarding the assessment of inappropriateness and severity of touch.

Author/s: Federico Puleo, Tiziana Lanciano, Fabiana Battista, Ivan Mangiulli, Antonietta Curci

Type: Talk in simposio

The role and nature of sensorimotor activation in the perception and memory of actions

Speaker: Bucciarelli, Monica

Track: Memory

Abstract

In the field of cognitive psychology, the idea that cognition cannot be studied independently of corporeality has become increasingly accepted in recent decades. The symposium will present recent studies conducted from this perspective of situated cognition, with the aim of covering different theoretical approaches and reporting on their implications for the social and applied domains.

Particular attention is paid to the type of sensorimotor activation and simulation involved in the perception and memory of observed or suffered actions, to the role of the context in which the actions are inserted for social prediction, to the process of formation of new sensorimotor active connections both during the execution and during the perception of actions. Studies on the perception and memory of observed actions have important implications for investigative and forensic practice, as sensorimotor activation and simulation can also lead to the creation of false memories of actions.

Furthermore, the context in which actions are embedded can support social prediction in the observation of incomplete and ambiguous actions. Studies on the context in which actions are embedded highlight the role of cerebrocerebellar networks in contextualized action prediction and motor resonance. Finally, it must be taken into account that many everyday actions are performed by interacting with the screen of cell phones.

The generational difference in the ability to perform such actions in the digital world allows us to investigate the process of forming new sensorimotor connections that are active during both the performance and perception of digital actions.

Author/s: Monica Bucciarelli, Antonietta Curci, Giuliana Mazzoni

Type: Abstract complessivo di un simposio

An electroencephalographic investigation of the impact of eye movements in a memory probe task

Speaker: Petrin, Alberto

Track: Memory

Abstract

Most neuroscientists often neglect that the soundest motivation for excluding EEG epochs contaminated by saccades from analysis does not entail only signal quality but also signal meaning. Saccades can in fact be an overt manifestation of spurious cognitive processing that may distort the interpretation of event-related potentials (ERP). We evaluated this potential risk by comparing two artifact removal methods (a standard epoch rejection method and independent components analysis, or ICA) on a lateralized ERP component indexing visual working memory load, i.e., the sustained posterior contralateral negativity (SPCN).

Subjects had to memorize an array composed of a variable number of laterally displayed colored squares. In half of the experiment, subjects had to keep their gaze at fixation, whereas they had to saccade towards the memoranda in the other half. The memory array was displayed for 100 ms or 500 ms so as to check for effects of the post-saccade physical availability of the memoranda on SPCN amplitude and latency.

The results were clear-cut in showing that, relative to epoch rejection, ICA correction preserved both quality and meaning of SPCN amplitude. The post-saccade physical availability of the memoranda affected the latency of the SPCN, with shorter SPCN offset latency when the memoranda were exposed for 500 ms than for 100 ms, probably due to a post-saccade retinotopical remapping of the memoranda.

The results are discussed with reference to the possible modifications of instructions and designs that can be used to test visual working memory load in analogous probe designs.

Author/s: Alberto Petrin, Sabrina Brigadoi, Mattia Doro, Paola Sessa, Roberto Dell'Acqua

Type: Mini-talks

Can a social robot reduce the cognitive load related to daily-life activities? A pilot study with healthy adults

Speaker: Varrasi, Simone

Track: Memory

Abstract

Some populations, such as older people, struggle with the cognitive load involved in daily activities. This is related to the limits of human working memory when mental resources are simultaneously stressed by a task. In this scenario, artificial agents have been increasingly integrated in several environments by designing supportive human-robot interactions (HRI), but most of literature focused on the use of co-bots in work settings. This pilot work, therefore, intended to verify whether HRI could help with the reduction of cognitive load related to daily activities.

Twelve healthy adult participants completed order-randomized dual-task cognitive exercises at different conditions: individually, with the support of a social robot (HRI), and with the support of a human-human interaction (HHI). Both HRI and HHI conditions were designed to produce three different levels of cognitive load: low, medium, and high.

The results showed that under low cognitive load, completing the task individually led to similar accuracy compared to HRI, but importantly, the HRI condition induced a significantly lower mental demand ($F_r = 26.2$, $p < .001$) and faster execution times ($F_r = 13.2$, $p < .01$). As expected, medium and high cognitive load produced increasing levels of mistakes. The comparison between HRI and HHI indicated that under high cognitive load the HRI condition was perceived as less frustrating ($F_r = 10.2$, $p < .01$).

This suggests people may benefit from the support of social robots during daily tasks of varying cognitive load levels, but the effectiveness of such approach depends on HRI cognitive demands.

Author/s: Simone Varrasi, Roberto Vagnetti, Nicola Camp, John Hough, Alessandro Di Nuovo, Sabrina Castellano, Daniele Magistro

Type: Mini-talks

Do musicians have better short-term memory than nonmusicians? A multi-lab study

Speaker: Grassi, Massimo

Track: Memory

Abstract

Musicians are often regarded as models of brain plasticity and associated cognitive benefits. This emerges when expert musicians are compared with nonmusicians. A frequently observed finding is a short-term memory advantage of the former over the latter. Although meta-analyses report that the effect size of this advantage is medium, no study was adequately powered to estimate reliably an effect of such size.

This multi-lab study has been ideated, realised, and conducted by several researchers working on this topic. Our ultimate goal was to provide a community-driven shared and reliable estimate of the musicians' memory advantage (if any) and set a method and a standard for future studies in neuroscience and psychology comparing expert musicians and nonmusicians. Thirty-four research units are participating in the project. Participants will complete musical, verbal, and visuospatial spans to assess short-term memory; n-back task for executive functions, raven matrices and WAIS-IV vocabulary for intelligence, and other tasks to assess individual differences in musicality, personality, and socio-economic status.

We expect to collect over 700 expert musicians and 700 paired nonmusicians in a laboratory experiment.

We expect to replicate the results of the meta-analysis on short-term memory of musicians and nonmusicians, namely, a large musicians' advantage in musical short-term memory, and a medium advantage in verbal and visuospatial short-term memory.

This project aims to set the basis for sound research practices in studies comparing musicians and nonmusicians, and contribute to the ongoing debate on the possible cognitive benefits of musical training. Results will be available at the conference.

Author/s: Massimo Grassi

Type: Mini-talks

Effects of Viewing Simulated Natural and Urban Environment on Affect and Cognition in a Sample of Young Adults

Speaker: Ricciardi, Elisabetta

Track: Memory

Abstract

Virtual reality, in both 2D and 3D formats, has become increasingly prevalent in psychological research, providing immersive environments to explore human behavior, emotion, and cognition. While studies often highlight the restorative benefits of virtual nature environments over urban ones, the effects on affect and cognitive outcomes are still debated. Additionally, there is limited research on the potential benefits of social sharing in simulated natural environments for affect and cognition. This study aimed to investigate the effects of viewing 2D simulated natural, urban, or neutral (control) environments on affective and cognitive outcomes, and whether these effects vary based on shared or solo experiences.

Using a 3x2x2 mixed design, 164 university students were enrolled, with exposure conditions manipulated as shared vs. solo experiences and repeated measures assessing changes from pre-exposure to post-exposure. Results indicated that participants exposed to natural environments had higher levels of restorativeness. Furthermore, in the solo journey condition, participants exposed to natural virtual environments showed higher scores in certain attention outcomes (i.e., Adaptive Tachistoscopic Traffic Perception) compared to those in urban environments. The findings suggest that natural virtual environments could have beneficial effects on attention outcomes, and individuals exposed to urban environments tend to perform worse when they are in solo experience compared to when they are in shared experience.

These insights underscore the importance of considering social sharing and environmental factors in virtual reality research for understanding their impacts on human behavior, affect, and cognition.

Author/s: Elisabetta Ricciardi, Luigi Tinella, Sergio Traficante, Rosa Napoletano, Antonella Lopez, Alessandro Oronzo Caffò, Andrea Bosco, Giuseppina Spano

Type: Mini-talks

From Vector Spaces to DRM Lists: False Memory Generator, a Software for the Automatic Generation of Stimuli Lists Inducing False Memories

Speaker: Petilli, Marco

Track: Memory

Abstract

The Deese-Roediger-McDermott (DRM) paradigm is one of the most widely used tools for investigating the factors that cause false memories. In this task, participants typically memorize a list of words and later identify whether words in a new list were present in the original one. Previous studies using this paradigm have demonstrated the crucial role of semantic similarity in generating false memories, showing that new words semantically related to the learned ones tend to be erroneously recognized as part of the memorized list.

Despite its strengths, the DRM paradigm has a significant limitation: it requires a lengthy and complex manual phase to construct lists based on word association norms, posing both practical and theoretical challenges. To address this limitation, we developed False Memory Generator (FMG), a software that automatically generates DRM lists by leveraging similarity relationships within a vector space. Here, we present FMG and demonstrate the validity of the lists generated from distributional semantic spaces in replicating known semantic effects in false memory production.

Finally, we show how FMG provides a wide range of applications, enabling the study of factors inducing false memories beyond current possibilities. FMG can be used to test how any property encoded within a vector space - such as features associated with words, their referents, or even other stimuli like images and sounds - affects false memory production.

Author/s: Marco Petilli, Daniele Gatti, Giuliana Mazzoni, Luca Rinaldi, Marco Marelli, Michela Marchetti

Type: Mini-talks

Navigating the Memory Maze: Unveiling Visuo-spatial Working Memory with VR-based RAM in Healthy Adults

Speaker: Passarello, Noemi

Track: Memory

Abstract

This study investigates visuo-spatial working memory in healthy adults ($n = 61$, mean age = 25 years, $SD = 3.45$) using virtual reality (VR) and traditional methods.

We adapted the Radial Arm Maze task (RAM) in VR to assess working memory dynamically. Participants navigated a maze to find hidden objects. Concurrently, we administered classical measures (Corsi and Digit Span tests) and analysed individual differences in RAM performance related to sports activity, gender, and age.

Cowan's K was employed to evaluate RAM performance, and regression modelling examined its predictive power for working memory beyond classical tests. Results revealed RAM's unique ability to capture visuo-spatial working memory nuances, significantly predicting broader working memory abilities. Individual differences analysis highlighted the impact of sports activity, gender, and age on RAM performance.

This study underscores VR's utility in cognitive research and offers insights into visuo-spatial working memory complexity. By integrating innovative methodologies and analysing individual differences, our findings advance cognitive assessment strategies in healthy adults.

Author/s: Noemi Passarello, Tommaso Palombi, Andrea Chirico, Fabio Alivernini, Fabio Lucidi, Laura Mandolesi

Type: Mini-talks

The “bi-factor vogue”

Speaker: Giorgini, Roberto

Track: Memory

Abstract

The application of the bi-factor model is frequently implemented to assess the latent structure of psychological tests. However, this “bi-factor vogue” in many cases led to anomalous results, in particular, despite models displaying excellent fit indices had also anomalous loading patterns (Eid et al, 2016). In this work, the latent structure of the Prospective and Retrospective Memory Questionnaire (PRMQ; Smith et al., 2000) was evaluated using several model comparisons to provide instances of bifactor misspecification. The PRMQ was administered through an online survey to a matched sample of 384 participants (50% Female; Age = 37.43 ± 11.49 ; Education = 15.57 ± 3.28), all analyses were performed in the statistical programming environment R (R Core Team, 2022).

Three classical models proposed by Crawford et al. (2003) and four alternative bi-factor models meant to address anomalous outcomes when the bi-factor classic model is applied were calculated and compared using the lavaan package (Rosseel, 2012; Eid et al., 2016)

Considering classic fit indices and alternatives in contrast with previous studies, the results seemed to support the unidimensional model as the best-fitting one ($df = 104$; CFI = .99; TLI = .99; RMSEA = .07; SRMR = .060; $\chi^2 = 290.86$, $p < .001$), rather than the alternative bi-factor (PUC = .59; ECV > 0.60; $\omega_h > .70$; Reise et al., 2013; McDonald, 1999)

The results are in line with the latent variable that PRMQ proposes to evaluate, indeed, the proximal construct that PRMQ's items assess is memory self-efficacy, namely the respondents' beliefs of the frequency of forgetting.

Author/s: Aldo Quattrone, Maria Grazia Vaccaro, Maria Lucia Maiuolo, Roberto Giorgini

Type: Mini-talks

The relation between the semantic-memory network structure and creativity across ages

Speaker: Campidelli, Lorenzo

Track: Memory

Abstract

The emergence of network models allowed researchers to investigate the structure of semantic memory, with recent studies highlighting that highly creative people are characterized by more flexible semantic networks compared to low creatives, with more connected, less modular, and less distance between nodes (Kenett et al., 2014). Other evidence pointed out that semantic networks are subjected to age-related stiffening, showing semantic structures featuring more segregated and less connected networks (Cosgrove, 2023).

The aim of this study was to investigate the relationship between semantic memory networks, creative performance and creative success in young (N= 81, Age = 18-26) and old adults (N=78, Age = 70-90). Participants completed two verbal fluency tasks and two free association tasks which results were used to estimate the indexes of semantic networks through a correlation-based network method. Then both groups performed an Alternative Uses Task, a measure of divergent thinking, and the Kaufman Domains of Creativity Scale (Kaufman, 2012), a questionnaire measuring creative success in different domains.

Preliminary analyses (conducted in R) performed on the sample of the young participants replicated the typical network structures characterizing high and low creative individuals. Further, more specific data analyses are still undergoing, testing the hypotheses that: 1) network structures of old participants are less flexible compared to young participants; 2) network structures of high creative achievers do not differ between young and old participants. This work could help unravelling the complex role of semantic network and of its development in the definition of creative performance at different ages.

Author/s: Lorenzo Campidelli, Umberto Domanti, Cecilia Segatta, Giulia Fusi, Sergio Agnoli

Type: Mini-talks

The flashbulb-like nature of memory for the first COVID-19 case and the impact of the emergency. A cross-national survey

Speaker: Lanciano, Tiziana

Track: Memory

Abstract

Flashbulb memories (FBMs) refer to vivid and long-lasting autobiographical memories for the circumstances in which people learned of a shocking and consequential public event. A cross-national study across eleven countries (N= 2306) aimed to investigate FBM formation following the first COVID-19 case news in each country and test the effect of pandemic-related variables on FBM. Participants had detailed memories of the date and others present when they heard the news, and had partially detailed memories of the place, activity, and news source. China had the highest FBM specificity.

All countries considered the COVID-19 emergency as highly significant at both the individual and global level. The Classification and Regression Tree Analysis revealed that FBM specificity might be influenced by participants' age, subjective severity (assessment of COVID-19 impact in each country and relative to others), residing in an area with stringent COVID-19 protection measures, and expecting the pandemic effects.

Hierarchical regression models supported the role of emotional and cognitive factors - subjective severity, pandemic impact expectedness, rehearsal – on the formation of specific and detailed FBMs in the different countries involved.

Author/s: Tiziana Lanciano, Federica Alfeo, Antonietta Curci, Claudia Marin, Angela Maria D'Uggento, Diletta Decarolis

Type: Poster

Aphasia 360°: A Virtual Reality Protocol for Anomia Rehabilitation

Speaker: Romano, Daniele

Track: Memory

Abstract

Aphasia is an acquired deficit resulting from acute damage to the central nervous system, leading to difficulties or inability in understanding and producing language. A characteristic disorder of non-fluent forms of aphasia is anomia, which refers to difficulties in word retrieval, particularly when naming objects and actions. According to the Embodied Cognition (EC) framework, language is closely connected to the motor system. From this perspective, linguistic rehabilitation programs should stimulate language by activating the motor system. This approach posits that anomic deficits often stem from a weak link between a word's meaning and its lemma. Hebbian principles of coincident and correlated learning can be leveraged to strengthen these links, synchronously activating the lexical and semantic components while associating them with their motor counterparts.

This study introduces an innovative training protocol based on the EC framework, utilizing new technologies for anomia rehabilitation in post-stroke patients. Specifically, the experimental group engages with 360° videos depicting daily actions viewed immersively from a first-person perspective. In contrast, the control group watches standard videos showing the same actions recorded from a third-person perspective. The training sessions are conducted three times a week for four weeks. Naming abilities are assessed before and after the training, along with additional cognitive and psychological measures. Preliminary data on the treatment's efficacy will be presented.

Author/s: Daniele Romano, Francesca Frisco

Type: Poster

Electrophysiological evidence for differing autobiographical memory retrieval routes

Speaker: Talbot, Jessica

Track: Memory

Abstract

Theoretical models of autobiographical memory often describe two distinct retrieval modes which can be utilised to retrieve past events. Direct retrieval is considered effortless and immediate, whilst generative retrieval requires a deliberate search process to successfully access a memory.

To our knowledge, no study has explored how these two retrieval modes differ in relation to their neural temporal activations. In the present study, 26 participants completed a memory task whilst their brain neurophysiological activity was recorded via a 40-channel electroencephalography cap. Single words were presented on screen and participants were instructed to press the spacebar to indicate the moment a specific autobiographical event was accessed. After reporting which retrieval mode was used, participants elaborated the memory in as much as detail as possible and answered a series of follow up questions (e.g., how personally significant the event was).

Preliminary analysis of behavioural data revealed that participants accessed direct memories significantly faster and direct memories were rated as significantly more detailed and personally significant. Results from ongoing EEG data analysis will be discussed in relation to autobiographical memory theories.

Author/s: Gianmarco Convertino, Giuliana Mazzoni, Jessica Talbot, William McGeown

Type: Poster

Evaluating Cognitive Impairment in Idiopathic Normal-Pressure Hydrocephalus through Rey Auditory Verbal Learning Test

Speaker: Maiuolo, Maria Lucia

Track: Memory

Abstract

The idiopathic Normal-Pressure Hydrocephalus it's a condition of quadri-ventricular active distension associated with cerebrospinal fluid in absence of other identifiable cause. Symptomatology is characterized by balance impairment, urinary incontinence and cognitive impairment and it's attenuated by shunt-surgery with a positive response in 80-84% of cases.

There are some improvements in frontal lobe, memory and visuoconstructive function at six months and at one year and general cognitive improvement 3 months after shunt-surgery . Neuroimage studies show a medial temporal lobe volume reduction that incides on memory impairment. Cognitive deficits are caused by frontal subcortical dysfunction; individuals frequently have delayed processing and impaired frontal lobe function. Generally, symptomatology comprises psychomotor slowing, impairment of attention and concentration, short-term memory impairment and language production and attention reduced, general reduction of processing speed and difficulty to manipulate acquired information.

The purpose of this study was to use the Rey Auditory Verbal Learning Test (RAVLT) to examine the learning process involved in immediate and delayed recall, and to investigate whether primacy or recency effects were present in iNPH patients when recalling word lists. The findings revealed a lack of learning during RAVLT trials, as participants did not demonstrate significant improvement in their capacity to recall or repeat the words presented during repeated memorization tasks.

This absence of learning suggests potential factors such as memory disorders, distractions, or suboptimal learning methods among the study participants.

Author/s: Maria Lucia Maiuolo, Roberto Giorgini, Andrea Quattrone, Aldo Quattrone, Maria Grazia Vaccaro

Type: Poster

Exploring the Complex Interplay between Cognitive Reserve, Emotional States and Cognitive functioning

Speaker: Gasparre, Daphne

Track: Memory

Abstract

****Background**:** Cognitive reserve (CR) offers a compensatory mechanism for cognitive decline in the elderly, incorporating education, occupation, and leisure activities. Emerging evidence highlights the role of whole social context, life experiences, emotional states and leisure activities on cognitive abilities. This study aims to explore the role of emotional states in the complex relationship between cognitive reserve and other psychological and cognitive variables.

****Methods**:** N = 285 participants were recruited; a neuropsychological assessment was administered, evaluating cognitive reserve, emotional state, and cognitive abilities. R 4.3.2 software was used to explore the role of emotional state and cognitive reserve, on executive abilities and other cognitive functions.

****Results**:** Notably, participants with higher CR scores show lower levels of depression and higher scores on tests assessing cognitive functioning and executive abilities. These findings suggest that emotional states may play a mediating role in the relationship between CR and cognitive performances.

****Conclusion**:** The engagement in leisure activities over time appears to have a positive impact on emotional state, which in turn may contribute to cognitive functioning and executive abilities. These preliminary results highlight the potential benefits of interventions targeting mood, stimulating leisure activities and promoting social engagement for cognitive health in aging populations.

Author/s: Daphne Gasparre, Elisabetta Ricciardi, Chiara Abbatantuono, Laura Prontu, Federica Marocchino, Madia Marika Biasi, Giulia Paparella, Alessandro Intronà, Damiano Paolicelli, Romina Barberio, Eleonora Gentile, Alessandro Oronzo Caffò, Maria Fara De Caro, Paolo Taurisano

Type: Poster

RECODE: a new, open access, computer-based platform for cognitive stimulation in Italian

Speaker: Livoti, Vincenzo

Track: Memory

Abstract

Increasing evidence suggests that cognitive stimulation (CS) can be beneficial for people with Mild Cognitive Impairment (MCI) and Mild Dementia (MD)[1].

However, there are only a few computerised cognitive stimulation programmes available in Italian and some of them require long training sessions or expensive softwares and devices (e.g. virtual reality)[2]. We developed a free and easy-to-use computer-based platform, which could be administered from the patient's home. The REmote COgnitive stimulation for DEmentia (RECODE) does not need dedicated software as it runs entirely in the browser and can be easily shared and modified through the open-access source code. RECODE activities are divided in six main cognitive domains (attention, memory, language, executive functions, working memory and spatial-temporal orientation) randomised at each access. The different tasks are a digitalized adaptation of the paper-and-pencil exercises from the well-known and widely used CS program by Bergamaschi et al. [3]. Each participant (or their caregiver) accesses the activities through a personal link, allowing an adaptive procedure to select the most appropriate level of difficulty based on the scores previously obtained.

The patient's responses are collected via standard keyboard and mouse. Feedback is provided after every 20-minute session, and it includes a domain-specific average score and a total score (sum of all exercise scores weighted out of 10). RECODE records a personal activity log that allows the clinician to track performance improvements.

Data collection with MCI and MD patients is ongoing for validating the software.

Author/s: Vincenzo Livoti, Giulio Contemori, Eleonora Macchia, Adele Ravelli, Zaira Romeo, Marianna Noale, Giorgia Rotundo, Alessandro Bettin, Daniela Mapelli, Mario Bonato, Maria Devita

Type: Poster

The unconscious effect of emotional information on spatial working memory performance

Speaker: Cianfanelli, Beatrice

Track: Memory

Abstract

Remembering where negative events occur has undeniable value, but how emotional memories are encoded remains elusive. It is widely recognized that information in working memory (WM) is consciously processed. During the encoding, emotion-related information attracts attention more quickly or occupies more attention resources and has an emotional bias effect. However, evidence that WM can operate on unconsciously represented information is accumulating.

Here, we investigate whether the subliminal presentation of emotional pictures can affect spatial WM performance.

Participants (N=37) were presented with an emotional object-relocation task with different load conditions. An array of 2, 4, 6 or 8 rectangles appeared (1s) on the screen of a computer. After that, pictures selected from IAPS subliminally appeared (16.67 ms) superimposed on each rectangle. For each load condition, half of pictures were negatively-valenced ($M_{valence} = 2.64$, $Marousal = 6.55$) and the other half were neutral ($M_{valence} = 5.02$, $Marousal = 2.51$). Participants were then asked to relocate the rectangles in the original position as accurately as possible.

Statistical analysis (two-way ANOVA with valence and load as factors) showed significant effects for load ($F(3,108) = 16.93$; $P < 0.0001$) and for the interaction ($F(3,108) = 3.13$; $P = 0.03$). Post hoc analyses revealed that subliminal presentation of negative pictures increased spatial WM performance only in the load condition with 8 rectangles ($\#$, $P = 0.04$), suggesting that emotional stimuli affect spatial WM performance unconsciously when cognitive load exceeds memory capacity.

Author/s: Beatrice Cianfanelli, Marco Costanzi

Type: Poster

Assessment in Health Psychology: Development, Validation and Applications of Self-Report Tools for Patients and Caregivers

Speaker: Panzeri, Anna

Track: Methodology

Abstract

Measurement is fundamental to accurately investigate constructs in psychological science, influencing the estimation of effects, the validity of study results, and ultimately replicability. Illness has a dramatic psychological impact on patients and (informal) caregivers, often termed “hidden patients”. However, crucial constructs like uncertainty in illness (UI) and caregiver burden were overlooked from both psychometric and clinical perspectives. Moreover, existing assessment tools in health psychology often lack validation or are inadequately tailored for patients and caregivers. This research aimed to enhance assessment methodologies in health psychology by developing and validating tools specific to illness-related constructs through original studies involving diverse patient and caregiver samples.

The first part details the development and psychometric validation of the Uncertainty in Illness Questionnaire (UIQ).

In Study 1, Exploratory Graph Analysis (EGA) identified four UI stable dimensions: uncertainty about symptoms, treatments, future change, and relationships. In Study 2, Confirmatory Factor Analysis (CFA) supported a hierarchical second-order model, also demonstrating measurement invariance between patients and caregivers. In Study 3, a Structural Equation Model (SEM) established the discriminant validity between UIQ and the Intolerance of Uncertainty Scale-Revised (IUS-R) confirming they measure distinct constructs.

The second part presents a short form of a widely used measure for caregiver burden, not previously validated. In Study 4, EGA detected three stable burden dimensions: impairment, emotions, uncertainty. In Study 5 a subsequent hierarchical second-order CFA model provided good fit.

The third part focuses on constructs relations, Study 6 tested a theoretically driven sequential mediation SEM, from IU, through worry and UI to anxiety, revealing good fit and a complete mediation effect.

Concluding, psychometrics can enhance research and societal benefits by accurately assessing health conditions, reducing costs, and ultimately improving individuals' psychological well-being. This research emphasizes the necessity of valid measures and robust statistics in quantitative psychology to improve research quality and replicability.

Author/s: Anna Panzeri

Type: PhD prize

Assessment and testing procedures from research to clinical practice

Speaker: Mazza, Monica

Track: Methodology

Abstract

In recent years, the importance of constructing agile measures that can be applied to different clinical contexts for the evaluation of interventions has increased, as has the construction of instruments that find application in clinical practice. The aim of this symposium is to propose different evaluation strategies applicable to multidimensional interventions, the construction of instruments, and the assessment of the appropriateness of psychometric properties of measures that find application in clinical practice.

The contributions that will be covered in the symposium range from the application of methods such as Exploratory Graph Analysis and traditional techniques applicable to clinical practice and caregiver burden evaluation, to the assessment of coping strategies in the elderly and for the clinical diagnosis of autism, to the evaluation of the quality of distance learning.

The integration of modern and traditional techniques in psychological assessment allows for the validation of psychometrically valid assessment instruments with useful implications for clinical and research purposes.

Author/s: Andrea Bosco, Anna Panzeri, Ilenia Le Donne, Maria Rita Sergi, Monica Mazza

Type: Abstract complessivo di un simposio

From the assessment to the intervention in aging: The Italian version of WHO-ICOPE (Integrated Care for Older People)

Speaker: Bosco, Andrea

Track: Methodology

Abstract

As the elderly population continue to grow, there is an urgent need for innovative and comprehensive healthcare approaches to support the well-being of older individuals. The World Health Organization Integrated Care for Older People (WHO-ICOPE) is a holistic, comprehensive approach designed to address the multifaceted needs of elderly individuals, focusing on person-centered assessment and pathways within primary care settings.

In the light of the publication of the Italian version of the tool edited by Solimando, Barbagallo e Veronese (University of Palermo) and revised by the Authors of the present talk (<https://iris.who.int/bitstream/handle/10665/326843/WHO-FWC-ALC-19.1-ita.pdf>), we want to show the ICOPE assessment process which emphasizes the importance of tailoring interventions to individual preferences, values, and circumstances. Drawing upon evidence-based practices and interdisciplinary collaboration, ICOPE represents a paradigm shift towards proactive and preventive care for older populations.

ICOPE evaluates various domains of health and well-being, including physical, cognitive, mental, social, and environmental factors. The assessment allows targeted and personalized care strategies. ICOPE also emphasizes the importance of collaboration among healthcare professionals, caregivers, and community resources.

By identifying risk factors and early signs of decline, healthcare providers can implement strategies to prevent or delay functional decline, frailty, and other age-related conditions, improving individual outcomes and reducing healthcare costs associated with managing preventable complications, as well.

In conclusion, our aim is devoted to elucidating the principles of ICOPE, its implementation strategies, and the potential impact on improving health outcomes and promoting healthy aging within primary care settings.

Author/s: Andrea Bosco, Antonella Lopez

Type: Talk in simposio

Reduction and Validation of an Assessment Tool for Caregiver Burden: Exploratory Graph Analysis and Confirmatory Factor Analysis

Speaker: Panzeri, Anna

Track: Methodology

Abstract

Caregiver burden refers to the multifaceted strain experienced by informal caregivers assisting a loved one suffering from a severe medical condition. Despite the crucial role of this construct in health psychology, one of the most used measurement tools to assess it lacks a full validation.

Indeed, the original study providing the ZBI Italian adaptation only utilized a principal component analysis, and not an exploratory factor analysis, resulting in a 5-factor structure that was never tested with confirmatory factor analysis (CFA).

In a large sample of Italian caregivers, this structure was tested in a CFA model which yielded unacceptable goodness-of-fit indices. Consequently, the sample was divided in two parts. In Study 1, in the first sample an exploratory graph analysis (EGA) – a modern technique from network psychometrics – identified a 3-dimensional solution. However, this solution exhibited problematic cross-loadings and lacked stability across the 10'000 bootstrap replications. Thus, the 5 problematic items with cross-loadings and low stability were removed, and another EGA was estimated on the remaining items. This identified a 3-factor solution with non-problematic network cross-loading and good stability across bootstrap replications.

In Study 2, the factorial structure resulting from the EGA was then specified in a CFA model, which provided good fit indices (after correlating the residuals of two semantically correlated items within the same dimension).

The integration of both modern and traditional techniques in psychological assessment enabled the validation of a psychometrically sound assessment tool, with useful implications for clinical and research purposes.

Author/s: Anna Panzeri, Andrea Spoto, Gioia Bottesi, Giulio Vidotto

Type: Talk in simposio

The use of ADOS-2 in early diagnosis for Autism Spectrum Disorder: Explorative Graph Analysis.

Speaker: Le Donne, Ilenia

Track: Methodology

Abstract

Autism Spectrum Disorder represents a neurodevelopmental condition characterized by a variety of behavioral manifestations. In addition, there has been growing awareness of the importance of early diagnosis and the development or revision of screening and diagnostic tools for autism.

The Autism Diagnostic Observation Schedule – 2 (ADOS-2) represents the gold standard in autism diagnosis, but identification of the latent factors underlying its items remains an area of clinical and research interest. The present study aims to investigate, using psychometric network analysis techniques, particularly Exploratory Graph Analysis (EGA), the underlying structure of the ADOS-2 items to identify latent factors and any patterns or clusters of items that are correlated with each other. This can provide hypotheses about how different symptoms of autism manifest and interact with each other.

In addition, by analyzing the patterns of connection between items, it is possible to assess the internal consistency of the ADOS-2 and identify any items that may not be in line with the overall structure of the test. In addition, the predictive agreement between the Toddler Module and Module 1 of the ADOS-2, and the predictive effect of the two constructs shared by the two modules, namely Social Affect and Restricted and Repetitive Behaviors in the diagnosis of autism was evaluated.

This work provides a new perspective on the use of the EGA to better understand the structure of the ADOS-2 and its cross-sectional validity in the diagnosis of autism.

Author/s: Ilenia Le Donne, Monica Mazza, Margherita Attanasio, Maria Paola Greco, Nicole Covone, Marco Valenti

Type: Talk in simposio

Validation and Standardization of a New Instrument for Assessing the Quality of Distance Learning: An Exploratory Study

Speaker: Sergi, Maria Rita

Track: Methodology

Abstract

Introduction As a consequence of the restrictive limits imposed by COVID-19, Distance Learning (DaD) has seen and still finds widespread use. In this context, assessing the perception of DaD quality assumes considerable importance due to its implications for improving teaching methodologies and evaluating the associated effects. Focusing on “blended learning” and relying on primarily qualitative tools are undoubtedly limiting factors. With the aim of providing teachers and researchers with a robust quantitative tool for measuring perceptions of DaD quality, the present research analyzes the psychometric characteristics of a newly developed quantitative instrument: the Perceived Quality of Distance Learning (PQDL; Sergi et al., 2023).

Method The PQDL, State-Trait Anxiety Inventory, and Depression Questionnaire were administered to a sample of 429 college students (Age: $M = 23.20$; $SD = 5.91$). The dimensionality and reliability of the PQDL, structural invariance by gender, through multigroup confirmatory factor analysis, and predictive validity, through regression analysis, were examined. Results Two factors emerged from the exploratory and confirmatory factor analyses of the PQDL: Distance Learning Organization and Cognitive-Emotive Reaction to Distance Learning. Both factors demonstrated good reliability ($\alpha = .86$ and $\alpha = .865$, respectively), as well as good metric invariance ($RMSEA = .062$; $\Delta CFI < .01$) and scalar invariance ($RMSEA = .068$; $\Delta CFI < .01$). Only depression was found to predict the two PQDL factors ($t = -3.008$, $p < .05$ and $t = 4.505$, $p < .05$, respectively). **Discussions and Conclusions** The data highlight the adequacy of the psychometric properties of the PQDL in terms of dimensionality and internal consistency.

The two factors that emerged are invariant across males and females. Finally, high DaD organization ability appears to be associated with low levels of depression.

Author/s: Maria Rita Sergi, Michela Balsamo, Laura Piccioni, Marco Tommasi, Chiara Di Marcantonio, Ramona Bongelli, Giorgia D'Ignazio, Aristide Saggino, Alessandra Fermani

Type: Talk in simposio

Attention in plants: the subtle balance between being a unity and a multiplicity when interacting with the world

Speaker: Parise, Andre Geremia

Track: Methodology

Abstract

Plants are highly complex organisms, capable of perceiving and simultaneously responding to various environmental stimuli. Despite their evolutionary success over the last 440 million years, and like all living organisms, their capacity to interact with and respond to diverse environmental stimuli is limited.

This suggests that plants possess a mechanism that allows them to select and prioritise stimuli relevant to their survival. A selection mechanism that could resemble what, in the animal world, we call selective attention. By studying the electrical activity of plants, we hypothesised that if a plant were in a state of attention, its electrical signals would exhibit greater energy, be less complex, more regular, and more correlated with one another—a behaviour consistent with the modular structure of these organisms. To test this hypothesis, we examined the electrical signalling of various plants in situations that presumably require attention. The results indicate that, in many cases, plant electrical signalling behaves as predicted, which suggests an empirical method for studying selective attention in plants.

However, the presumed attention does not last long, likely only when the plant needs to synchronise the functioning of its parts in response to a stimulus crucial for its survival. Thus, a plant oscillates between unity and multiplicity in its interactions with the world.

These findings suggest the existence of a form of attention specific to plants that is fundamentally different from attention in animals.

Author/s: Andre Geremia Parise

Type: Talk in simposio

One, none and a hundred thousand minds: comparative cognition across species

Speaker: Loconsole, Maria

Track: Methodology

Abstract

‘Us, the animals, the plants’. Humans often perceive other species as entirely distinct and separate organisms, a perspective that fosters the belief that humans are the sole cognitive agents. This anthropocentric and anthropomorphic tendency can obscure the rich cognitive diversity across species. By adopting a comparative approach, it is possible to transcend these constraints, identifying and analysing the unique cognitive factors that define each species.

This symposium aims to address this issue by emphasizing how processes previously believed to be exclusive to humans can, in fact, occur in different organisms due to the adaptive mechanisms specific to a given species. During the symposium, it will be discussed: the role of different brain hemispheres on the development and functioning of cognitive abilities in fish (Maria Elena Miletto-Petrazzini); the contribution derived from a computational approach for the classification of communicative repertoires in non-human animals such as chicks (Antonella Maria Cristina Torrissi); the study of behavioral, neurophysiological, and cognitive correlates for the investigation of emotional processes in honeybees (Luigi Baciadonna); new challenges and approaches for the study of cognitive processes in aneural organisms, with particular reference to the plant model (Margherita Bianchi); and the attentional mechanisms that allow plants to explore the environment and interact with it properly (André Geremia Parise).

By integrating perspectives on animal and plant cognition, the symposium seeks to provide a more comprehensive and unified understanding of the evolution of cognitive mechanisms across species.

Author/s: Maria Loconsole, Silvia Guerra

Type: Abstract complessivo di un simposio

Unraveling the neuro-ethological components of emotions in honeybees

Speaker: Baciadonna, Luigi

Track: Methodology

Abstract

The idea that invertebrates have primitive forms of emotions is growing, partly because of recent evidence of their high-level cognitive skills. However, these skills do not imply the existence of emotional states per se and the characterization of emotions in invertebrates is still at its infancy. Here we used a multicomponent approach, including behavioural, neurophysiological, and cognitive correlates, to obtain insights on the emotion of fear using honey bees as a model (*Apis mellifera*) following the perception of an immediate or future danger.

Following the condition, in which a color-light context defines the occurrence of shock we were able to characterize the behavioural and physiological building blocks of fear. Not only did the bees learn and remember the negative event for up to one hour, but their behaviour was modulated by the intensity of the shock. In addition, bees that learned the association had a different respiratory dynamic than the control bee. The behavioural and physiological pattern we observed strongly suggests that the bees were not simply acting reflexively. Furthermore, we found higher levels of serotonin in the brain samples of conditioned bees compared to the control bees.

The involvement of serotonin, a neurotransmitter widely known to be involved in mammalian emotions, highlights the phylogenetic link between invertebrate and vertebrate neurobiology.

Investigating the proximate mechanisms of emotion in invertebrates has the potential to bypass the discussion of the appropriateness of semantic labels and advance our understanding of how these mechanisms parallel those found in mammals, including humans.

Author/s: Luigi Baciadonna

Type: Talk in simposio

Data sharing and privacy: fatal attraction

Speaker: Scandola, Michele

Track: Methodology

Abstract

Open data is fundamental to open science, enhancing the trustworthiness and reproducibility of research alongside pre-registration. Many journals and European grants require data sharing and encourage compliance with the FAIR guidelines. However, despite its benefits, data sharing faces barriers, particularly around privacy.

GDPR mandates strict privacy protections that challenge the feasibility of anonymisation, especially in niche populations such as those in clinical or neurodivergent settings. Significantly, the AIP ethical code and, in multilab studies, the ethical standards of other nations, as well as the consent form, collectively play pivotal roles.

This talk will describe the inherent risks of data sharing, and present strategies to improve data anonymisation. It will explore potential solutions within the legal framework, acknowledging the complexities and ambiguities therein.

In addressing these challenges, we aim to strike a balance between the imperatives of open science and the rights of individuals to privacy and data protection.

Author/s: Michele Scandola, Paulo Santos, Vittorio Iacovella, Marco Zanon, Marta Bortoletto, Giorgio Arcara, Gian Mauro Manzoni, Antony Casula

Type: Talk in simposio

Multilab collaborations from the editor's perspective

Speaker: Crepaldi, Davide

Track: Methodology

Abstract

There's no doubt that large-scale collaboration efforts are improving the precision and reliability of our science (wannabe) and, ultimately, the contribution of experimental psychology to the community at large. However, this radically new way of carrying out psychological research brings along several challenges. Some of these challenges are quite obvious and pervasive in our day-to-day activity (e.g., leading a group vs. working as a lonely wolf); others are more subtle (e.g., how to navigate seniority in a broad community vs. in your own lab, how to define --and promote-- consensus). Some of these issues have strong implications on the editorial process -- what gets published and what doesn't. Leveraging on my experience at the British Journal of Psychology and Psychonomic Bulletin and Review, I'll share some considerations (open questions, really) on these issues from the perspective of the Action Editor.

Author/s: Davide Crepaldi

Type: Talk in simposio

Post-selection Inference in Multiverse Analysis (PIMA): An Inferential Framework Based on the Sign Flipping Score Test

Speaker: Finos, Livio

Track: Methodology

Abstract

When analyzing data, researchers make some choices that are either arbitrary, based on subjective beliefs about the data-generating process, or for which equally justifiable alternative choices could have been made. This wide range of data-analytic choices can be abused and has been one of the underlying causes of the replication crisis in several fields. Recently, the introduction of multiverse analysis provides researchers with a method to evaluate the stability of the results across reasonable choices that could be made when analyzing data.

Multiverse analysis is confined to a descriptive role, lacking a proper and comprehensive inferential procedure. Recently, specification curve analysis adds an inferential procedure to multiverse analysis, but this approach is limited to simple cases related to the linear model, and only allows researchers to infer whether at least one specification rejects the null hypothesis, but not which specifications should be selected. In this contribution, we present a Post-selection Inference approach to Multiverse Analysis (PIMA) which is a flexible and general inferential approach that considers for all possible models, i.e., the multiverse of reasonable analyses.

The approach allows for a wide range of data specifications (i.e., preprocessing) and any generalized linear model; it allows testing the null hypothesis that a given predictor is not associated with the outcome, by combining information from all reasonable models of multiverse analysis, and provides strong control of the familywise error rate allowing researchers to claim that the null hypothesis can be rejected for any specification that shows a significant effect.

Author/s: Livio Finos, Paolo Girardi, Anna Vesely, Daniel Lakens, Massimiliano Pastore, Antonio Calcagni, Gianmarco Altoè

Type: Talk in simposio

Power Analysis and Bayesian Data Analysis in Cross-National Multi-Lab Studies: The Experience of the Many Smiles Collaboration

Speaker: Liuzza, Marco Tullio

Track: Methodology

Abstract

Multi-lab studies, studies that involve different labs in many countries, are a powerful tool to increase the external validity of our results - they increase cultural diversity - and for testing hypotheses whose effect sizes could hardly be studied in a single lab. However, an international collaboration also implies potential sources of heterogeneity in the effect studies, which poses novel challenges to the experimenters and the data analysts who want to properly plan their study through a power analysis while trying to take such heterogeneity into account.

I will discuss conducting power analysis and Bayesian data analysis for the 'Many Smiles' multi-lab study, a cross-country adversarial collaboration to severely test the facial-feedback theory across countries and operationalizations.

First, I will describe the statistical approach and the challenges faced in conducting a simulation-based power analysis within a multilevel modeling framework, and how, together with the rest of the team, we made some assumptions that guided our modeling strategy. Secondly, I will show how we conducted Bayesian data analyses following the data collection, the practical and theoretical challenges posed by this approach, and the added value carried by a Bayesian approach to the conclusions drawn from this approach. Finally, I will reflect on what this experience taught me about what it means to falsify a psychological theory in the context of psychological science.

Author/s: Marco Tullio Liuzza

Type: Talk in simposio

The Multiverse Approach in Multi-Lab Projects: Robustness Might Matter More Than Statistical Significance in Infancy Research

Speaker: Calignano, Giulia

Track: Methodology

Abstract

Modern research in psychology is adopting several tools to face the replicability and reproducibility crisis. In this context, multi-lab research combined with the multiverse approach is a very powerful yet complex approach.

The symposium aims to present a modern overview of editorial aspects, statistical methods, and data management in the era of multi-lab and multiverse studies highlighting strengths, limitations, and challenges. The first talk by Crepaldi provides an introduction to multi-lab and multiverse studies focusing on the editorial aspects.

The talk by Liuzza provides an example of planning a multi-lab study from a methodological and statistical point of view. Multi-lab studies require appropriate statistical models when planning (e.g., statistical power) and analyzing data. The talk by Calignano integrated the multiverse approach into the multi-lab methodology focusing on data pre-processing showing the amount of researchers' degrees of freedom and the impact on the final results. Summarising and presenting the results of a multiverse analysis requires appropriate descriptive and inferential tools. Given the lack of proper inferential methods, the talk by Finos proposed an innovative, flexible, and powerful inferential approach to summarise the results of a multiverse analysis. Especially for multi-lab studies, adopting open science practices in terms of transparency, preregistration, and data sharing, is becoming a new standard. However, data sharing is also a controversial, delicate, and often overlooked topic.

The final talk by Scandola illustrates the problem of data management and sharing considering privacy policies and modern open science practices.

Author/s: Giulia Calignano

Type: Talk in simposio

The Multiverse of Multi-labs. Methodological and Statistical Aspects of Multi-Lab and Multiverse Studies.

Speaker: Gambarota, Filippo

Track: Methodology

Abstract

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The symposium aims to present a modern overview of editorial aspects, statistical methods, and data management in the era of multi-lab and multiverse studies highlighting strengths, limitations, and challenges. The first talk by Crepaldi provides an introduction to multi-lab and multiverse studies focusing on the editorial aspects. The talk by Liuzza provides an example of planning a multi-lab study from a methodological and statistical point of view. Multi-lab studies require appropriate statistical models when planning (e.g., statistical power) and analyzing data.

The talk by Calignano integrated the multiverse approach into the multi-lab methodology focusing on data pre-processing showing the amount of researchers' degrees of freedom and the impact on the final results. Summarising and presenting the results of a multiverse analysis requires appropriate descriptive and inferential tools. Given the lack of proper inferential methods, the talk by Finos proposed an innovative, flexible, and powerful inferential approach to summarise the results of a multiverse analysis. Especially for multi-lab studies, adopting open science practices in terms of transparency, preregistration, and data sharing, is becoming a new standard. However, data sharing is also a controversial, delicate, and often overlooked topic.

The final talk by Scandola illustrates the problem of data management and sharing considering privacy policies and modern open science practices.

Author/s: Filippo Gambarota, Davide Crepaldi, Marco Tullio Liuzza, Giulia Calignano, Livio Finos, Michele Scandola

Type: Abstract complessivo di un simposio

An empirical investigation of the clinical validity and utility of fully idiographic network analysis in clinical practice

Speaker: Andreoli, Giovanbattista

Track: Methodology

Abstract

Fully idiographic network analysis (FINA) is a network analysis approach that allows the examination of within-person processes by assessing dynamic relationships between symptoms and symptom progression within individuals over time.

FINA has shown promising results as an analytical tool to better describe psychopathology in an idiographic way across a wide array of disorders. Nevertheless, more evidence is needed to support its clinical validity (i.e., how well it aligns with clinicians' judgments) and utility (i.e., its applicability across different populations and contexts, acceptability, ease of use, and cost-effectiveness). To fill this gap, we recruited dyads of clinicians and patients.

We tested FINA's clinical validity by comparing the clinician's anticipated psychological network for their patient with the empirical network generated from the patient's data using FINA in their ability to predict the patient's subsequent functioning. Data from the patient were collected via two waves of Ecological Momentary Assessment. To test clinical utility, we employed ad-hoc questionnaires assessing clinicians' and patients' perceptions of FINA's applicability, acceptability, ease of use, and cost.

We will present preliminary findings, and discuss the strengths and limitations of FINA in clinical practice.

Author/s: Giovanbattista Andreoli, Chiara Rafanelli, Giulia Casu, Giulio Costantini, Stefan Hofmann

Type: Talk in simposio

An introduction to psychometric network analysis with applications to personality psychology

Speaker: Costantini, Giulio

Track: Methodology

Abstract

Network psychometrics aims to model correlational patterns in psychological phenomena, such as traits, affects, behaviors, cognitions, desires, abilities, and environments, in terms of interactions among their basic constituents.

Network psychometrics has become central to several subfields of Psychology, offering a novel perspective on several phenomena, including personality traits. Conceptualizing personality traits as networks allowed researchers to go beyond the assumption that they simply reflect the effects of unobservable latent variables, to focus instead on the possibility that they can emerge from the interactions among their basic constituents. Network psychometrics offers a toolbox of statistical techniques to model psychological dynamics in a way that is coherent with this view.

I will introduce widespread network psychometric techniques, including techniques for modeling cross-sectional and longitudinal data, with examples from personality psychology.

Author/s: Giulio Costantini

Type: Talk in simposio

Applications of Psychometric Network Analysis in Psychology

Speaker: Zambelli, Michela

Track: Methodology

Abstract

Psychometric Network Analysis represents a cutting-edge methodology for modeling psychological phenomena as interconnected systems of variables. This approach allows for the exploration of relationships among variables across individuals and over time (Borsboom et al., 2021). The fundamental structure of a psychometric network comprises nodes, which denote variables within a dataset, and edges, representing pairwise conditional associations between node pair. The accessibility of user-friendly software in the open-source R environment have facilitated the proliferation of network psychometrics across various disciplines in the psychological and social sciences.

The symposium showcases five compelling applications of psychometric network analysis across diverse fields within Psychology, including personality, cognitive, clinical, and positive psychology. Costantini will provide an overview of psychometric network analysis, illustrating its application within personality psychology. Zagaria and colleagues explore the distinctiveness of orthorexia nervosa within the spectrum of eating disorders by applying network psychometrics to cross-sectional data. Tosi employs Cross-Lagged Panel Network (CLPN) models to investigate the longitudinal changes in the relationships between cognitive functions in patients with mild cognitive impairment.

Andreoli and colleagues investigate the clinical validity of the Fully Idiographic Network Analysis (FINA) by comparing the clinician's anticipated psychological network for their patient with the patient's empirical network estimated on Ecological Momentary Assessment data. Finally, Zambelli and colleagues applied a Meta-Analytic Gaussian Network Aggregation (MAGNA) to investigate similarities and differences among the reciprocal interrelation of flourishing components across 22 countries.

Author/s: Michela Zambelli

Type: Abstract complessivo di un simposio

Brain-heart Interplay, self-regulation and depression risk

Speaker: Mura, Francesca

Track: Methodology

Abstract

The intricate communication between the brain and the heart significantly impacts human behavior, with disruptions in this dialogue potentially leading to decreased self-regulation abilities and exacerbating symptoms of mental health disorders such as depression, anxiety, and cognitive impairment.

The Brain-Heart Interplay (BHI) serves as a comprehensive measure, capturing the reciprocal communication between the cardiac autonomic system (measured via electrocardiographic [ECG] recording) and the central nervous system (measured via electroencephalographic [EEG] recording). This index holds promise in unraveling the psychophysiological mechanisms underlying the connection between self-regulation and mood disorders. Research investigating BHI among individuals with depressive symptoms in various states, including rest and emotional tasks, supports the idea of altered cardiac-cortical interactions. Furthermore, a pilot study suggests distinct patterns in Brain-to-Heart interaction during a self-regulation task with or without external feedback (biofeedback). Specifically, a higher prevalence of Brain-to-Heart interaction when self-regulation is performed without external feedback suggests a greater cognitive demand, as individuals rely more on self-generated cognitive strategies to modulate their bodily cardiac arousal (i.e., heart rate). In contrast, the presence of the external feedback during the self-regulation task offers external guidance, more accurate information on actual internal signals and may reduce the cognitive load.

These findings provide empirical support for the usefulness of BHI indexes both to unravel psychophysiological mechanisms underlying self-regulation processes and risk for psychopathological conditions and add to the literature on the theoretical basis of biofeedback interventions and underscore their potential as therapeutic tools for addressing mood disorders and enhancing emotional well-being.

Author/s: Francesca Mura, Vincenzo Catrambone, Gaetano Valenza, Claudio Gentili, Elisabetta Patron

Type: Talk in simposio

Divergent Network Trajectories in MCI: Converters vs. Non-Converters to Alzheimer's Disease

Speaker: Tosi, Giorgia

Track: Methodology

Abstract

Mild Cognitive Impairment (MCI) consists of a cognitive impairment that does not affect a person's activities of daily living and progresses to dementia at a rate of approximately 12% per year. In cross-sectional studies, the complexity of the cognitive organisation was explored using Network Analysis to evaluate the relationships between cognitive functions. The present study aims to investigate the longitudinal changes in the relationships between cognitive functions.

From the ADNI database, we extracted three cognitive evaluations of two groups of MCI patients who will convert to Alzheimer's Disease (convMCI; N=128) or not (stabMCI; N=390) and cognitive performances before and after the conversion to AD (MCI/AD; N=203). We used cross-lagged panel network (CLPN) models to investigate the relationship between cognitive performance on different measurement occasions. We assessed node-wise prediction stability via bootstrap (500 samples).

The stabMCI group showed a higher density of connections in the first year (0.322) than in the second year (0.198). In the first year, memory performance predicted almost all other cognitive tests. On the contrary, the convMCI group showed a lower density of connections in the first year (0.165) than in the second year (0.248), when memory performance and executive functions showed predictive power. Predictions were less stable in the convMCI than in the stabMCI group. The MCI/AD group showed sparse connections (density=0.215), with the Trial Making Test and the Boston Naming Test showing higher predictions than the other variables.

These results show different predictive patterns depending on the future evolution of cognitive impairment.

Author/s: Giorgia Tosi

Type: Talk in simposio

Examining the Distinctiveness of Orthorexia Nervosa: Insights from a Psychometric Network Analysis

Speaker: Zagaria, Andrea

Track: Methodology

Abstract

****Introduction:**** Orthorexia Nervosa (ON) is a proposed clinical condition characterised by a pathological obsession with healthy eating. Despite ongoing research, it has yet to be clarified whether ON could be considered a part of Feeding and Eating Disorders (FED) or a manifestation of obsessive-compulsive disorder (OCD), and whether it warrants recognition as a unique diagnostic entity. To shed light on this matter, a psychometric network analysis was conducted by considering these three clusters of symptoms.

****Methods:**** A total of 422 participants ($M_{age}=20.70$, $SD=3.44$; 71.8% women) completed self-report questionnaires, including the Eating Attitudes Test-26, the Disordered Eating Questionnaire, the Düsseldorf Orthorexia Scale, the ORTO-15, and the Obsessive-Compulsive Inventory-Revised.

****Results:**** Findings revealed that ON, FED, and OCD emerged as relatively distinct communities within the network structure. Importantly, ON was more closely related to the cluster of FED. Specifically, an examination of edge weights and centrality metrics highlighted shared characteristics between FED and ON, such as the economic and emotional consequences due to strict adherence to healthy dietary rules. Additionally, inter-cluster edges were observed for guilt following eating, purging behaviours, and food-related worry, which bridged the theoretically defined communities of FED and ON. Conversely, excessive washing due to feeling contaminated played a pivotal role in linking OCD with ON.

****Conclusions:**** Our findings support ON as distinct from both OCD and FED, yet closely related to the latter. The stronger interrelationships observed between FED and ON might suggest considering obsessive fixation with healthy eating as a distinct entity within the spectrum of eating disorders.

Author/s: Andrea Zagaria, Silvia Cerolini, Mariacarolina Vacca, Caterina Lombardo

Type: Talk in simposio

Have we (once again) forgotten the body? Rediscovering the mind-body interaction to understand cognitive and emotional processes.

Speaker: Del Popolo Cristaldi, Fiorella

Track: Methodology

Abstract

Despite the longstanding philosophical and psychophysiological tradition surrounding the "mind-body problem," recent focus on cognitive and affective neuroscience has increasingly skewed our understanding toward the brain, often sidelining the concept of the "body." While the central nervous system (CNS) plays a critical role in supporting both healthy and pathological mental processes, it is reductive to focus exclusively on its contributions, neglecting the body's role and its bidirectional relationship with the CNS in maintaining homeostatic balance and supporting cognitive and emotional processes.

Re-examining mind-body interactions is thus crucial for deepening our understanding of the cognitive and emotional processes shaping our mental lives. Studying these interactions and their potential dysregulations also offers valuable insights for understanding and treating various neurological and psychiatric conditions.

This symposium aims to create a shared space for discussing recent empirical contributions that examine mind-body interaction, both in relation to fundamental cognitive and emotional processes (e.g., time perception, body perception and representation) and to alterations observed in pathological conditions (e.g., chronic pain, mood disorders). Through critical analysis of this evidence, we ultimately aim to "bring the body back into focus," expanding current knowledge and laying the groundwork for therapeutic and preventive approaches that promote health and well-being.

Author/s: Fiorella Del Popolo Cristaldi

Type: Abstract complessivo di un simposio

In the heart of time: An experimental study on the link between interoception and time perception.

Speaker: Del Popolo Cristaldi, Fiorella

Track: Methodology

Abstract

Recent studies suggest that our sense of time is linked to activity in the primary sensory area for interoception. Thus, improved access to bodily signals, both objectively measured (interoceptive accuracy) and subjectively reported (interoceptive sensitivity), may explain more accurate time perception. However, evidence supporting a link between interoception and time perception remains fragmented, and little is known about a potential dissociation between implicit and explicit time processing. In this study, we explored the relationship between interoceptive accuracy and sensitivity on one hand, and implicit and explicit timing abilities on the other. We used a heartbeat counting task to measure interoceptive accuracy and Porges' Body Perception Questionnaire to assess interoceptive sensitivity. Adult participants (M age = 22.9, SD = 2.39) completed either an implicit timing task (foreperiod, N=28, 13 M) or an explicit timing task (finger tapping, N=23, 11 M). Preliminary results showed that higher interoceptive accuracy and sensitivity predicted a stronger foreperiod effect in the implicit task, indicating that participants were better able to internalize temporal information to prepare motor responses. In the explicit task, we found that greater interoceptive sensitivity predicted lower variability in tapping intervals, indicating more accurate and precise timing abilities.

Overall, our findings confirm that awareness of psychophysiological changes plays a role in time perception and in internalizing temporal information to perform motor responses.

Author/s: Fiorella Del Popolo Cristaldi, Luigi Micillo, Nicola Cellini, Giovanna Mioni

Type: Talk in simposio

Many Countries, One Flourishing Network? Exploring the Psychometric Network of Flourishing Across 22 Countries

Speaker: Zambelli, Michela

Track: Methodology

Abstract

Flourishing indicates the extent to which all aspects of a person's life, including the context in which they live, are considered good. As a multi-dimensional construct, recent work has begun to explore the interrelatedness among flourishing constituents and their contribution to the achievement and maintaining of individual well-being. Using the national representative survey data from the first wave of the Global Flourishing Study (total N = 202,898 from 22 countries; Crabtree et al., 2021), a Meta-Analytic Gaussian Graphical Network (MAGNA) was applied using psychometrics (Epskamp et al., 2022) to investigate similarity and differences among the reciprocal interrelation of flourishing components across countries. Flourishing was assessed with the twelve self-report items composing the Secure Flourishing Measure (VanderWeele, 2017).

A random-effect MAGNA model was estimated to obtain a common cross-country network of flourishing, and a variance-covariance matrix of random effects that quantifies the heterogeneity of edges across countries. Results revealed: (a) consistent heterogeneity in the strength of associations between flourishing components, especially in the interrelations between life satisfaction, happiness and mental health; (b) the common-country flourishing network was characterized by positive interrelations between the flourishing components, with financial and material stability assuming a marginal involvement in the network; (c) "life-satisfaction" and "happiness" emerged as the most central constituents of flourishing with the strongest overall positive influence and predictability with the nodes to which they were connected.

Understanding cross-country differences in light of socio-contextual peculiarities will be crucial for informing the development of targeted flourishing interventions.

Author/s: Michela Zambelli, Dwight C. K. Tse, Richard G. Cowden, Jan Hölzge, Tyler J. VanderWeele

Type: Talk in simposio

Tactile and thermal interoceptive signals modulate the sense of body ownership

Speaker: Crucianelli, Laura

Track: Methodology

Abstract

Touch plays a vital role in social and individual development and in maintaining psychological well-being in humans. Recent studies have shown that the affective aspects of interpersonal tactile contact are processed by a specialised neurophysiological system of CT afferent fibers, which projects to the insular cortex, a central brain region for body awareness and homeostatic regulation. Thus, it has been proposed that some affective and thermal tactile signals might be redefined as interoceptive, as they provide information about the body's physiological state. In this talk,

I will present a series of behavioural studies that have investigated body representation using the Rubber Hand Illusion, a robust bodily illusion that allows us to manipulate the sense of body ownership. Specifically, I will discuss the contribution of interoceptive signals (i.e., information about the body's physiological condition, such as affective touch and thermal stimulation) and exteroceptive signals (i.e., visual cues) to the perception of a body part as belonging to oneself. Our results indicate that not only spatial and temporal congruence but also interoception may be necessary for the Rubber Hand Illusion to occur.

Thus, interoceptive signals mediated by the skin contribute to the development of the sense of body ownership. Such studies may provide empirical support for the idea that our sense of self is built upon empathic and embodied interactions with others via multisensory integration processes.

Author/s: Laura Crucianelli, Henrik Ehrsson

Type: Talk in simposio

The role of interoceptive signals in shaping corporeal awareness in healthy women and women with chronic pain

Speaker: Cantoni, Chiara

Track: Methodology

Abstract

Although body signals are crucial for maintaining homeostasis, current theoretical models and empirical evidence suggest that they might also influence higher-level emotional and cognitive processes.

Among these, corporeal awareness, i.e. the feeling of having a body, that occupies a specific position in space and acts according to one's will, derives from the constant integration of interoceptive (e.g. cardiac, respiratory, gastrointestinal, bladder) and exteroceptive (e.g. visual, tactile, auditory) signals. In particular, interoceptive signals play a crucial role in shaping our perception of the whole body and how we interpret specific bodily sensations, attributing sensory and emotional properties to them, as in the case of pain. In this context, we explored the role of interoceptive signals in shaping corporeal awareness in a sample of healthy women and women suffering from chronic pain (endometriosis).

In the first study, we investigated the role of breath in affecting corporeal awareness in healthy women through the illusion of 'Embreathment', an 'embodiment' paradigm in virtual reality. In the second one, we explored the perception of different interoceptive signals (cardiac, gastric, and, for the first time, urinary) in women suffering from endometriosis, and their impact on the perception of chronic pain, usually investigated through self-report questionnaires.

The results of the two studies respectively showed the relevance of respiratory signals in the perception of the sense of body ownership and body agency in healthy women and the alteration of gastric and urinary interoceptive signals in women with endometriosis (vs. healthy women), an impairment that is partly associated with the perception of chronic pain characterising this condition.

Author/s: Chiara Cantoni, Andrea Salaris, Sofia Ciccarone, Alessandro Monti, Giuseppina Porciello, Salvatore Maria Aglioti

Type: Talk in simposio

Applying pupillometry to investigate developmental trajectories of attentional engagement toward rhythmic patterns in music and speech across sensory modalities

Speaker: Russo, Sofia

Track: Methodology

Abstract

First experiences with rhythm occur in the womb, with different rhythmic sources being available to the human fetus. Among sensory modalities, vestibular, tactile, and somatosensory perception (VTS; Provasi et al., 2014) plays a crucial role in early processing. However, a limited number of studies so far has focused on VTS rhythms in language development, due to the difficulties of assessing cross-sensory processing abilities in early development.

In this work, we take advantage of pupillometry to assess changes in pupil diameter as a measure of attentional engagement while presenting infants with experimental stimuli across different sensory modalities. Specifically, VTS rhythmic abilities are firstly assessed through a vibrotactile tool for music perception in a cohort of 45 infants (21 females; M age = 661.6 days, SD = 192.6; Experiment 1). In Experiment 2, the link with auditory, linguistic abilities is evaluated by testing phonological and prosodic processing. Discrimination abilities for rhythmic and linguistic stimuli across experiments are inferred from changes in pupil diameter to contingent visual stimuli over time, collected through a Tobii X-60 eye-tracker (Hepach and Westermann, 2016; Mathôt, 2018; Calignano et al., 2023).

The predictive effect of VTS rhythmic abilities on linguistic processing and the developmental changes occurring across ages were explored by means of generalized, additive and linear, mixed-effect models. Results are discussed in terms of cross-sensory (i.e., haptic to hearing) and cross-domain (i.e., music to language) effects of rhythm on language acquisition, with implications for typical and atypical development.

Author/s: Sofia Russo, Filippo Carnovalini, Giulia Calignano, Barbara Arfé, Antonio Rodà, Eloisa Valenza

Type: Talk in simposio

Breaking into the attentional mechanisms underlying cognition via the science of pupil

Speaker: Russo, Sofia

Track: Methodology

Abstract

Every image we see first enters our brain through the pupil. This dynamic window in the iris regulates its opening and closing as a function of luminance and, importantly, psychosensory stimulation (Loewenfeld, 1958).

During the last decades, the birth and development of pupillometry techniques investigating this psychosensory response has shed light on the cognitive underpinning of a vast range of mental processes. In this symposium, a chorus of young and promising, early career researchers will discuss the most recent advances in the application of this psychophysiological measure.

The first talk will present the application of pupillometry to the study of preverbal and verbal populations, to the processing of visual, auditory and, tactile information including linguistic and music stimuli (Russo et al., 2023). The second talk will illustrate the opportunities and challenges of applying pupillometry to the study of object concepts in infancy (Mayer et al., 2023). The third talk will move toward the assessment of early theory of mind and social cognitive processes in preverbal infants (Pflüger et al., 2024). Lastly, the fourth contribution will shed light on pupillometry as a method for assessing cognitive effort during the administration of a verbal memory span test in the presence of noise (Gheller et al., 2024).

In summary, this symposium will discuss the important insights pupillometry brought to experimental research in the last decade, also considering implications and future challenges regarding different experimental techniques, cognitive and sensory domains, and developmental stages.

Author/s: Giulia Calignano, Sofia Russo

Type: Abstract complessivo di un simposio

Effect of noise on the performance of young adults in verbal working memory tasks: pupillometry as a measure of cognitive effort

Speaker: Gheller, Flavia

Track: Methodology

Abstract

Concentrating to perform listening tasks in a noisy environment requires to re-allocate mental resources to overcome the interference of noise. This process and the resulting fatigue, i.e., listening effort, can be detrimental to cognitive performance.

Research has shown that eye pupil dilation and high blink rates can be considered psychophysiological markers of cognitive effort, making pupillometry a practical and reliable method for evaluating cognitive load.

In this study, we tested the effects of unintelligible noise (multitalker babble noise) on university students' performance of the Digit Span (DS) Test. The participants performed the DS test (Forward and Backward) under two different acoustic conditions: quiet and noise (noise administered through headphones at an intensity of 65 dB A). Task order was counterbalanced between participants.

The Digit Span Test assesses verbal working memory by recalling a series of auditory digits presented through headphones, in the same order (forward subtest) and in reverse order (backward subtest).

Participants wore a portable eye-tracker (Pupil Labs) to record their pupil diameter during performance in both acoustic conditions. Additionally, the number of ocular blinks was assessed.

Participants' performance on the digit span tasks in quiet and noise was thus complemented by an assessment of the changes in pupil diameter and number of blinks compared to a baseline, aiming to evaluate the effect of noise on their listening and cognitive effort.

Furthermore, each participant was asked to complete a self-report questionnaire to assess their perceived cognitive effort during the task. Results will be discussed in light of existing literature.

Author/s: Flavia Gheller, Gaia Spicciarelli, Barbara Arfé

Type: Talk in simposio

Navigating Complexity: Pupillometry in Infant Social Cognition Research

Speaker: Pflüger, Maria

Track: Methodology

Abstract

Eyetracking serves as a valuable method for objectively assessing early theory of mind and related social cognitive processes in preverbal infants. Recent studies have extended this approach by analyzing pupillary responses, offering deeper insights into infants' processing of others' mental states. This shift responds to critiques of traditional measures like looking time, which have been argued to be challenging to interpret and insufficiently comparable across age groups.

Importantly, incorporating pupil dilation measures in experimental studies necessitates careful selection of stimuli to prevent confounding effects such as changes in pupil size due to stimuli luminance variations or infant gaze behavior patterns, such as frequent eye movements. Selecting appropriate stimuli poses particular challenges in the investigation of social cognitive abilities, as those are usually required during social interactions entailing a lot of different information. As a consequence, when aiming for naturalistic stimuli, materials can easily become highly complex.

We conducted a study investigating 18-month-olds' ability to detect changes in adults' attitudes towards different action effects signaled through emotional expressions and verbalizations. We implemented a violation-of-expectation design measuring pupil dilation in response to expected and unexpected emotional reactions.

In my talk, I will present the insights gained from analyzing infants' pupillary responses to relatively complex video stimuli together with the specific challenges and limitations encountered during implementation and analysis of our experiment.

Author/s: Maria Pflüger, David Buttelmann, Birgit Elsner

Type: Talk in simposio

Using pupillometry to investigate object concepts in infancy

Speaker: Mayer, Marlena

Track: Methodology

Abstract

Since the ontogeny of object permanence was proclaimed an important developmental milestone in Piaget's seminal work on cognitive development (Piaget, 1954), much research has been dedicated to investigating the emergence of object concepts.

The growing interest gave rise to a variety of methods that were developed or adapted to measure different aspects of object understanding in preverbal infants. However, sustained criticism of popular methods such as classical manual search tasks and looking-time based violation-of-expectation designs (Munakata, 1997; Charles & Rivera, 2009) has inspired the use of novel neuro- and psychophysiological measures in recent years.

These include EEG (Kaufman et al., 2003; 2005), fNIRS (Baird et al., 2002), and crucially, pupillometry (Jackson & Sirois, 2009; Pätzold & Liszkowski, 2020). In this talk, I will discuss the suitability of employing pupillometric paradigms to investigate object concepts in infancy. To do so, I will draw on our own experiences in conducting a series of cross-sectional studies on object permanence, object identity, object absence and object categorization in infants aged 6 to 14 months.

The talk will illustrate the unique opportunities and challenges the pupillometric approach presents in the case of studying object concepts in infancy. Implications will be considered with respect to the different experimental design stages (i.e. stimuli design, implementation, processing and analysis).

Author/s: Marlena Mayer, Ulf Liszkowski

Type: Talk in simposio

A Simulation-based Approach to Power Analysis with Reaction Times and Formalized Hypotheses.

Speaker: Atzeni, Lorenzo

Track: Methodology

Abstract

Power analysis is a statistical methodology necessary to ensure the reliability of scientific research results. The present paper presents an approach to power analysis for a 2x2 interaction with reaction time data, a common context in cognitive psychology, and well-specified a priori hypotheses. In particular, we focused on the interaction parameter with the goal of identifying adequate sample size aimed to provide a reliable estimate of this parameter.

Our approach, based on simulation, serves as an alternative to most commonly used methods, and is characterized by several interesting features that make it suitable to any experimental context.

Author/s: Lorenzo Atzeni, Massimiliano Pastore, Giovanni Galfano

Type: Mini-talks

A study on ChatGPT's abilities to simulate depression

Speaker: Battista, Fabiana

Track: Methodology

Abstract

Malingering is a well-known phenomenon consisting of the intentional simulation, exaggeration, or minimization of medical and/or psychological symptoms to obtain an external gain. It is oftentimes adopted by a person during psychological evaluation and, thus, has strong social implications. Malingering is particularly difficult to detect as the malingerer's ability to simulate increases, so it is important to evaluate whether Artificial Intelligence can be a source for people learning how to deceive without being caught.

The present study tested this research question by investigating whether ChatGPT (i.e., 3.5 turbo) is able to malingering depression, one of the easiest and most commonly feigned conditions in different contexts (i.e., forensic, clinical, workplace). We, therefore, collected 228 responses from humans and ChatGPT (i.e., 114 humans' responses and 114 ChatGPT responses) to the Minnesota Multiphasic Personality Inventory-2 (MMPI-2) with the instructions to either malingering depression or not (i.e., honest humans vs human malingeringers vs honest ChatGPT vs ChatGPT malingeringers).

Our results showed that both humans and ChatGPT were able to malingering to suffer from depressive symptoms while filling the MMPI-2, although the validity scales of the MMPI-2 allowed us to identify malingered responses for both groups (humans and ChatGPT). In addition, humans and ChatGPT performance significantly differed.

Author/s: Fabiana Battista

Type: Mini-talks

Characterizing Ejaculatory Patterns Among Males: Insights from Latent Profile Analysis

Speaker: Mollaioli, Daniele

Track: Methodology

Abstract

Ejaculatory disorders (EjD), while represent a prevalent male sexual issue, are often misdiagnosed due to clinical/psychometric biases. EjD encompasses a broad spectrum of issues, ranging from premature to delayed ejaculation, and even anejaculation. The present study aimed identify specific orgasmic profiles in a non-clinical sample of males by using latent profile analysis (LPA) to classify and characterize adults according to specific sexological outcomes.

A sample of 1364 Italian male adults completed a battery of questionnaires including the International Index of Erectile Function (IIEF), the Premature Ejaculation Diagnostic Tool (PEDT) and the Orgasmometer. LPA was utilized to examine predictors of latent memberships and profile differences on four variables (premature ejaculation, intercourse satisfaction, perceived orgasmic intensity and ejaculatory frequency).

Four latent profiles were identified and labeled “Suborgasmic” (N = 189, 13.9%), “Premature” (N = 105, 7.7%), “Normal” (N = 914, 67.0%) and “Anhedonic” (N = 156, 11.4%). The first profile is characterized by low frequency, low satisfaction, low PEDT and medium intensity; the second profile is characterized by high frequency, medium satisfaction, high PEDT and medium intensity; the third profile is characterized by high frequency, high satisfaction, low PEDT and high intensity; the fourth profile is characterized by high frequency, low satisfaction, low PEDT and low intensity.

Characterizing ejaculatory profiles is an important step toward understanding the many shades of ejaculatory and orgasmic behavior in males. Identifying various ejaculatory profiles has implications for future research, including the development of more precise diagnostic tools and interventions to address EjD in clinical context.

Author/s: Daniele Mollaioli, Andrea Sansone, Elena Colonnello, Tommaso B. Jannini, Erika Limoncin, Giacomo Ciocca, Emmanuele B. Jannini

Type: Mini-talks

Entraining Gamma Oscillations: A Comparative Exploration of the Effects of 40Hz and 60Hz Rhythmic Auditory Stimulation

Speaker: Scaramuzzi, Giorgia Francesca

Track: Methodology

Abstract

Gamma oscillations (γ , 30-120 Hz) have been implicated in various cognitive functions and are associated with multiple neuropsychiatric disorders. Non-invasive gamma entrainment using sensory stimuli has emerged as a potential therapeutic approach, particularly for Alzheimer's Disease patients. However, the comparative efficacy of different gamma frequencies sensory stimulation in entraining endogenous gamma oscillations remains under-explored.

The objective of this study is to investigate the effects of 40 Hz and 60 Hz rhythmic auditory stimulation (rAS) on steady-state power spectrum density (PSD) and aftereffects via electroencephalography (EEG). Employing a crossover within-subject design, young-adult healthy participants received both stimulation frequencies randomly. EEG data were recorded pre-stimulation, during stimulation, and post-stimulation.

The analysis, focused on the effects of 40Hz vs. 60Hz auditory stimulation on PSD, revealed a gradual increase in gamma band entrainment throughout the 40Hz and 60Hz rAS, persisting, as an aftereffect, in the minutes immediately following the stimulation. Particularly, 40Hz rAS increased low-gamma (30-47Hz) power across the whole brain, especially in the temporal cluster. Moreover, the high-gamma (53-70 Hz) power analysis revealed a cluster-dependent entrainment with 60Hz rAS increasing high-gamma mainly within the central cluster, while 40Hz rAS within the temporal cluster.

In conclusion, this study aims to elucidate the neural responses to different rAS frequencies, as the potential to entrain neural frequencies through sensory stimulation offers the opportunity to explore the link between brain oscillations and cognitive functions, which could have significant implications for neuroenhancement and rehabilitation programs.

Author/s: Giorgia Francesca Scaramuzzi, Gaetano Scianatico, Ester Cornacchia, Anna Concetta Spina, Michael A. Nitsche, Giancarlo Logroscino, Davide Rivolta, Valerio Manippa

Type: Mini-talks

How much flexibility do we need? Investigating the use of polytomous IRT models in psychological measurement.

Speaker: Bruno, Giovanni

Track: Methodology

Abstract

Measurement models based on Item Response Theory (IRT) have garnered substantial credit in the field of psychometrics and psychological testing. When dealing with items on a polytomous response scale, opting for a IRT model requires considering a number of theoretical assumptions, such as the nature of the measurement scale or the type of investigated construct. A typically adopted solution is the application of IRT model with few assumptions (e.g., the Graded Response Model), which allow greater flexibility but that may not reflect the theory that guided the psychometrician in developing the psychological scale.

This research delves into this topic comparing three IRT models for polytomous items with an increasing level of flexibility (Rating Scale Model, Graded Response Model, and Partial Credit Model) in terms of goodness of model and item fit, accordingly to a simulative and an applied case using real data. The main aim of the present contribution is to underline that IRT model selection (a-priori or following a model comparison approach) holds the potential to influence the description of a psychological construct, which may have a series of repercussion if applied to psychopathological assessment.

Interestingly, results derived from the administration of the tool may not match its theoretical assumptions, leaving room for theoretical and psychometric rethinking. In conclusion, the strength of a “good” IRT model comes not only from the results of statistical testing, but – at least in the first instance - also from its consistency with the foundation theory that led the scale development.

Author/s: Giovanni Bruno, Gioia Bottesi, Daniela Di Riso, Andrea Spoto

Type: Mini-talks

Is that a cluster? A practical guide on how to avoid Type I and Type II error

Speaker: Perugini, Ambra

Track: Methodology

Abstract

Clustering, or cluster analysis, is a family of unsupervised machine learning methods that allow researchers to group sets of observations into smaller subsets (clusters) based on some sort of similarity. As cluster analysis is becoming popular in psychological and social sciences, it comes the need to point out some risks in performing cluster analysis. Even though these methods are mostly exploratory, they are more often used to make inference, therefore, inferential risks should be taken into consideration. Common risks include not only failing to detect existing clusters due to a lack of power but also revealing multiple clusters that do not exist in the population (Type I error).

Through data simulation we will go through a couple of examples highlighting these risks. And ultimately, we will introduce a tool developed to estimate Type I error and power which can be used a priori to determine whether the research design is respecting the assumptions. When assumptions in the data structure are not respected (skewness, kurtosis, correlation between indicators), there is a high risk of detecting clusters that are not there. Specifically, in psychological research those assumptions are rarely respected, and a wise choice of the technique used to perform cluster analysis is even more important, as different existing methods have different underlying assumptions (i.e. K-means, Gaussian Mixture Models).

Author/s: Ambra Perugini, Enrico Toffalini, Tommaso Feraco, Filippo Gambarota, Massimiliano Pastore, Gianmarco Altoè

Type: Mini-talks

Item Reverse or Non-Reverse: This Is The Dilemma. Item Response Theory Evidence from the Balanced Emotional Empathy Scale (BEES)

Speaker: Bottaro, Rossella

Track: Methodology

Abstract

The incorporation of reverse-worded items in the development of psychometric instruments has been a longstanding practice.

Indeed, reverse-worded items are routinely utilized to mitigate response style biases, including acquiescence bias, extreme response bias, and unthinking responding. The present study aimed to contribute novel insights regarding the wording effect. Specifically, we employed the Item Response Theory (IRT) approach to investigate this phenomenon, focusing on the Balanced Emotional Empathy Scale (BEES). A total of 312 participants ($M_{age} = 21.35$, $sd = 8.25$) completed the BEES. To explore the characteristics of the BEES items, we separately applied the IRT Graded Response Model to both non-reverse and reverse items. Additionally, we assessed age-related invariance. Our findings supported the unidimensionality of both item types when analyzed independently. Notably, the non-reverse items exhibited higher discrimination and information compared to the reverse items, while maintaining internal coherence.

The BEES demonstrated satisfactory precision at the lower and middle-lower levels of the trait (Cronbach's $\alpha = 0.85$). However, age-related invariance was only evident within the medium to low trait levels. In conclusion, our findings caution against uncritical adoption of reverse-worded items as a standard practice, given their inherent conceptual challenges. Although we do not outright exclude the use of reverse items, we emphasize the importance of employing cost-effective tools and vigilantly contemplating any methodological artifacts that could impact research outcomes.

Our empirical findings support a new parsimonious version of the BEES, comprising solely fifteen positively worded items.

Author/s: Rossella Bottaro, Giusy Danila Valenti, Giuliana Nasonte, Palmira Faraci

Type: Mini-talks

Test length doesn't matter: An intelligent procedure for item selection in Item Response Theory

Speaker: Epifania, Ottavia

Track: Methodology

Abstract

Item Response Theory (IRT) provides the ideal framework for generating short test forms (STFs) from item banks or from full-length tests thanks to the possibility of obtaining detailed information on the precision with which each item measures the latent trait.

As such, the most precise items can be selected for inclusion in the STF and the number of items can be minimized while the measurement precision can be maximized. The usual procedure for developing STFs is based on the visual inspection of item and test information functions (IIFs and TIFs) to find the items that best contribute to make up a STF with the desired characteristics. This contribution presents a new procedure that aims at automating this process by defining a target TIF and finding the items from the item bank that best recover it. The algorithm directly compares the distance between the target TIF and a temporary TIF obtained by adding an item at a time. The items are chosen according to their closeness to the location on the latent trait where the distance between the target and the temporary TIFs is maximized. The algorithm stops when the addition of a new item does not reduce the distance between target and temporary TIFs.

The procedure can be applied both when the length of the STF is defined a priori and when the aim is to find the optimal number of items. The results of the application of this procedure are presented.

Author/s: Ottavia M. Epifania, Pasquale Anselmi, Egidio Robusto

Type: Mini-talks

The permutation test on Overlapping

Speaker: Nucci, Massimo

Track: Methodology

Abstract

In psychological research, the variability and shape of data distributions are potentially relevant and significant factors. However, in the most commonly used inferential tests, variability and shape are subject to assumptions, while statistical hypotheses almost exclusively concern means.

To overcome this situation, we propose the use of an index called Overlapping, which measures the degree of overlap between empirical data distributions. In other words, it estimates the empirical density of the data and quantifies the proportion of density shared by different distributions. This index, besides being informative in itself, can be used for inferential purposes thanks to the permutation test approach. Through a Monte Carlo simulation, we compared some traditional tests with permutation tests on Overlapping: the manipulated variables are the difference between means, the difference between variances, the shape of distributions, and sample size.

In the most frequent scenarios of experimental psychology, the permutation test on Overlapping shows better performance both in terms of power and control of Type I error.

Author/s: Massimo Nucci, Ambra Perugini, Livio Finos, Massimiliano Pastore

Type: Mini-talks

Beyond words: methodological considerations in the development of visual and musical stimuli

Speaker: Tagliabue, Semira

Track: Methodology

Abstract

Many self-report instruments used to measure constructs in psychology use verbal stimuli which rely on people's ability to respond precisely and accurately to statements about themselves. Such measures can be biased by social desirability, limitations in respondents' introspective capacity, and inaccessibility to people who lack sufficient language skills (Zogmaister & Castelli, 2006).

In contrast, some psychological instruments use non-verbal stimuli, such as visual stimuli (Crone et al., 2018; Dawell et al., 2022) and, less commonly, musical stimuli (Strauss et al., 2024). The challenges in creating and validating such tools are many, and there are not always common guidelines or specific methodological considerations. The aim of this paper is to open a reflection on the process of developing and validating measurement instruments that use languages other than verbal language. As an example, a research project is presented that develops visual and musical stimuli to measure the concept of meaning in life. Specifically, the first operational phase will be illustrated, which involved the participation of experienced artists and musicians in six workshops, in which, starting from the verbal definition of the construct, the technical characteristics of visual and musical stimuli to measure the basic components of meaning in life were identified.

Reflections on the open challenges (e.g. operationalisation skills; validity), opportunities and limitations of these tools will be offered.

Author/s: Semira Tagliabue, Michela Zambelli

Type: Mini-talks

Costs and Benefits of Item Reduction: The Abridgment of the Emotion Regulation Questionnaire (ERQ)

Speaker: Valenti, Giusy Danila

Track: Methodology

Abstract

Shortening instruments is a highly required procedure, as short scales may be advantageous over their lengthier counterparts, especially when time and resources are constrained. However, these abbreviated forms may be weaker than their original versions for both content coverage and psychometric robustness. Also, the abridgment of measures often suffers from methodological strictness, and the potential drawbacks of the shortened scales are rarely reported. This study aims to describe the process of scale shortening, emphasizing the potential costs and benefits in the context of a balance between time-resource savings and potential compromises in validity and reliability. We selected the Emotion Regulation

Questionnaire (ERQ) for this condensation process, involving a sample of 459 participants. Item reduction was driven by an intent to preserve the construct's content breadth and scale's psychometric quality. Our results supported a two-factor structure (Cognitive Reappraisal and Expressive Suppression), $\chi^2(8) = 11.357$ ns, CFI = .995, TLI = .990, RMSEA = .030 (.000-.067), SRMR = .031, and three items were selected for each subscale. Both factors showed satisfactory levels of reliability (α and $\omega > .710$). We tested a latent variable model on an independent sample to evaluate the relations between these two emotion strategies and depression, anxiety, and stress: Cognitive Reappraisal reported negative associations, whereas Expressive Suppression showed associations in the opposite direction.

The ERQ-S, as a brief version of the original ERQ, offers potential benefits, as it effectively assesses the two emotion regulation strategies, with a reduced number of items, thereby enhancing its utility in research and practice.

Author/s: Giusy Danila Valenti, Giuliana Nasonte, Rossella Bottaro, Palmira Faraci

Type: Mini-talks

How can we conceive replicability with AI-mediated experimental conditions? A position talk

Speaker: Aquino, Antonio

Track: Methodology

Abstract

Ensuring the replicability of scientific experiments is crucial for advancing knowledge and establishing the credibility of research findings. However, the increasing use of Artificial Intelligence (AI) to create responsive and more natural experimental conditions based on participants' verbal and behavioral responses presents new challenges for experiment replicability.

Researchers can use AI algorithms to adjust experimental parameters in real-time based on participants' responses and contextual factors, such as environmental changes, participant demographics, and unexpected variables. This approach introduces variability that cannot be monitored with traditional methods. It is not sufficient to control AI behaviour by keeping fixed algorithm parameters. Instead, a way must be found to consider the different participant's behavioural topographies that lead to the same functionality. This means considering the different response modes with the same function.

In conclusion, this talk will introduce and discuss the main aspects of AI-adapted experimental conditions, proposing potential solutions from a theoretical and philosophical perspective.

Author/s: Antonio Aquino, Fabio Aurelio D'Asaro, Marco Lezcano, Vittorio Iacovella, Michele Scandola, Michela Vezzoli

Type: Mini-talks

Italian validation of the Drexel Defusion Scale (DDS) in a sample of people with multiple sclerosis

Speaker: Toscano, Anna

Track: Methodology

Abstract

Background and Objectives: The Drexel Defusion Scale (DDS) is a valid and reliable instrument used to measure defusion, which is the ability to distance oneself from dysfunctional thoughts rather than seeing them as real and true. This is an aspect related to flexibility, a key concept in the Acceptance and Commitment Therapy (ACT) framework, which is a psychological framework for behavioral change. The purpose of the present work is to validate the Italian version of the DDS scale in patients with multiple sclerosis (MS).

Author/s: Ambra Mara Giovannetti, Anna Toscano, Kenneth Pakenham, Jana Pöttgen, Paolo Confalonieri, Andrea Giordano, Rosalba Rosato, Alessandra Solari

Type: Mini-talks

Measuring maladaptive cognitions related to video-gaming: Development of a shortened version of the Internet Gaming Cognition Scale by applying Item Response Theory

Speaker: Gori, Costanza

Track: Methodology

Abstract

Problematic behavioral patterns with video games can arise or be maintained by maladaptive game-related cognitions, even in adolescents. Thus, for preventive and clinical purposes, it is important to have instruments specifically able to relieve high levels of maladaptive cognitions.

The Internet Gaming Cognition Scale (IGCS) is a new and promising scale to assess problematic gaming cognitions through items with a three-ordered response scale. However, relatively few attention has been focused on its psychometric properties, and only by applying Classical Theory of Test.

The aim of the present study was to investigate the psychometric properties of the IGCS using item response theory analyses in order i) to test if items really assess medium and high levels of the latent trait and ii) to maximize the scale efficiency by maintaining items that show the best functioning in measuring it. Participants were 741 adolescent video-gamers (58% males, Mage=16.38, SD = 1.53).

The Graded Response Model resulted to fit data, but some items did not fit or showed problems of local dependence. By deleting those items, a shorter version of the IGCS was obtained. Total Information Function (TIF) showed that the scale was very informative from medium to high levels of the trait. Invariance across gamers with different levels of severity was tested with Differential Item Functioning (DIF), and correlations with time spent gaming and risky lootbox use were provided. The shortened version of IGCS obtained through IRT seems to be a useful tool for preventive and clinical purposes with adolescents.

Author/s: Costanza Gori, Emilia Serra, Marta Vecchiato, Valentina Veronese, Caterina Primi, Maria Anna Donati

Type: Mini-talks

On generalizing the use of raters threshold in the estimation of the agreement among multiple raters

Speaker: Spoto, Andrea

Track: Methodology

Abstract

Classification tasks where raters have to classify objects into predefined classes have been gaining popularity in science. Therefore, accuracy and reliability of classification are two necessary conditions. Any classification process is partly based on an evidence-based evaluation and partly on the subjective evaluation of the rater.

This last component is crucial for the reliability of the classification. Traditional indexes used to estimate inter-rater agreement typically count the number of observed agreements and correct them by removing chance agreements. In a recent paper Nucci and colleagues introduced a methodology for improving the estimation of interrater agreement in a classification task in the case of two independent raters.

Their contribution is based on the definition the Belonging Measure, and the Belonging Threshold of the raters. In this research we study, by means of a number of Monte Carlo simulation studies, the performance of the new methodology in estimating the agreement among multiple raters.

Results confirm the accuracy of the new methodology even in the case of multiple raters. Moreover, it is shown that when differences among the Belonging Thresholds increase, traditional inter-rater agreement indexes are biased, while this is not the case for the indexes computed using the new methodology. Future research perspectives are then discussed.

Author/s: Andrea Spoto

Type: Mini-talks

Preliminary validation of the Assessment of Recovery Capital (ARC) scale in an Italian clinical sample with substance use disorder

Speaker: Toscano, Anna

Track: Methodology

Abstract

Objectives: Recovery Capital (RC) can be defined as the set of internal and external resources that facilitate recovery from a substance use disorder and is an indispensable construct for assessing patients' progress in recovery pathways. The Assessment of Recovery Capital (ARC) scale is a short, easy-to-administer questionnaire used to detect RC. It can be used as an outcome measure in monitoring patients with substance use disorder during and at the end of treatment. This study aimed to translate and validate the ARC in an Italian clinical sample.

Author/s: Elisa Zamagni, Anna Toscano, Rosalba Rosato, Elisa Martino, Simona Brunetti, Michela Tazzini, Miriam Savarese, David Best, Paola Carozza, Teo Vignoli

Type: Mini-talks

The “Reading the Mind in Films” Task: a Pilot study for the Italian adaptation of a complex mental states recognition test in adults with and without Autism Spectrum Condition

Speaker: Scuotto, Raffaele Simone

Track: Methodology

Abstract

The present pilot study tested and reports the Italian adaptation of the Reading the Mind in Film test (RMF) by Golan et al. (2006) as an ecological test for assessing, in Italian adults with and without Autism Spectrum Condition (ASC), complex emotion recognition in natural settings and everyday situations.

A sample of young adults with Autism Spectrum Condition (with ASC; $n=22$), attending a filmmaking course at a post diploma school (Scuola Futuro Lavoro) took part in the study and was compared with a control group of neurotypical university students (without ASC; $n=22$). All participants underwent individual testing and completed the Italian version of the Autism Questionnaire before performing the Italian version of both the RMF task and the Reading the Mind in the Eyes Test (RMET). The latter, widely used to evaluate the ability to detect what someone else is thinking or feeling from the eye region. The findings of the control group were in line with the original study demonstrating the validity and reliability of the translation and the dubbing procedure of the RMF test.

However, no significant differences in performance were found between the two groups. Such a results will be discussed in terms of experience with films and video gained by the ASC group from attending the filmmaking course.

Author/s: Raffaele Simone Scuotto, Paola Ricciardelli, Sofia Bonfanti

Type: Mini-talks

Two- and three-dimensional indicators of green and grey space exposure and mental health in a large Italian cohort

Speaker: Spano, Giuseppina

Track: Methodology

Abstract

The aim of the present study was to explore the link between 2D and 3D indicators of green and grey spaces and the prevalence of psychiatric disorders in a large population-based group from Rome, Italy. Data from 593,894 adults (≥ 30 years) participating in the Rome Longitudinal Study were analyzed. Mental health outcomes were determined through drug prescriptions (such as antidepressants, antipsychotics, mood stabilizers, anxiolytics, hypnotics, and sedatives) or hospitalizations for psychiatric diagnoses (including schizophrenia spectrum disorder, depression, anxiety, stress-related disorders, somatoform disorders, and substance use disorders).

Participants' addresses were used to assign exposure to indicators like the Normalized Difference Vegetation Index (NDVI), green and grey volumes, number of trees, and the Normalized Difference Green-Grey Volume Index (NDGG). Cox proportional hazards regression models were employed, and potential effect modification by sex, age, and deprivation index was assessed. Protective associations were found between NDVI and the number of trees and certain medications (such as antipsychotics and lithium), as well as between NDGG and other medications (like anxiolytics, hypnotics, and sedatives). Adverse associations were observed between grey volume and specific medications.

The study suggests that higher levels of green space around residences may be associated with decreased use of psychiatric drugs, whereas greater exposure to grey spaces may lead to increased use. Accurately characterizing green and grey spaces is emphasized as important for mental health treatment and promotion.

Author/s: Giuseppina Spano, Federica Nobile, Giovanni Sanesi, Massimo Stafoggia, Vincenzo Giannico, Andrea Bosco

Type: Mini-talks

Assessing Sleep, Circadian Rhythms and Mood: development of the revised version of SCRAM questionnaire.

Speaker: Marcaccio, Martina

Track: Methodology

Abstract

Aim: The study aims to validate a revised version of the SCRAM questionnaire, called rSCRAM, which incorporates items to measure anxious mood alongside sleep quality, chronotype, and depressive symptomatology. **Materials and Methods:**

Data from 486 Italian participants aged 18 to 77(343 F, Age $M = 26.9 \pm 10.1$) underwent two distinct analyses. In Study 1, a principal component analysis (PCA) was conducted on commonly used anxiety questionnaires to select representative items for inclusion in the rSCRAM. In Study 2, after including the anxiety subscale, a two-step analytical strategy consisting of exploratory factor analysis (EFA) followed by confirmatory factor analysis (CFA) was employed. Results: The EFA revealed a 4-factor model with 16 items, confirming the inclusion of anxious mood alongside sleep, circadian preferences, and depressive symptoms. CFA confirmed this structure with excellent fit indices. The rSCRAM questionnaire demonstrated excellent internal consistency (Cronbach's α values ranging from 0.72 to 0.90), strong test-retest reliability over 2 weeks (r ranging from 0.73 to 0.82), and high correlations for convergent validity, with low correlations for divergent validity. Inclusion of the anxiety scale expands the utility of the instrument in assessing mental health constructs within a single tool. **Conclusions:**

The rSCRAM is a comprehensive tool for assessing sleep quality, chronotype, and depressive and anxious mood, as well as their interrelationships.

The inclusion of anxiety scale expands its utility in assessing mental health constructs within a single instrument. The study showed the rSCRAM reliability in measuring sleep quality, circadian phase, as well as depressive and anxious mood.

Author/s: Ilaria Di Pompeo, Martina Marcaccio, Simone Migliore, Giuseppe Curcio

Type: Poster

Instruments for Health-Related Quality of Life measurement in people with Multiple Sclerosis: a COSMIN systematic review

Speaker: Donarelli, Edoardo

Track: Methodology

Abstract

Objectives. Many different patient-reported outcome measures (PROMs) were developed to assess Quality of Life (QoL) and Health-Related Quality of Life (HRQoL) in people with multiple sclerosis (MS). However, it is still unclear which ones are the best in terms of validity, reliability, responsiveness, and interpretability. The present systematic review aimed to assess the psychometric properties and interpretability of the PROMs that measure (HR)QoL in people with MS.

Author/s: Andrea Giordano, Edoardo Donarelli, Giulia Di Domenico, Anna Toscano, Giampaolo Brichetto, Eleonora Cocco, Silvia Testa, Alessandra Solari, Rosalba Rosato

Type: Poster

Preliminary validation of the Exam Metacognition Inventory

Speaker: Mollaioli, Daniele

Track: Methodology

Abstract

Metacognition, defined as the awareness and regulation of one's cognitive abilities, plays a crucial role in academic performance. Recent studies have highlighted how metacognition significantly influences academic outcomes through students' ability to monitor and regulate their own learning. Despite these insights, there remains a notable gap in the availability of psychometric tools specifically designed to assess metacognition in the context of academic exams, which is critical for precisely measuring and understanding student learning behaviors and outcomes.

The aim of this study was to develop a new psychometric instrument, the ***Exam Metacognition Inventory*** (EMI). The initial pool of items was derived from the adaptation of the Italian version of the *Metacognition Questionnaire* (MCQ-30). The measurement's factor structure and criterion validity were examined using a convenience sample of 196 university students from southern Italy. A principal-axis Exploratory Factor Analysis with oblique (*Oblimin*) rotation was conducted on a 30-item preliminary version. The instrument revealed a three-factor structure—Metacognitive Knowledge, Regulation, and Responsiveness—with strong internal reliability (Cronbach's alpha ranging from 0.80 to 0.91) and adequate criterion validity. Based on the item-total correlation coefficients, the final version of the instrument was reduced to 15 items, with 5 items per subscale. All subscales of the EMI showed significant correlations with all five subscales of the MCQ-30.

These preliminary results confirm the robust psychometric properties of the Exam Metacognition Inventory and underscore the importance of identifying specific metacognitive issues in academic settings. Detecting these issues can facilitate targeted educational and psychological interventions to support academic students.

Author/s: Aurora Calcagno, Vanessa Muscolino, Naomi Caccioppo, Rossana Rechichi, Teresa Papalia, Daniele Mollaioli

Type: Poster

The Social Media Fatigue Scale (BSMFS): A Brief Version

Speaker: Nasonte, Giuliana

Track: Methodology

Abstract

Social media, an integral component of daily life, can affect psychological well-being and lead to a state known as social media fatigue (SMF). This study investigates the structure and psychometric properties of the Social Media Fatigue Scale (SMFS) and examines its relationships with related psychological constructs. Our sample comprised 329 individuals (Mage = 26, SD = 8.46; 26.1% males) who completed an online survey assessing SMF, trait anxiety, fear of missing out (FoMO), boredom proneness (BP), and problematic social media use. The latent structure of the SMFS was initially examined using Exploratory Factor Analysis (EFA), subsequently corroborated through Confirmatory Factor Analysis (CFA), and comparatively analyzed with Exploratory Structural Equation Modeling (ESEM). To further investigate the relationships between SMF and associated constructs, path analyses were conducted. The results revealed a refined brief scale with three factors within the ESEM framework, demonstrating excellent fit ($\chi^2 = 43.620$, $df = 33$, $p = .083$; RMSEA = .046, $p = .54$; CFI = .984; TLI = .967; SRMR = .033) and satisfying reliability ($\omega_{F1} = .75$; $\omega_{F2} = .89$; $\omega_{F3} = .73$).

Our findings also indicated that FoMO mediates the relationship between trait anxiety and SMF, predominantly through its fear component. Additionally, problematic social media use was identified as a moderator in the connection between SMF and apathy, a key aspect of BP.

These outcomes highlight the complex interplay between personality traits and the psychological impact of social media usage.

Author/s: Giuliana Nasonte, Rossella Bottaro, Giusy Danila Valenti, Palmira Faraci

Type: Poster

The ‘Digital Interventions for Psychological and Psychiatric Services’ (DIPPS) Project: An Early Warning Prediction System Relying on Bayesian Networks

Speaker: Panzeri, Anna

Track: Methodology

Abstract

The DIPPS project endeavors to construct a digital platform aimed at supporting psychological and psychiatric interventions to improve mental health. The DIPPS platform encompasses various functionalities, from the digitalized assessment data to a predictive system for potential symptom exacerbation.

Utilizing the digitalized assessment data, Bayesian network (BNs) can be informed to forecast the pathways and probabilities leading to worsening of specific psychopathology indicators. BNs represent a novel method to modeling causal relations, especially with cross-sectional data, where partial correlation networks are challenged. Employing a directed acyclic graph (DAG), BNs depict causality and conditional probabilities.

In a sample of 1017 participants, the hill climbing (HC) algorithm was used with the R-package “bnlearn”. Initially, the HC algorithm starts with a saturated network and progressively introduces tests that augment the number of conditioning nodes. To ensure a robust BN, a bootstrap was employed with 1000 iterations. The final averaged network incorporated edges that recurred in at least 85% of the bootstrap iterations and maintained consistent directions in over 50% of these iterations. Findings indicated that intolerance of uncertainty is a ‘parent node’, influencing anxious, somatic and PTSD symptoms, while feelings of loneliness are a ‘child node,’ influenced by most other nodes.

Bayesian networks facilitate researchers in identifying plausible causal connections within psychometric data, providing fresh insights into the psychological phenomena under examination. They are instrumental in formulating novel hypotheses and substantiating existing ones with relevant evidence. Insights gained from BNs could inform more effective interventions or personalized treatment strategies for mental health conditions.

Author/s: Anna Panzeri, Gioia Bottesi, Andrea Spoto

Type: Poster

Communication of synergistic health risks

Speaker: Barjaková, Martina

Track: Reasoning

Abstract

Many non-communicable diseases result from combinations of risk factors, which sometimes interact to produce risks going beyond their sum, called **synergistic risks**. For instance, smoking and alcohol consumption interact synergistically to increase the risk of head and neck cancers. Our previous studies show that only a minority of people judge synergistic risks for non-communicable diseases as such, which reveals the need of improving awareness and understanding of these risks through effective communication. Existing online communications usually inform about the existence of a synergistic relationship, explain briefly what it means and illustrate it with data on the increase in risk (stating the risk is “X-times higher”).

Scientific evidence on how to best communicate synergistic risks is almost non-existent. There is just limited evidence that providing probability information (in natural frequency format) and explaining the biological mechanism behind the synergy improve judgements about synergistic health risks. The aim of our research is to help fill this gap in the literature by providing new empirical evidence on the ways of explaining synergistic health risks to people. In our study, we test whether (a) explaining what a synergistic relationship means, (b) explaining the biological mechanism behind the synergy, or (c) providing the commonly-used relative risk information, improve people’s judgements of synergistic risks.

The results will be of both theoretical and practical relevance, as they can shed light on the mechanism which best demonstrates the idea of a synergistic risk, and can inform the design of real-world communications on synergistic health risks for non-communicable diseases.

Author/s: Martina Barjaková, Laura Macchi

Type: Mini-talks

Disentangling Cognitive Flexibility and its Role on Higher-Level Executive Functions in Physiologic Aging

Speaker: Corbo, Ilaria

Track: Reasoning

Abstract

Over the past decades, the construct of cognitive flexibility (CF) has been defined in different ways. The multiplicity of definitions not only reflects its inherent complexity, but also presents a challenge in experimental assessment. The definition of CF is contingent upon the approach taken to its investigation and this renders difficult to establish a universally accepted definition. Some definitions of CF refer to it as a single construct, while others analyze it through its components. Conversely, some authors analyze CF in relation to other executive functions (EFs). Cognitive Flexibility, like other EFs (i.e., planning and fluid intelligence), remains stable throughout adulthood and begins to gradually decline with age.

The aims of this study is to examine the relationship between cognitive flexibility and higher-level EFs (planning and fluid intelligence) in physiological aging, with the following goals: (i) defining the components of CF; (ii) evaluating the role of global functioning in mediating the relationship between CF components and higher-level EFs; (iii) assessing whether these components predict higher-level EFs; and (iv) evaluating whether these components are able to predict higher-level EFs in adults and older individuals. A sample of 130 participants was selected. A series of analyses were conducted to test the study hypotheses.

The results indicate that CF is not a unitary construct, but rather comprises two factors: Task-Switching and Set-Shifting. Furthermore, the components of CF are capable of predicting higher-level EFs, although this relationship differs in adults and older adults.

Author/s: Ilaria Corbo, Giuseppe Forte, Maria Casagrande

Type: Mini-talks

Explicit and implicit representation of reward value in cocaine use disorder (CUD): a mouse kinematic study on intertemporal decision-making

Speaker: Grande, Eleonora

Track: Reasoning

Abstract

Background: Cocaine Use Disorder (CUD) is a chronic condition with implications on cognitive functions such as decision-making and impulse control. Intertemporal choice paradigms, measuring temporal discounting, offer insight into decision-making of addictive behaviors; mouse kinematics, a process-tracing method, provide a deeper understanding of decision dynamics. Here, mouse kinematics was implemented with the aim to investigate the intertemporal decision-making in CUD patients compared to healthy controls (HC), and to explore the relation between decision-making biases and clinical measures.

Methods: mouse kinematics recorded during an intertemporal choice task was administered in 36 CUD patients and 34 healthy matched controls. Participants also underwent a complete psychiatric and neuropsychological evaluation.

Results: In line with previous literature, results revealed higher discount rates in the CUD group. Mouse kinematics was able to discriminate among groups, with CUD patients display straighter trajectories for immediate choices and edge-curved ones for future ones. Further, a series of associations have been found between discount rates, kinematic measures and clinical indices.

Conclusion: Overall, these results hold important implications and relevant insights for tailored therapeutic interventions, relapses prediction, and neurobiological classification of addictive disorders.

Author/s: Eleonora Grande, Cinzia Calluso, Annalisa Tosoni, Francesco Di Carlo, Lorenza Lucidi, Lorenzo Pio Padula, Ilenia Rosa, Mauro Pettoruso, Giovanni Martinotti, Giorgia Committeri

Type: Mini-talks

Exploring the relationship between cognitive abilities and olfactory function in younger adults

Speaker: Tolomeo, Eva

Track: Reasoning

Abstract

The relationship between cognitive abilities and olfactory function (FO) has been a subject of great research interest.

Previous studies highlighted that both olfactory and specific cognitive processes are regulated by the orbitofrontal cortex, and suggested associations between declines in cognitive abilities and alterations in olfactory perception. However, the majority of investigations focused on specific populations (i.e. older adults, and individuals with cognitive impairment), and primarily relied on the only identification test to assess olfaction, which is known to be partially confounded by cognitive and cultural factors. In light of these premises, there is a shared need to further explore these domains in a cohort of young adults devoid of cognitive impairment signs to determine the value of olfactory testing as a possible predictor of cognitive impairment in young and healthy individuals. For this reason, we investigated the relationship between olfaction and cognitive abilities and explored the possible role of gender differences in a population of younger adults. To evaluate OF we used the Sniffin' Sticks Extended version (Threshold, Discrimination, and Identification), while for cognitive abilities we used the ICAR16 test (investigating four dimensions: verbal reasoning, letter and number series, matrix reasoning, and three-dimensional rotation).

Preliminary results did not support previous research findings, indicating a lack of statistically significant correlation between OF and cognitive abilities in younger adults, and no influence of gender. Further studies are pivotal to clarify the nature of this relationship.

Author/s: Eva Tolomeo, Giuseppe Occhiuto, Cristiana Colacino, Marco Tullio Liuzza

Type: Mini-talks

Is the g-factor innate or does it emerge with experience? Initial evidence from newborn chicks

Speaker: Feraco, Tommaso

Track: Reasoning

Abstract

In humans, the existence of a general intelligence factor, the g-factor, has been proposed to explain why scores on cognitive tests are correlated (positive manifold). The positive manifold has also been observed in six-year-old children, but due to the impossibility of testing newborns or individuals with no experience, conclusions cannot be drawn about the origin of this factor in our species—whether it is innate or learned through experience.

However, newborns of other species can be studied and the positive manifold has been identified in adult specimens of some non-human animals, such as monkeys and dogs. This study investigates the presence of the positive manifold in domestic chicken chicks (N=126) between 2 and 5 days old through five tests of cognitive abilities (numerical, visuospatial, visual search, rule generalization, memory) and a neophobia test. The domestic chicken, being a precocial species, is capable from birth of solving tasks that require cognitive skills. Contrary to our hypothesis that an innate g-factor would produce a positive correlation among the performance in different tests, the chicks' performances were, with one exception, orthogonal to each other and to the neophobia test ($.01 < |r| < .25$).

Although these results do not appear to support the innatist hypothesis of the g-factor, alternative explanations will also be discussed, such as the role of methodologies used, the possibility that it may emerge later in development, or that it might even be absent in the tested species.

Author/s: Tommaso Feraco, Maria Loconsole, Beatrice Malaman, Manon Skrypczuk, Enrico Toffalini, Lucia Regolin

Type: Mini-talks

Measuring Academic Self-Efficacy of Italian students across biological sex, socioeconomic status and migration background.

Speaker: Zacchilli, Michele

Track: Reasoning

Abstract

Academic Self-Efficacy (ASE), or the belief that one can achieve positive results in school activities, is an important factor in students' learning, motivation and academic success. Several studies have already investigated ASE, however, no study has ever simultaneously considered the presence of multiple individual characteristics that may influence it.

Therefore, the aim of the present study is to investigate the invariance by gender, Socio-Economic Status (SES) and migration background of a short scale measuring ASE, and to compare the mean scores for ASE in these groups, in a representative sample of Italian high school students ($n = 26564$).

The results indicate scalar-level invariance for the groups considered (males and females; Italians, first-generation immigrants and second-generation immigrants; low, middle and high SES).

Comparison of the latent means of ASE, shows that: males exhibit lower self-efficacy than females; native Italian students exhibit higher self-efficacy than both first- and second-generation immigrants, who, on the other hand, do not show significant differences between themselves; students with low SES show lower self-efficacy than both medium and high SES students, while the latter showing higher self-efficacy than their peers with medium SES.

In conclusion, this study shows that the proposed scale is a reliable measure of ASE. Furthermore, the differences in the means between groups with different biological sex, migration background, and SES underscore the importance of considering these characteristics when developing new interventions to improve AS in school settings.

Author/s: Michele Zacchilli, Elisa Cavicchiolo, Fabio Alivernini, Fabio Lucidi, Giulia Raimondi, Sara Germani, Sara Manganelli

Type: Mini-talks

Scarcity and borrowing behavior: from opening a new line of credit to repayment strategy

Speaker: Caserotti, Marta

Track: Reasoning

Abstract

Literature suggests that people facing financial scarcity - the perception of insufficient economic resources to meet their needs - often show disadvantageous behaviors, such as increased willingness to borrow money (WTB). Two observational studies based on representative Italian samples investigated the role of psychological ownership of borrowed money (POBM), perceived risk of indebtedness in borrowing decisions (Study1, N=1,997) and repayment strategies during economic hardship (Study2, N=938). An Hurdle model (Study1) and a beta regression (Study2) were performed due to the non-normal distribution of the dependent variables.

Study1 confirmed our hypothesis that participants in the scarcity (vs. control) condition were more likely to incur debt (OR: 1.43, $p=.003$) and had greater WTB (IRR: 1.10, $p=.039$). Further, a higher (vs. lower) POBM predicted both the loan (OR: 1.51, $p<.001$) and the WTB (IRR: 1.21, $p<.001$). Conversely, higher (vs. lower) perceived risk was associated with a reduced probability to incur debt (OR: 0.80, $p=.003$) and a lower WTB (IRR: 0.80, $p<.001$).

Study2 showed that participants in scarcity (vs. control) condition were slightly more willing to refinance (namely to open a new line of credit) instead of renegotiating (OR: .69, $p=0.06$), although those experiencing less economic hardship were more willing to renegotiate (OR: 1.93, $p=.04$). High (vs. low) POBM was associated with a greater willingness to refinance ($ps<0.05$) while high (vs. low) debt risk perception was associated with a greater willingness to renegotiate (OR:1.55, $p=.002$).

Results expand the literature on the role of financial scarcity on indebtedness, deepening the role of psychological aspects involved.

Author/s: Marta Caserotti, Paolo Girardi, Roberta Sellaro, Alessandra Tasso, Teresa Gavaruzzi, Caroline Roux, Lorella Lotto, Enrico Rubaltelli

Type: Mini-talks

Testing psychological models of reasoning on empirical data from the CISIA TOLC-PSI test.

Speaker: Conte, Federica

Track: Reasoning

Abstract

Current psychological models of human reasoning use a small set of assumptions to explain and predict the pattern of competence and errors in solving deductive reasoning problems. Here, we test those theories on a large dataset derived from the CISIA TOLC-PSI test, which collected answers to a wide range of deductive problems from over 40000 prospective university students.

The test included four categories of verbal reasoning problems: propositional logic, syllogisms, iterative reasoning, and the definition of necessary and sufficient conditions. Additionally, each problem can be characterized along several dimensions, some shared across the four categories (e.g., logical depth), others category-specific (e.g., the figure of a quantified syllogism). Each participant solved ten problems selected from a pool of 200, for an average of 2000 responses to each problem. Unlike many previous psychological studies that have focused on a narrow range of problem types or relied on relatively small sample sizes, the diversity of the CISIA dataset, encompassing the spectrum of logical complexity, offers a distinctive advantage.

We present results from our two-step approach: first, formalized theory-based predictions of problem difficulty (e.g. that problems involving a greater number of implication schemas, semantic models, or assumptions would be more challenging); second, the comparison between theory-based and empirical difficulty estimates obtained from the application of polytomous Item Response Theory models.

Author/s: Federica Conte, Paolo Cherubini, Marcello D'Agostino, Gabriele Dalla Torre, Vincenzo Falco, Giorgio Filippi, Marcello Gallucci, Carlo Reverberi

Type: Mini-talks

Tiny dictators: understanding altruism in young children

Speaker: Marini, Marco

Track: Reasoning

Abstract

Fairness and altruism are fundamental aspects of human social behavior, often observed across various contexts and age groups. Previous research has suggested that time constraints can influence decision-making processes, particularly in scenarios involving resource allocation.

This study investigates the developmental origins of fairness in preschool children (aged 4 to 5) through a modified dictator game, examining their responses under time pressure. Children from six nursery schools (N=115) participated in a within-between subject design study, where children engaged in both “give” and “take” versions of the game. In the “Give” condition, children decided how many stickers to donate, while in the “Take” condition, they chose how many stickers to take from another child’s endowment. Time pressure was introduced, prompting children to reallocate resources within a specified time frame, with the penalty of receiving nothing if they failed to do so. Results indicate that initial resource allocation significantly influenced subsequent sticker sharing, with children in the “Give” condition displaying less generosity than those in the “Take” condition. Notably, time pressure consistently led to increased sharing across both allocation conditions. These findings highlight the early emergence of a sense of fairness and altruism in preschool-aged children, irrespective of endowment or status quo effects.

The study contributes valuable insights into the interplay between contextual factors and prosocial decision-making in early childhood. The modified dictator game employed in this study serves as a valuable tool for investigating the development fairness and altruism, shedding light on the intricate interplay between economic games and prosocial tendencies.

Author/s: Marco Marini, Sebastiano Munini, Michela Carlino, Fabio Paglieri

Type: Mini-talks

Disentangling decision making under value-based conditions in patients with Parkinson's disease

Speaker: Colautti, Laura

Track: Reasoning

Abstract

Patients with Parkinson's disease (PD) may be more prone to make risky value-based decisions, probably due to impairments in anticipating the unrewarding consequences or to an insensitiveness to them. So far, evidence showed that: i) In PD neural structures pivotal in decision making (DM) are affected; ii) Dopaminergic medications may bias choices toward risk; iii) Cognitive functioning, in particular executive functions (EFs), is crucial to avoid risky decisions.

The present study aimed at deepening the DM mechanisms in PD patients without impulse control disorders, both comparing the decisional performances between patients and healthy controls and analyzing the decisional performances in relation to different dopamine medications and cognitive functioning. Through a neuropsychological battery composed of cognitive tests to evaluate EFs and memory and decisional tasks (i.e., Iowa Gambling Task and Game of Dice Task), differences in value-based DM between 33 adults with PD (age: 66.21 ± 7.64 years; education: 10.61 ± 3.80 years) and 33 matched healthy controls (age: 65.94 ± 7.77 ; education: 10.82 ± 3.69) were explored. Decisional performances were further investigated in a sample of 42 PD patients (age: 66.4 ± 7.79 years; education: 9.90 ± 3.67 years). Results showed that PD patients made a higher number of risky decisions when compared to healthy controls, depending on the characteristics of the decisional situation. Furthermore, the number of risky choices was significantly related to the posology of dopaminergic medications and EFs.

From present findings, several clinical implications can follow, considering that DM is fundamental for patients' wellbeing and autonomy.

Author/s: Laura Colautti, Paola Iannello, Maria Caterina Silveri, Anna Rita Giovagnoli, Antonio Emanuele Elia, Fulvio Pepe, Eugenio Magni, Alessandro Antonietti

Type: Poster

Perinatal influences on threat-cues processing in decision-making

Speaker: Mastroianni, Ilenia

Track: Reasoning

Abstract

The perinatal period (conception to first year) brings about psychological changes in mothers, including heightened vulnerability to potential threats, especially during pregnancy (e.g., Brygger Venø et al., 2021). When competing for resources, people are also sensitive to cues of threat, with physically weaker individuals tending to concede more resources to those who appear more (vs less) threatening (Geniole et al., 2017). However, no studies have explored if such threat-sensitivity is exaggerated during this perinatal period.

We investigated this question in 86 pregnant women, tested in late pregnancy (29 weeks gestation) and one month postpartum, and a control group of 53 non-pregnant women, tested twice with a two-months gap. All participants played a web-based, competitively-framed ultimatum game against partners displaying high- or low-threat faces. Afterward, they rated the perceived threat of these faces.

The results of robust multilevel modelling revealed a clear interaction between pregnancy and time ($p = .002$): before giving birth, pregnant women ceded fewer resources than non-pregnant women, regardless of the partner's threat level. Additionally, a marginal perinatal x threat effect ($p = .053$) revealed that non-pregnant women exhibited the expected threat premium effect (more concessions to high-threat faces, $p = .01$), but pregnant and post-partum women did not ($p = .93$).

These findings suggest that pregnancy may affect social and economic decision-making by reducing (rather than increasing) submissiveness to threat when competing over resources.

Author/s: Ilenia Mastroianni, Martina Arioli, Shawn Geniole, Valentina Proietti, Valentina Silvestri, Viola Marina Macchi Cassia

Type: Poster

Understanding sustainable fashion consumption through the lens of the Theory of Planned Behavior

Speaker: Robba, Matteo

Track: Reasoning

Abstract

Environmental issues and climate change require consumers to shift their habits towards more sustainable consumption behaviors. Recently, the negative environmental impact of the fashion industries has garnered increasingly attention.

Hence, we conducted an exploratory study aiming at understanding which determinants and barriers shape consumers' sustainable fashion consumption. Additionally, we intended to make a cross-country comparison between Italy and Germany to check for similarities and differences in what motivates (or prevents) consumers to buy organic garments. We adopted the Theory of Planned Behavior (TPB) as a theoretical framework to investigate the main drivers behind the decision to buy sustainable apparel. Besides the three main determinants of behavior suggested by TPB (i.e., attitudes, subjective norms, and perceived behavioral control), we extended the framework by incorporating the role of personal norms, consumers' sustainable fashion awareness, climate change worry and connectedness to nature.

Cross-sectional data stemming from a representative sample of Italian consumers ($N = 1,002$) are used to perform a Structural Equation Model. Findings suggest that various determinants seem to play a key role in sustainable fashion consumption, such as attitudes, (subjective and personal) norms, perceived behavioral control, climate change worry, and connectedness to nature. Conversely, awareness of the environmental impact of the fashion industry does not appear to be a significant prerequisite for sustainable fashion consumption. After the data collection for the German sample is completed, a multigroup path analysis will be performed.

This will enable us to understand whether these psychological determinants of sustainable fashion consumption are moderated by cultural influences.

Author/s: Matteo Robba, Carmela Aprea, Paola Iannello

Type: Poster

Decision-Making Factors in Insanity Assessments: A Systematic Review

Speaker: Casale, Simona

Track: Reasoning

Abstract

Forensic psychiatric evaluations are mandatory for the insanity assessment but face significant challenges related to their accuracy, accountability, and transparency. The lack of standardised methods makes it extremely difficult for experts to agree on insanity evaluations. A comprehensive understanding of the assessment processes and the biases influencing forensic psychologists and psychiatrists is essential for improving their reliability and standardising the methodology.

This systematic review aims to identify the factors that influence assessments of insanity. The investigation focuses on the pieces of information (e.g., personal information and psychiatric information about the defendant, information about the defendant's criminal record and the committed offence) which tend to guide the decision-making process of psychologists and psychiatrists appointed by the Court to assess the defendant's insanity.

This systematic review adheres to the PRISMA guidelines. The search will be conducted on the following electronic databases: PubMed, CINAHL, PsycINFO, Web of Science and Scopus. It will include studies searched through reference lists of relevant review papers and references of included/excluded studies with no limitations on the year of publication. Two reviewers will independently make a screening of titles and abstracts for eligibility, followed by a detailed review of full papers. Discrepancies will be resolved through discussion or consultation with a third reviewer.

This systematic review seeks to enhance comprehension regarding the limitations and strengths inherent in the decision-making processes of expert psychologists and psychiatrists in charge of evaluating the defendant's insanity, a fundamental initial step towards standardising forensic evaluations.

Author/s: Simona Casale, Giovanna Parmigiani, Clara Gangemi, Folco Panizza, Gustavo Cevolani, Stefano Ferracuti, Pietro Pietrini

Type: Poster

Delving into cooperativeness for deconstructing moral judgments in self-sacrificial dilemmas under time constraints: preliminary results from a preregistered study.

Speaker: Cutini, Simone

Track: Reasoning

Abstract

Moral dilemmas often force individuals into high-conflict situations where reaching a satisfactory resolution proves elusive. Sacrificial dilemmas, particularly, require individuals to grapple with the prospect of sacrificing one or more lives, often endorsing a utilitarian approach to prioritize the greater good.

Despite contemporary challenges necessitating individuals to make utilitarian but self-sacrificial decisions (the dilemma of autonomous vehicles or AV dilemma), the permissibility of such acts remains undervalued. Additionally, the role of time availability in moral judgments is complex and sometimes controversial, with studies suggesting increased use of decision heuristics under time pressure. This study aims to elucidate moral objectives in self-sacrificial AV dilemmas, hypothesizing a direct influence of time availability on moral judgment and a moderating effect of cooperativeness. We developed a modified version of the three-person Ultimatum Game, alongside personality scales measuring cooperativeness (Cooperativeness and Competitiveness Personality Scale, CCPS, and the Social Value Orientation slider, SVO).

Participants also responded to three sacrificial AV dilemmas under different time conditions (time pressure, time delay, or no constraints). We anticipate cooperativeness may moderate the impact of decisional time on utilitarian resolutions, suggesting deliberative processes could enhance utilitarian judgments, with individual tendencies toward cooperation clarifying this relationship. Data collection is ongoing, and preliminary results will be presented.

The study was preregistered on the Open Science Framework (<https://osf.io/rxk6v>).

Author/s: Giovanni Bruno, Simone Cutini, Marta Caserotti, Andrea Spoto, Luca Pelliccia, Nicola Cellini, Michela Sarlo, Lorella Lotto

Type: Poster

Morality in the Flesh: Influence of Corporeal Signals on Moral Decisions in Real and Virtual Social Interactions

Speaker: Aglioti, Salvatore Maria

Track: Social cognition

Abstract

Embodied cognition theories suggest that even abstract processes such as, for example, language syntax can be influenced by the sensorimotor signals through which bodily self-consciousness -our sense of owning a body (ownership) and being the author of actions (agency)- is built and maintained. Using an embodied morality framework, I will report on recent research that explores how bodily signals affect moral decision-making with a specific focus on whether strengthening or weakening participants' sense of ownership and agency over artificial agents influences dishonesty in real and virtual interactions.

I will consider innovative technologies, such as ingestible devices that can transmit gut signals during cognitive and emotional tasks, alongside established experimental methods like physiological recordings of autonomic nervous activity. I will also discuss the impact of exteroceptive (e.g., the external features of a virtual body such as its physical appearance) and interoceptive cues (e.g., the internal bodily states shaped by cardiac, or thermal signals) on modulating bodily self-consciousness and its relationship with (dis)honest decisions. Additionally, I will examine the contribution of less explored, deep body signals, like respiratory and gastrointestinal, supposedly involved in regulating homeostasis and allostatic brain-body interactions.

Delving into how corporeal cues modulate higher-order functions will offer novel insights into how comparatively low-level body-related variables influence moral decisions at behavioral, physiological, and neural levels.

Author/s: Salvatore Maria Aglioti

Type: Keynote talk

Facemasks reduce face trustworthiness perceived by deaf individuals

Speaker: Arioli, Maria

Track: Social cognition

Abstract

During the COVID-19 pandemic, most people wore face masks to protect themselves and the others. Whilst this was recommendable, unfortunately face masks represented a critical problem for deaf people by preventing lipreading.

Moreover, the mouth region represents a critical source of information for inferring emotional states as well as for visually-based social first impressions. Visually-based first impressions may become even more relevant for a deaf person that cannot rely on verbal cues. In light of this, an interesting question is whether face masks impact on social inferences, such as trustworthiness judgments, in a similar vein in deaf and hearing individuals. Our results showed that overall deaf individuals performed similarly to hearing controls in discriminating different levels of trustworthiness in computer-generated faces manipulated for trustworthiness.

However, deaf individuals judged faces with face masks to be overall less trustworthy than hearing participants.

We interpret this finding as suggesting that for the deaf individuals, occluding the mouth area generates frustration and feelings of communication exclusion and this may result in less trustworthiness perceived in others.

Author/s: Maria Arioli, Tina Iachini, Costanza Papagno, Zaira Cattaneo

Type: Talk in simposio

Facial expressions and identities recognition in Parkinson disease

Speaker: Gobbo, Silvia

Track: Social cognition

Abstract

Parkinson's Disease (PD) is associated with motor and non-motor symptoms. Among the latter are deficits in matching, identification, and recognition of emotional facial expressions. On one hand, this deficit has been attributed to a dysfunction in emotion processing.

Another explanation (which does not exclude the former) links this deficit with reduced facial expressiveness in these patients, which prevents them from properly understanding or embodying emotions. To disentangle the specific contribution of emotion comprehension and that of facial expression processing in PD's observed deficit with emotions we performed two experiments on non-emotional facial expressions. In Experiment 1, a group of PD patients and a group of Healthy Controls (HC) underwent a task of non-emotional expression recognition in faces of different identity and a task of identity recognition in faces with different expression.

No differences were observed between the two groups in accuracies. In Experiment 2, PD patients and Healthy Controls underwent a task where they had to recognize the identity of faces encoded through a non-emotional facial expression, through a rigid head movement, or as neutral. Again, no group differences were observed. In none of the two experiments hypomimia scores had a specific effect on expression processing.

We conclude that in PD patients the observed impairment with emotional expressions is likely due to a specific deficit for emotions to a greater extent than for facial expressivity processing.

Author/s: Silvia Gobbo, Matilde Menghini, Elisa Urso, Aurora Colombo, Cecilia Perin, Ioannis Ugo Isaías, Roberta Daini

Type: Talk in simposio

Gaze matters: On the nature of the reverse congruency effect.

Speaker: Lorenzoni, Anna

Track: Social cognition

Abstract

Eye-gaze plays a central role in social interactions and can elicit orienting of attention in an observer. Recent evidence has shown differences in inducing attentional shifting between eye-gaze stimuli compared to non-social stimuli (e.g., 'arrows').

For example, in a spatial Stroop task, while arrows induce a standard congruency effect (faster reaction times for congruent compared to incongruent trials), eye-gaze stimuli elicit a reversed congruency effect (faster reaction times for incongruent compared to congruent trials). Our study aims to further explore the explanation for the reverse congruency effect related to joint attention: on incongruent trials, specifically for eye-gaze stimuli, the peripheral stimulus is pointing towards the object to which participants' attention is expected to be allocated (i.e., the fixation). Participants ($N = 60$) were asked to discriminate the direction indicated by the target (arrow or eye-gaze stimuli), which can appear to the left or right of a central fixation point.

Participants were instructed to keep their eyes at fixation and to ignore the location in which the target could appear. To further explore the joint-attention assumption, we manipulated the central fixation point (i.e., the object of joint focus), which, within trials, could be either a meaningful real-life object or a symbolic cross.

The results replicate previous studies, showing a standard congruency effect for arrow stimuli and a reverse congruency effect for eye-gaze stimuli, for both the symbolic cross and the meaningful real-life object fixation points. Ongoing research is still exploring the nature of this result.

Author/s: Anna Lorenzoni, Mario Dalmaso

Type: Talk in simposio

Neural correlates of emotional face processing: the role of the cerebellum

Speaker: Ciricugno, Andrea

Track: Social cognition

Abstract

The posterior cerebellum has recently gained attention as a crucial structure of the social brain, mediating the processing of different social cues, including emotional facial expressions. Nevertheless, many open questions still remain regarding its causal contribution and functional role in this process.

To address this gap in cerebellar knowledge, we performed a series of studies employing different transcranial magnetic stimulation (TMS) approaches, to explore the topographical organization of the causal contribution of the posterior cerebellum during the processing of facial expressions, the temporal course of its recruitment as well as its causal connectivity between other regions of the social brain (i.e., the posterior superior temporal sulcus, pSTS). We demonstrated the existence of a medial-to-lateral gradient in the functional topography of the cerebellar response to affective functions, with regions dedicated to the processing of emotional features of facial expressions located medially and those involved in higher-level social inferences located in more lateral sectors of the cerebellum. Moreover, we revealed, for the first time, that when processing emotional faces the posterior cerebellum is recruited in a specific time window (ranging from 120-220 ms from the face onset), with this recruitment being simultaneous to that of the pSTS.

Lastly, we showed that pSTS recruitment during the perception of facial expressions is contingent on the level of cerebellar activation, providing evidence that cerebellar-to-pSTS communication is instrumental to processing emotions in others' faces.

Author/s: Andrea Ciricugno, Sonia Paternò, Zaira Cattaneo, Chiara Ferrari

Type: Talk in simposio

The Many Faces of Face Processing

Speaker: Dalmaso, Mario

Track: Social cognition

Abstract

In social interactions, our actions are deeply influenced by a rich array of signals from others' faces. Among these, gaze direction plays a primary role in attention processes, while emotional expressions are central to affective mechanisms. Additionally, more stable elements such as identity, gender, and age can significantly modulate relational dynamics.

This symposium aims to offer a broad overview of the subtle but meaningful influences that facial stimuli exert on the neuro-cognitive level. Through a multidisciplinary perspective, we will present data from recent studies that have employed such stimuli to uncover the complex underlying processing mechanisms.

Author/s: Mario Dalmaso, Chiara Ferrari

Type: Abstract complessivo di un simposio

Uncanny valley effect e differenze individuali nella percezione di volti artificiali

Speaker: Ciardo, Francesca

Track: Social cognition

Abstract

Artificial agents are part of our daily lives and are increasingly being applied in fields of psychological support and assistance. Since the 1970s, numerous studies have investigated the phenomenon known as the Uncanny Valley (UV) effect, which refers to the phenomenon where the more an artificial agent resembles a human being in physical appearance, the more it evokes negative feelings and aversion in the observer.

Experimental evidence led to the formulation of various hypotheses to explain this phenomenon. The most widespread explanation attributes the UV effect to individual dispositions and attitudes in attributing mental states to artificial agents, such as age, gender, and animism. One of the major limitations of this hypothesis is that it does not explain how individual differences determine the various manifestations of the UV effect.

More recently, it has been proposed that the UV effect may stem from the simultaneous activation of two responses when processing an ambiguous face—one for the artificial face and one for the natural face—leading to an increased cognitive load. The negative and aversive feelings, thus, would be a consequence of the increased difficulty in selecting an appropriate response. From this perspective, the role of individual differences would be to determine different thresholds in decision-making.

This study investigates whether individual differences in attachment style and tolerance to ambiguous stimuli influence different sensitivity thresholds and response criteria when categorizing artificial faces based on their similarity to human faces.

Author/s: Francesca Ciardo

Type: Talk in simposio

Explicit and Implicit Interventions to Promote Seasonal Products Knowledge and Consumption: The Role of Decision-Making Styles

Speaker: Scaglioni, Giulia

Track: Social cognition

Abstract

Introduction: Food education is a key factor in promoting the consumption of seasonal fruits and vegetables. However, we often lack the time and cognitive resources needed for thoughtful food choices, which may limit the effectiveness of information-based interventions.

Objectives: This preregistered experimental study aimed to test the combined effect of explicit information and associative learning on seasonal product knowledge and simulated choice under time pressure or control conditions, also considering individual differences in decision-making style (preference for intuition and deliberation).

Method: Participants (229 adults recruited via Prolific) were randomly assigned to one of the eight conditions in a 2 (explicit information vs. control) x 2 (product/season associative learning vs. control) x 2 (time pressure vs. control) factorial design. The study, part of the PRIN PNRR 2022 DEMETRA ↔ ARTEMED project, was conducted in accordance with the AIP Code of Ethics.

Results: Both explicit information and associative learning improved knowledge of seasonality. In the simulated choice task, under time pressure, the selection of seasonal products increased when both interventions were present. However, these interventions were less effective for participants with a more intuitive decision-making style, and no interactions were observed with the deliberative style.

Conclusions: To enhance knowledge and consumption of seasonal fruits and vegetables, it may be beneficial to provide information and encourage the formation of automatic associations through gamification techniques. Further research is needed to replicate our results and understand how to foster this behavior among individuals with a more intuitive decision-making style.

Author/s: Giulia Scaglioni, Nicoletta Cavazza, Margherita Guidetti

Type: Talk in simposio

Exploring the Link Between Individual Differences in Personality Traits and Vicarious Approach/Avoidance Effect

Speaker: Fedeli, Francesco

Track: Social cognition

Abstract

We investigated the link between individual differences in personality traits (measured with the HEXACO-100 and the HAS) and the Vicarious Approach/Avoidance (VAA) effect.

Three hundred twenty-three participants (age: $M = 31.60$, $SD = 10.00$) answered the HEXACO-100 and the HAS personality inventories. They then read two vignettes describing a model approaching or avoiding a target (i.e., a package of cookies). In the first vignette, the model approached cookies from a brand; in the second, a different brand was avoided. We assessed participants' attitudes and model-attributed attitudes toward the two targets, reliability and liking of the model, and attributed agency (i.e., whether the model was responsible for the choice to approach/avoid the target).

The VAA procedure proved effective. We found a significant VAA effect, $d = 0.60$, with participants expressing more positive attitudes toward products associated with the approach than those associated with the avoidance behaviors. Moreover, significant correlations emerged between the H, E, A, C personality, and Honesty HAS and participants' attitudes toward the approached target. As for the facets, sentimentality, altruism, and diligence showed the highest correlations with the VAA effect.

These findings carry both theoretical and practical implications. Initially, we replicate the findings of Zogmaister and colleagues (2023a, b), demonstrating the robustness of the VAA effect. Additionally, the insights from this study can inform the development of more effective tailored (VAA-based) interventions that account for individual differences.

Author/s: Francesco Fedeli, Cristina Zogmaister, Marco Perugini

Type: Talk in simposio

Individual Differences and the Legitimization of Illegal Authority: The Role of Identity and Cultural Values in Criminal Governance

Speaker: Giammusso, Isabella

Track: Social cognition

Abstract

In this study, we examined how the relationship between masculine honor ideology and the justification of connivance practices with organized crime is influenced by the salience of social identity. Understanding these mechanisms is essential to understand how criminal organizations establish governance in contemporary society.

We manipulated social identity salience (national, local, or individual) in a sample of 390 Sicilians and measured their levels of masculine honor and justification of connivance with organized crime. Results showed that the relationship between endorsing masculine honor values and justifying connivance norms was weaker when national identity was salient, while it was stronger when local identity was salient. These findings offer important insights into the processes of legitimizing illegal authorities, highlighting how certain criminal groups leverage values considered significant in a particular social context to gain consent, and how this consent depends on the interaction between social identity and adherence to these values.

Author/s: Isabella Giammusso, Giovanni A. Travaglino, Alberto Mirisola

Type: Talk in simposio

Individual Differences in Experimental Research

Speaker: Zogmaister, Cristina

Track: Social cognition

Abstract

This symposium aims to explore the challenges and opportunities in investigating the role played by individual differences in experimental contexts. From the perspective of experimental psychology, incorporating individual difference variables into research and studying their effects alongside manipulations can be beneficial in several ways: it can enhance our understanding of the impact of these manipulations, guide the formulation of new explanatory hypotheses about the reasons and mechanisms behind their (in)effectiveness, and enable the tailoring of interventions as well as the creation of interventions robust to such differences.

Author/s: Cristina Zogmaister, Francesco Fedeli

Type: Abstract complessivo di un simposio

Similarities Between Categories Are Much Larger Than Their Differences: A Cautionary Note for Interpreting Individual Differences

Speaker: Zogmaister, Cristina

Track: Social cognition

Abstract

Given the enormous amount of discourse in popular media and in research around gender differences, a person could be excused for believing the cliché that men are from Mars and women are from Venus. Many other categorical individual differences, such as ethnicity, nationality, and religion, are met with similar beliefs about the enormity of differences. In this presentation, I will show the dangers of an approach to research that focuses on individual differences to the expense of noting similarities.

To illustrate the importance of acknowledging similarities in addition to differences, the presentation will focus on data regarding between-category similarities and differences in human values. Around the world, people talk about the importance of their values – ideals such as equality, freedom, helpfulness, or the environment. People use these abstract ideals to justify their attitudes and actions, and to praise or condemn others. It is frequently assumed that values differ substantially between people, with differences between numerous social categories, such as culture, gender, nationality, political views, religiosity, and social class. This presentation highlights evidence that the reality is very different. International data show strong similarities in values between diverse groups.

The research not only demonstrates high similarity, but also shows that introducing people to this similarity increases outgroup positivity and optimism about solving societal challenges, while having the potential to increase intellectual humility in debate.

Author/s: Gregory R. Maio, Cristina Zogmaister

Type: Talk in simposio

The Importance of Individual Differences in Experimental Research on Attitudes

Speaker: Zogmaister, Cristina

Track: Social cognition

Abstract

Understanding how and why individuals differ in their responses to experimental manipulations is crucial for advancing scientific knowledge. Based on empirical evidence regarding the role of personality traits, cognitive styles, and cultural values in shaping individual responses to situations and manipulations (e.g., personality and attention, Mathews et al., 2003, <https://doi.org/10.1080/13506280344000095>; values and conformity, Lönnqvist et al., 2010, <https://doi.org/10.1348/014466608X377396>), this contribution explores the moderating role that individual differences may have on the impact of experimental manipulations. It provides empirical evidence from the literature and discusses its implications for experimental research.

The focus will primarily be on studies related to attitude and preference learning, but the general implications will be applicable across other areas of experimental research. Finally, a reflection will be offered on the benefits that may arise from integrating the examination of individual differences in experimental research, both in terms of a better understanding of the effectiveness of experimental manipulations and in advancing knowledge about individual differences.

Author/s: Cristina Zogmaister

Type: Talk in simposio

Emotions modulation on interbrain dynamics

Speaker: Antonelli, Federica

Track: Social cognition

Abstract

Social interactions imply dynamic and synergic feedback loops in which actions, reactions, and internal states of each partner is modulated by the others. In this framework, interacting brains appear to operate as an integrated system, showing shared neural dynamics coevolving over time. In-phase brain oscillation alignment have been found in interacting people, but also in monkeys, bats, and mice.

However, how emotional alterations can influence interbrain synchrony (IBS) is still unclear. Here, combining microendoscopic calcium imaging within the Anterior Cingulate Cortex (ACC or Area 24) with a behavioral task for emotion recognition in mice, we find differences in IBS between pyramidal and somatostatin-expressing (SOM) neurons. SOM neurons show stronger correlation between a neutral observer and a stressed demonstrator. Moreover, disrupting SOM synchronization in ACC by optogenetics disrupts emotion recognition. Conversely, ACC pyramidal neurons show stronger interbrain correlation only in basal states (neutral-neutral interactions) and an anticorrelation with the socially-preferred stressed mouse.

In agreement, artificial pyramidal neurons synchronization by optogenetics can induce a preference toward the non-synchronized mouse. Overall, these data reveal opposite involvement of ACC SOM and pyramidal neurons in interbrain synchronization in supporting emotion recognition.

Author/s: Federica Antonelli, Francesco Papaleo

Type: Talk in simposio

Encoding of voice identity by neurons in the macaque anterior Temporal Voice Area

Speaker: Giamundo, Margherita

Track: Social cognition

Abstract

Social interactions in primates are possible through the ability to extract relevant information from voices, for example their identity. The anterior Temporal Voice Area (aTVA) is a region in the anterior temporal lobe of humans, macaques and marmosets specialized in the processing of voices, but the exact voice information represented by individual neurons in the aTVA remains obscure.

Here we asked how aTVA neurons encode voice identity information. We implanted two rhesus macaques with high-density multi-electrode arrays in their fMRI-localized aTVA. Spiking activity was recorded during an auditory stimulation task in which we presented 50 natural stimuli including 5 different coo calls from each of 5 macaques, and 5 different calls from each of 5 humans.

Preliminary results show that aTVA neurons are modulated by voice identity. Particularly, Representational Dissimilarity Matrices, capturing pairwise spiking activity differences between the stimuli, showed significant association with an ideal categorical model separating between identities and grouping different calls from each identity.

A principal components analysis (PCA) applied to the mean population activity over time revealed that population responses to the same identity followed similar trajectories in the multidimensional state space, with the third PC showing marked differentiation of the different identities in the sustained response and allowing higher accuracy in the discrimination between identities than the other PCs.

These results contribute to elucidating the mechanisms by which abstract representations of identities, allowing speaker recognition, emerge in the primate brain.

Author/s: Margherita Giamundo, Etienne Thoret, Luc Renaud, Pascal Belin, Regis Trapeau, Thomas Brochier, Yoan Esposito

Type: Talk in simposio

Interacting with the world: from neurons to social behavior

Speaker: Ferrucci, Lorenzo

Track: Social cognition

Abstract

Every day we interact with the world around us, and our ability to have successful social interaction depends on our ability to integrate different information coming from different social contexts. To this end, studies on animal models can provide valuable insights, offering a controlled environment to investigate neural mechanisms, explore behavioral dynamics, and understand the evolutionary underpinnings of social behavior.

The aim of this symposium is to present recent findings that provide novel insights into how single neurons encode socially relevant variables. Giamundo will talk about the neural processing of vocalizations in primates, showing that neurons in the anterior temporal lobe are modulated not only by the voices of conspecifics but also by human voices, providing new understandings for the study of interspecies communication. Ceccarelli will discuss how the representation of actions performed by others changes dynamically over time, with neurons in the macaque premotor cortex developing an anticipatory response during observation learning. Nougaret's talk will show how the macaque frontal pole is involved in monitoring actions performed by others to change or maintain a choice based on the observed outcome. Finally, Antonelli will discuss how interbrain synchrony is affected during an emotion recognition task in interacting mice presenting calcium imaging data from the anterior cingulate cortex.

The purpose of this symposium is to advance our understanding of the basic mechanisms of brain functions involved in social interaction, which is crucial to studying conditions like autism, and to develop targeted interventions that enhance the quality of life for affected individuals.

Author/s: Lorenzo Ferrucci

Type: Abstract complessivo di un simposio

Macaque frontopolar cortex activity during social learning

Speaker: Nougaret, Simon

Track: Social cognition

Abstract

The evolution of frontopolar cortex (FPC) has been linked to advanced social skills typical to primates. Until recently, lesion and electrophysiological studies in macaques have revealed its role in exploratory behaviors and self-generated actions.

Two of our previous electrophysiological works confirmed and broadened this role. FPC neurons encoded the different stages of a learning process and the choices of others. This other-specific neural substrate was very specific and did not emerge during the interaction with a non-social agent, i.e. a computer performing the action. To go further in the understanding of the FPC functions in social behaviors, we recorded the activity of FPC neurons while macaque monkeys performed two observational versions of a fast-learning task.

During this task, monkeys must resolve problems (choosing the correct target out of two presented) after observing a social or a non-social agent trying to resolve randomly the same problem. Behaviorally, monkeys learned in both cases after only one trial, allowing to study the neural bases of these two types of observational learning. Our preliminary electrophysiological results show that during non-social observational learning, the learning stage representation was similar than during individual learning. Only the first presentation of problems was represented differently than the others, possibly reflecting a mental rehearsal of the action. Differently, during social observational learning, the second presentation of problems was different from the later ones.

This highlights the differences between the time one extracts information from other's action with the moment one uses information previously extracted.

Author/s: Simon Nougaret

Type: Talk in simposio

Neural correlates of observational learning in the macaque dorsal premotor cortex during a human-monkey interactive associative task

Speaker: Ceccarelli, Francesco

Track: Social cognition

Abstract

Primates have a complex social life that requires monitoring and understanding the actions and choices of the other group members and learning from others' behavior.

While previous behavioral studies have shown monkeys' remarkable observational learning abilities, how the information learned by observation is encoded at the neural level has not been studied yet. In this study, we recorded single-unit activity in the dorsal premotor cortex (PMd) while two macaque monkeys performed a human-monkey observational learning task, where the monkeys had to learn to identify the rewarded stimuli located in 4 unique complex scenes generated for each recording session. At the beginning of each session, the monkey was required to observe the human experimenter, showing them the correct stimulus-scene association (Learning period) for 60 consecutive trials.

Then, the monkey was tested for the correct learning of associations (Test period) for 15 trials. Finally, the session ended with the experimenter and monkey taking turns performing the task (Interaction period). Both monkeys completed the Test period almost without errors, providing compelling evidence that they had learned the correct associations. We found that the neuronal population in PMd gradually predicted the future human action toward the correct stimulus as the learning period progressed, reaching its highest level during the interaction period. Then, by applying a decoding approach, we found that such representation mutated throughout the learning period, shifting from a dynamic to a static representation.

These findings indicate the involvement of the PMd not only in individual but also in associative learning through observation.

Author/s: Francesco Ceccarelli

Type: Talk in simposio

Cradling Behavior and Social Cognition: Implications for Face Processing

Speaker: Spina, Anna Concetta

Track: Social cognition

Abstract

The Left Cradling Bias (LCB) or preference entails preference in positioning an infant on the left side of the body. LCB seems to facilitate the monitoring of the expressive left side of both the infant's and mother's faces, thereby activating the right hemisphere specialized for socio-affective processing and face perception and suggesting cradling as an index of hemispheric lateralization.

LCB is associated with typical socio-emotional functional lateralization, contrasting with individuals who cradle either on the right or bilaterally, such as those diagnosed with autism spectrum disorders (ASD). Individuals with prosopagnosia, a condition characterized by difficulties in recognizing faces, and those with ASD share commonalities in facial processing deficits and altered neural activation patterns. Congruently, both groups lack the typical right lateralization for face processing.

The observed association between LCB and ASD prompts the possibility of a link between cradling lateral preference and face processing impairment. This potential link may stem from variations in lateralization patterns, influencing cradling behavior and how the brain processes facial information. Moreover, the question arises whether individuals with prosopagnosia display attenuated processing of socio-emotional stimuli due to face recognition and discrimination deficits, therefore affecting cradling preference.

In this investigation, participants underwent thorough several assessments focusing on social cognition, social networks, personality traits, and face recognition and discrimination. Preliminary findings regarding the association between cradling behavior, face processing, and social cognition are discussed.

Author/s: Anna Concetta Spina, Valerio Manippa, Ester Cornacchia, Giorgia Francesca Scaramuzzi, Martina Ventura, Gianluca Malatesta, Davide Rivolta

Type: Mini-talks

Creativity in the Space-Time Continuum: The Importance of Context

Speaker: Faiella, Angela

Track: Social cognition

Abstract

Although the context-embedded nature of creativity has been confirmed by newest theories, laboratory studies cannot easily address it due to a lack of tools for measuring it. Based on the Space-Time continuum theoretical framework (Corazza and Lubart 2021), we modeled the context on two dimensions: the conceptual space in which an action or idea is conceived and the time interval available for idea generation.

This exploratory study, aimed to create and examine the effectiveness of a new research paradigm for manipulating the conceptual space. 129 participants (Mage = 29.04±10.38 years) were tested with two main tasks. First, participants were asked to produce concepts associated with a given cues (Free Association Task, FAT: “Write all the concepts you can think of about a [cue]”), contextualized in general, science, and art domains. By manipulating the specificity of the cue, we created four between-subject conditions with the conceptual space hypothetically ranging from very loose (e.g., “science”) to very tight (e.g., “scientific experiment in molecular biology”). Next, all participants performed the Alternative Uses Task (AUT), a classic divergent thinking task for measuring creative performance. ANOVA results (3 domains × 4 conditions) on FAT showed the effect of the condition on the number of concepts given, and post-hoc comparisons indicated that participants under the very tight condition generated less concepts than others. On the contrary, these participants generated more ideas during the AUT.

These results showed the effectiveness of the new paradigm in manipulating participants’ conceptual space, which likely also influenced their subsequent AUT performance.

Author/s: Angela Faiella, Giovanni Emanuele Corazza, Honghong Bai, Sergio Agnoli

Type: Mini-talks

From Pixels to Power: Exploring virtual Embodiment and Priming effects in affecting leadership persuasive skills

Speaker: Frisanco, Althea

Track: Social cognition

Abstract

In the realm of personal and professional growth, role models exert substantial influence, shaping behaviors and aspirations. Immersive virtual reality gets us closer to role models in an otherwise impossible way, allowing us to "wear" virtual bodies resembling successful characters whose valuable traits we aim to emulate.

In previous research, we investigated the attitudinal changes following the embodiment of an avatar resembling a successful leader, i.e., Angela Merkel. In this ongoing study, we explore behavioral and physiological changes in an immersive and arousing virtual scenario, where female participants are asked to give a public persuasive speech.

Adopting a within design experiment, participants experience three embodiment conditions: i) the Merkel avatar (Leader Embodiment condition LEc), ii) the Self-avatar (Self-Embodiment condition SEc) and iii) the Self-avatar while exposed to a picture of Merkel (Priming condition P-SEc). For each condition, we measure physiological responses (pitch, heart rate variability), self-attitude (self-related leadership traits, self-efficacy), posture and stage management, public speaking skills and speech length. We designed the experiment to replicate and expand Latu et al. (2013) findings, suggesting participants in P-SEc being more performative compared to a no-priming-condition. Here, we expect better performance in LEc compared to SEc, supporting the Proteus effect literature according to which avatar's body features shape behavior.

Finally, differences between LEc and P-SEc will help to tease apart embodiment from priming, shedding further light on the mechanisms underlying the Proteus effect.

Author/s: Althea Frisanco, Chiara Cantoni, Luca Provenzano, Salvatore Maria Aglioti

Type: Mini-talks

Ideological attitudes, personality traits and concern of COVID-19 threat: a correlational study

Speaker: Occhiuto, Giuseppe

Track: Social cognition

Abstract

The COVID-19 pandemic has raised questions regarding the ideological and personological antecedents of behavioral responses to the prevention of the pandemic threat. Observing that right-wing authoritarianism (RWA) positively predicted responses to the pandemic, while social dominance orientation (SDO) negatively predicted such responses, we hypothesized that: SDO mediates the relationship between low humility and underestimation of the pandemic threat; RWA involves in the positive relationship between the latter and fearfulness.

To test these hypotheses, we recruited 3294 participants online, aged between 18 and 70, equally distributed by gender and from: Australia, Colombia, India, Italy, Nigeria, the United Kingdom, the United States and Sweden. We administered the SDO scale, the RWA scale, an ad hoc scale for COVID-19 concern, and the "Modesty" and "Fearfulness" facets of the HEXACO personality traits "Humility/Morality" and "Neuroticism," respectively. To assess the unidimensionality of the measures, we initially conducted confirmatory factor analyses (CFA) for each scale, which yielded good fit indices. Subsequently, we tested our hypotheses using Structural Equation Models (SEM).

The results corroborate the hypotheses regarding SDO: individuals with low modesty exhibit a more hierarchical view of society, demonstrating less concern about the pandemic. RWA, however, does not appear to consistently predict such concern, nor does it mediate its relationship with fearfulness. These findings contribute to our understanding of which personality traits predispose individuals to react to the pandemic threat, elucidating the mediating role of ideological attitudes.

Furthermore, they indicate that the relationship between conservatism and response to the pandemic varies across countries.

Author/s: Giuseppe Occhiuto, Eva Tolomeo, Marco Tullio Liuzza

Type: Mini-talks

Italian Validation of the Scientific Reasoning Scale (SRS): Classical test theory and Item Response Theory

Speaker: Caliciuri, Rossella

Track: Social cognition

Abstract

Scientific reasoning (SR) is a crucial aspect in daily life, influencing individuals' ability to pose scientific questions, collect data, critically evaluate information, and draw informed conclusions. There are few tools for measuring SR, tailored to specific age groups or countries, which limits the comparability of results due to the unique characteristics of these tools. The Scientific Reasoning Scale (SRS), validated in the US and Turkey, measures an individual's ability to evaluate scientific evidence. To facilitate generalization across diverse populations, it is important to validate this scale in different cultural contexts.

This study aims to validate the SRS in the Italian context on a sample of 600 Italian adults aged 18 and over. A questionnaire was administered via Qualtrics. This validation process, following the approach of the unified view of validity, aims to establish the scale's validity across various sources of evidence: factorial structure, generalizability, convergent validity, criterion validity, known-group evidence, reliability. To achieve this, two measurement models will be applied as complementary approaches: Classical Test Theory and Item Response Theory. This choice is motivated by the idea that these models can be applied jointly to obtain different and triangular information, as suggested by Bean and Bowen (2021), and to provide more differentiated validity evidence, as suggested by the contemporary view of validity. The results will allow verification of the adequacy of the adaptation of this instrument and potentially fill the existing gap in the assessment of SR skills in the Italian context.

Author/s: Rossella Caliciuri, Margherita Lanz

Type: Mini-talks

Medication adherence among psychiatric patients treated with antidepressants: an exploratory study

Speaker: Platania, Giuseppe Alessio

Track: Social cognition

Abstract

Non-compliance encompasses various behaviours and attitudes, ranging from outright rejection of drug therapy to incorrect usage or premature discontinuation, potentially impacting symptom severity. In psychiatric settings, patients' reluctance to adhere to medication may stem from a lack of insight, fostering unfavourable views on pharmacotherapy. This study explores the connections between adherence to antidepressant drugs, insight, and attitudes toward medication. The participant pool included both inpatients and outpatients, including individuals with defined psychiatric diagnoses and excluding those with intellectual disabilities, major neurocognitive disorders, or psychotic acute relapses.

The sample was made of 41 patients diagnosed with mood disorders, both unipolar (90.2%) and bipolar depression (9.8%). It included 22 female and 19 males. The mean age was 51.5 (SD=15.6), ranging from 22 to 83 years old. Adherence was assessed using the Brief Adherence Rating Scale's (BARS) Visual Analog Scale (VAS) item, attitude towards drugs with the Drug Attitude Inventory (DAI), and insight with the Insight Orientation Scale (IOS). Analysis revealed a significant direct correlation between adherence and drug attitude ($\rho=0.844$; $p<.001$). Adherence showed a significant direct correlation with both DAI subscales which assess subjective responses to antipsychotics ($\rho=0.633$; $p<.001$) and subjective attitude towards treatment ($\rho=0.756$; $p<.001$). While the IOS scale lacked a significant correlation with BARS total score and DAI global score, it did exhibit a significant correlation with DAI factor II ($\rho=0.348$; $p=0.026$).

These findings emphasize the central role of patients' drug attitudes in influencing medication adherence.

Author/s: Giuseppe Alessio Platania, Sofia Francesca Aprile, Claudia Savia Guerrera, Simone Varrasi, Francesco Maria Boccaccio, Vittoria Torre, Maria Salvina Signorelli, Antonino Petralia, Alessandro Rodolico, Filippo Caraci, Concetta Pirrone, Sabrina Castellano

Type: Mini-talks

Moral and social nudges for promoting cooperation in wicked social dilemmas: a theoretical and experimental investigation on waste sorting behavior.

Speaker: Munini, Sebastiano

Track: Social cognition

Abstract

Social dilemmas are described as “wicked” when they involve additional obstacles to cooperation, such as unclear individual impact, doubts about the link between cooperation and outcomes, and difficulties tracking contributions. We study the effectiveness of norm-nudging interventions in promoting cooperation in such a scenario: waste sorting. Given the difficulties in implementing economic and reputational incentives in this context, we consider moral and social nudges as cost-effective solutions.

While moral nudges appeal to doing the right thing encouraging individuals to prioritize moral values, social nudges motivate to act as the virtuous majority of people. We use a 3x2 between-factor design. Participants are exposed to a moral, social, or no nudge, depending on the experimental condition they are randomly assigned to, and on the same basis, they experience a high or low level of cooperation from other players. The task consists of an 8-round computerized waste sorting game in which, in each round, participants must choose how and if to allocate garbage items in separate bins. Choosing to sort is costly and requires dragging objects in the corresponding bins, while non-differentiating is immediate and only requires pressing a button. Number of waste objects sorted is the main dependent variable.

We aim to verify the efficacy of each strategy to promote recycling behaviour, and to understand if strategy efficacy is moderated by experienced level of cooperation.

Results will help design targeted interventions to encourage sustainable behaviors.

Author/s: Fabio Paglieri, Marco Marini, Sebastiano Munini

Type: Mini-talks

Risk Perception in Medicine: When Training and Daily Practice Make the Difference

Speaker: Jacomuzzi, Alessandra Cecilia

Track: Social cognition

Abstract

BRCA (BReast CAncer gene) genetic mutations are directly associated with an increased risk of developing breast and ovarian cancers. Currently, in Italy the screening test to detect a possible mutation is offered within the National Health Service only to patients with specific risk factors.

This study aims at investigating physicians' perception of a patient's risk of carrying the mutation and their decision to prescribe the test. An online questionnaire was administered to 100 participants (55% male; mean age = 52 years) with various medical specializations. The questionnaire included: (i) three scenarios in which the patient's history indicated different levels of BRCA mutation risk; physicians were asked to assess the probability of BRCA mutation and whether they would recommend testing; (ii) self-report scales on personality traits.

The results show a difference in risk perception between general practitioners and other specialists regarding the likelihood of a patient carrying the BRCA mutation. Similar differences were found in the likelihood of recommending the test.

The findings highlight the need to address patient risk assessment more thoroughly in medical education. They also suggest that the daily work environment may play a significant role in physicians' long-term training.

Author/s: Alessandra Cecilia Jacomuzzi, Paola Iannello, Brigitta Pia Alioto

Type: Mini-talks

Children's Trust Learns to Adapt: Social Inconsistencies Shape First Impressions

Speaker: Silvestri, Valentina

Track: Social cognition

Abstract

Faces influence our initial trust decisions but sometimes can be deceiving. Young children can form trust impressions from faces and use them to guide their decisions in economic trust games (Ewing et al., 2015). Older children can also consider the fairness of partners' return behavior when making trust decisions (Siddique et al., 2022). Here, we explored how 5-7-year-olds adjust their trust behavior based on social experience.

Children (N=80) played a web-based child-friendly online trust game, collecting as many gems as possible along a journey where they met trustworthy- or untrustworthy-looking fairies. The fairies could act fairly or unfairly (congruently or incongruently with their facial appearance), multiplying or keeping the gems the child would offer them. Children's spontaneous sharing behavior with novel fairies' faces was monitored before and after their exposure to the fairies' return behavior to assess generalization to new social partners.

Data collection is still in progress. Preliminary results confirmed that children's sharing behavior was biased by facial trustworthiness, but this changed based on the fairies' actions. Children shared more with fair fairies and less with unfair ones (Time x Face trust x Congruency, $p < .001$). Notably, this effect showed a tendency to generalize to new faces, which, if confirmed in the final sample, would suggest children learned to adjust trust based on experience (Face trust x Congruency, $p = .11$).

These findings highlight the flexibility of children's trust formation. They can adapt their initial impressions based on social interactions, potentially beneficial in situations where appearances might be misleading.

Author/s: Valentina Silvestri, Ilenia Mastroianni, Shawn Geniole, Valentina Proietti, Viola Marina Macchi Cassia

Type: Poster

Differences in Synchronization and Collaboration between Face-to-Face and Remote Work: A Research Protocol

Speaker: Magni, Giulia

Track: Social cognition

Abstract

In the contemporary working environment, companies are driven to adapt rapidly to new modalities and increasingly advanced technological tools. However, these innovations have repercussions on levels of attention, engagement and attunement in interpersonal interactions.

The present study aims to investigate the collaborative process and interpersonal synchronization in a population of workers by comparing two working conditions: face-to-face (FTF) and remote (RW). According to a within-subjects research design, 24 adults divided into 12 pairs will participate in both experimental conditions to investigate how work modality influences neural and physiological synchronization as well as level of cooperation. Two sessions, each lasting about two hours, are planned, having the same experimental structure characterized by two collaborative cognitive tasks. In the FTF condition, the dyad will be in the same room, while in the RW condition the participants will be in two different rooms and their interaction will be through a videoconference. The experimentation will involve the use of electroencephalogram (EEG) to measure neural activity and electrocardiogram (ECG) for cardiac activity. The technique of hyperscanning will be used, allowing the neural and cardiac activity of two or more people to be detected simultaneously. Finally, behavioral measures and cognitive questionnaires are added to the physiological measures.

This study, as part of the BRIC-INAIL project “Emerging Psychosocial Risks in the Changing World of Work,” aims to make a significant contribution to the understanding of the cognitive and psychophysiological processes peculiar to the current and changing work environment by examining how different work modes impact key mechanisms such as collaboration and interpersonal synchronization.

Author/s: Giulia Magni, Luana Amadini Genovese

Type: Poster

Gender bias during a face decision task: when a face can be a MAESTRA but not a PRESIDENT

Speaker: Casalino, Laura

Track: Social cognition

Abstract

Gender bias is pervasive in many aspects of our lives: women experience more difficulties than men in the job market. Here, we tested a linguistic strategy to mitigate gender bias in professional contexts in Italian.

Four versions of 20 faces were created, varying along a continuum from masculinity (1) to femininity (7) using FaceGenArtistPro3 (Values:1,3,5,7). Participants saw two versions of the same identity-face along with a word and were required to decide which face matched the word better. The experimental pairs contained the two extreme values (1 and 7) or middle values (3 and 5). In Experiment 1, professions typically associated with males (*presidente*, *ingegnere*) or females (*badante*, *estetista*) were shown. Participants more often chose the faces with feminine value (5 and 7) with professions associated with females than with those associated with males. Interestingly, faster RTs were observed when the decision confirmed the gender bias (choosing 5 and 7 for *badante* and *estetista* compared to *presidente* and *ingegnere*). This pattern suggests a gender bias in decision-making and RTs. Experiment 2 was identical except that the professions were gender-marked nouns (male bias: *sindaco*, *sindaca*; female bias: *maestro*, *maestra*). No gender bias was reported in Experiment 2, participants selected faces with feminine value (5 and 7) with *sindaca* and *maestra*, and faces with male values (1 and 3) with *sindaco* and *maestro*.

This study offers a new test to identify gender bias in decision-making and RTs. In addition, we demonstrated that by using gender-marked nouns the gender bias can be eliminated.

Author/s: Laura Casalino, Giacomo Pigani, Eduardo Navarrete

Type: Poster

Ideal and real mental representation in individual or group-oriented people: a neuroscientific prospective

Speaker: Acconito, Carlotta

Track: Social cognition

Abstract

During the decision-making process, people create mental representations of the situation, that could be directed at the “real” or “ideal” world. Moreover, when people decide, they could adopt an individual or group orientation. In the first type of orientation, people consider the task and personal needs as more relevant than relationships, while group orientation is characterized by a high value placed on relationships and consideration of others’ perspectives.

This study explored the neural localization of group or individual orientation, while people mentally represented their ideal and real work group. Sixteen healthy participants performed a novel decision-making task, identifying themselves with a critical scenario and rating items about how the real and ideal group could solve the problem. A non-invasive electroencephalogram was adopted to collect brain activity (i.e., alpha and gamma band) in four regions of interest [Frontal 1 (F1: AFF5h, Fp1), Frontal 2 (F2: Aff6h, Fp2), Temporo-parietal 1 (TP1: T7; P3), Temporo-parietal 2 (TP2: T8; P4)].

The manipulation of mental representations (ideal versus real) was responsible for different cortical networks concerning group and individual orientations, particularly for the alpha and gamma bands. A more cognitive effort in creating mental representation and information processing, as well as memory processing, defined the individual orientation in ideal representation.

Furthermore, increased temporoparietal region activation - especially in the real representation – was reported in the group orientation.

Author/s: Carlotta Acconito, Laura Angioletti, Roberta A. Allegretta, Michela Balconi

Type: Poster

Personal Constructs and Their Relationship with Theory of Mind in Aging

Speaker: Fracassi, Lara

Track: Social cognition

Abstract

Relationships play a fundamental role in the psychophysical well-being of individuals, especially in older adults. During social interactions, various skills come into play, including Theory of Mind (ToM), which enables individuals to interpret their own and others' mental states (thoughts, emotions, desires). This ability is particularly useful for predicting others' behaviors and appears to be linked, at least in part, to executive functioning. However, in anticipating actions, we also rely on past experiences and mental schemas. To date, no study has analyzed the association between these and ToM.

The present study aims to examine the relationship between mental schemas, using the personal constructs approach, and ToM in both young and older adults. A lower complexity of constructs might help explain the difficulties older adults face in mentalization processes.

The study involved 30 young adults (aged 20–30 years) and 30 older adults (aged 65 years and older), who were administered two ToM tasks and an adaptation of Kelly's personal construct grid.

The results show significant differences in personal constructs: older adults exhibited lower construct complexity and a decline in ToM with advancing age. Preliminary analyses also reveal interesting associations between personal constructs and mentalization abilities. Further analyses will allow us to verify whether changes in mental schemas are responsible for the reduced mentalization abilities observed in the older adult sample.

Author/s: Lara Fracassi, Elena Cavallini

Type: Poster

The use of short information messages to improve attitudes towards electric vehicles

Speaker: Prpic, Valter

Track: Social cognition

Abstract

The transition from traditional combustion vehicles to electric vehicles (EVs) is essential to achieve decarbonization goals and tackle global warming. There are various obstacles that hinder this transition, many of which are psychological in nature. Particularly well-known is the problem of range anxiety, i.e. the fear of running out of charge while traveling.

This, along with other factors that make people skeptical about adopting an electric vehicle, are based on misinformation or outdated knowledge. In fact, individuals are often unaware of the most current advances that technology has made in improving, for example, travel times, charging speed and battery recovery. In this study, in collaboration with the Maserati company, we identified 12 false beliefs that many people have about EVs and developed a series of short informative messages to counter each of them. Participants were university students and completed a questionnaire, designed to measure attitudes towards EVs, before and after viewing the series of informational messages.

The results showed a significant improvement in most of the dimensions considered in the study (e.g., environmental, social impact), however there was no significant direct impact on the propensity to buy for oneself, while the intention to suggest the purchase to a family member or friend improved.

Author/s: Valter Prpic, Luisa Lugli

Type: Poster

Adjusting our behavior in social settings: the role of motor inhibition

Speaker: Manini, Aurora

Track: Social cognition

Abstract

Response inhibition is a multifaceted process involving either the ability to withhold a speeded motor response prior to its initiation, or the ability to cancel a response after it has been initiated (Wright et al., 2014). Individual differences in the ability to withhold inappropriate responses have been extensively investigated with different variants of the Go/No-Go task (e.g., Chowdhury et al., 2017; Wessel et al., 2017; Young et al., 2017), varying with respect to the colour and shape of stimuli, the relative proportion of Go/No-Go trials, and inter-trial intervals.

To date, these manipulations were mainly used to investigate motor inhibition performance at the individual level, but what happens to cognitive processes traditionally regarded as individual, like attention or inhibitory control, when a social component is considered? In this pre-registered study, we aim to validate a social version of the classical Go/No-Go task both in the laboratory and online. In these two settings, we are going to compare participants' performance (accuracy and reaction times) in both individual and social conditions to test 1) whether the mere presence or the interaction with another person affects our control over prepotent motor responses, and 2) whether the degree of shared attention and goals, e.g. when coordinating the efforts jointly or competing, is reflected in the individual performance.

Overall, we expect to report enhanced inhibitory capacity when comparing social vs. individual conditions, and stronger modulations when a joint vs. competitive goal is pursued (e.g., faster responses but more errors in the latter).

Author/s: Aurora Manini, Noemi Giacobbe, Nicola Canessa, Claudia Gianelli

Type: Poster

Shareability: a novel perspective on human-media interaction

Speaker: Bruno, Nicola

Track: Social cognition

Abstract

Interpersonal communication in the twenty-first century is increasingly taking place within digital media. This poses the problem of understanding the factors that may facilitate or hinder communication processes in virtual contexts.

Digital media require a human-machine interface, and the analysis of human-machine interfaces traditionally focuses on the dimension of usability. However, interface usability pertains to the interaction of users with digital devices, not to the interaction of users with other users. Here I argue that there is another dimension of human-media interaction that has remained largely unexplored, but plays a key role in interpersonal communication within digital media: shareability. I define shareability as the resultant of a set of interface features that: (i) make sharing of materials with fellow users easy, efficient, and timely (sharing-related usability); (ii) include features that intuitively invite users to share materials (sharing-related affordances); and (iii) provide a sensorimotor environment that includes perceptual information about both presented materials and the behavior of other users that are experiencing these materials through the medium at hand (support to shared experience).

Capitalizing on concepts from semiotics, proxemics, and perceptual and cognitive neuroscience, I explore potential criteria to assess shareability in human-machine interfaces.

Finally, I show how these notions may be applied in the analysis of three prototypical cases: online gaming, visual communication on social media, and online distance teaching.

Author/s: Nicola Bruno

Type: Poster

The Additive Bias Implicit Association Task: a tool to detect and quantify the additive bias

Speaker: Neroni, Maria Adriana

Track: Social cognition

Abstract

The term "additive bias" refers to the typically human tendency to favor choices or actions that involve adding new elements, rather than eliminating pre-existing elements. Previous research and historical anecdotes across multiple fields have demonstrated that this tendency toward addition can significantly impair decision-making and problem-solving abilities, often leading to suboptimal solutions.

Taking inspiration from psychology research on implicit association mechanisms, I developed a tool, the Additive Bias Implicit Association Task (ad-IAT), to detect and quantify the additive bias in an implicit way. The present research describes three studies in which, using the ad-IAT, I demonstrated that individuals automatically associate positive concepts to additive actions and negative concepts to subtractive actions. Importantly, my research also shows that the aforementioned tendency toward addition is negatively correlated with the choice and implementation of subtractive actions during a problem-solving task.

Collectively, these findings underscore the efficacy of the ad-IAT in uncovering and measuring additive bias, providing deeper insights into its impact on human behavior.

Author/s: Maria Adriana Neroni

Type: Poster

“There's a bug in my plate!” Vicarious Approach-Avoidance and Attitudes Toward Insect-Based Foods

Speaker: Fedeli, Francesco

Track: Social cognition

Abstract

Insect-based foods represent an intriguing solution to address issues associated with traditional meat diets. However, in Western cultures, there is a predominantly negative attitude towards such foods.

We conducted an experimental study implementing a Vicarious Approach-Avoidance procedure, a subtype of social learning. The aim was to investigate whether and how attitudes towards insect-based foods are influenced by reading short vignettes describing individuals engaging in approach or avoidance behaviors.

We employed a procedure similar to Zogmaister et al. (2023). Each participant read two vignettes: in the first one, the individual uses a voucher received from a promoter to obtain a package of cookies from a brand; in the second one, the voucher for a different brand is thrown away.

Furthermore, half of the participants were told that the cookies were made with insect flour, while the others were not given this information.

The sample consisted of 127 participants. We administered implicit and explicit measures to investigate attitudes, intentions of purchase and consumption, and automatic reactions toward the products while considering individual disgust levels.

The manipulation effectively affected explicit attitudes, $F(1, 111) = 9.82$, $p = .002$, $\eta^2p = .04$, and intentions of purchase and consumption, $F(1, 125) = 9.27$, $p = .003$, $\eta^2p = 0.01$, with participants expressing higher scores towards products associated with approach compared to those associated with avoidance behaviors.

The study enriches the literature on the effect of the Vicarious Approach-Avoidance procedure, particularly providing evidence that the procedure remains effective even when products that could elicit adverse reactions in participants are involved.

Author/s: Francesco Fedeli, Cristina Zogmaister, Patrizia Steca

Type: Poster

Exploring similarities and differences between gaze and arrow targets in spatial interference tasks: A Drift Diffusion Modeling approach.

Speaker: Ponce, Renato

Track: Social cognition

Abstract

In social attention research, the spatial interference paradigm reveals distinct congruency effects with gaze and arrow targets. Arrows typically induces a standard congruency effect (SCE), where responses are faster when the target's direction aligns with its location. Conversely, gaze targets yield a reversed congruency effect (RCE), with slower responses under these conditions. It is hypothesized that gaze cues, while triggering an SCE similar to arrows, introduce an additional social component that contributes to the RCE. To better understand these dynamics, we applied the Drift Diffusion Model (DDM) to analyse four published datasets: Marotta et al. (2018; 2019) using a between-block design and Hemmerich et al. (2022) using a within-block design.

We estimated three DDM parameter, drift rate, threshold boundary, and non-decision time, allowing them to vary across target types and congruency levels. We then built a linear mixed model from all the studies to compare these parameters. Our results revealed a significant interaction between target type and congruency for all parameters. Specifically, arrow targets consistently displayed differential patterns between congruent and incongruent conditions across the DDM parameters, aligning with the SCE.

However, gaze targets showed no significant differences in drift rate but did exhibit a numerical reversion. Additionally, non-decision time was the only parameter demonstrating a main effect of block design.

These findings suggest that gaze processing might involve additional information handling compared to arrows, potentially contributing to the observed RCE in reaction times. Further in-depth exploration of these effects is necessary.

Author/s: Renato Ponce, Maria Casagrande, Andrea Marotta, Juan Lupiáñez, Carlos González-García

Type: Poster

The Uncanny Valley in Psychopathic and Schizotypal Personality Traits as a Tool to Understand Human-Robot Interaction and Social Cognition

Speaker: Gangemi, Clara

Track: Social cognition

Abstract

Creating humanoid robots is an engineering longstanding goal. Yet a significant psychological obstacle stands in the way: the Uncanny Valley (UV). This phenomenon describes the abrupt shift in people's affective reactions towards robots, from affinity to discomfort, when the robot closely resembles a human, but fails to achieve true human-like appearance. Some scholars propose that this discomfort stems from attributing human-like mental abilities to non-human entities, regardless of their appearance. To date, empirical data have not yet conclusively determined whether human-like *bodily appearance* or *mental abilities* primarily elicit the uncanny feeling.

The present study aims to compare feelings of uncanniness evoked by androids with various degrees of human-like appearance and mental abilities in a large sample of individuals, with low to high psychopathic or schizotypal personality traits. Since high levels of these traits are associated with altered socio-cognitive abilities, if UV stems from a fallacious attribution of mental abilities, we expect our sample to exhibit differential UV effects, depending on the android's mental abilities and regardless of its bodily appearance.

The study will be implemented online and articulated in three phases: 1. Trait assessment: psychopathic and schizotypal traits, socio-cognitive abilities, general attitudes toward robots; 2. Stimulus presentation: photos of a human, an android, and a robot, accompanied by verbal descriptions of (high or low) mental abilities; 3. Rating phase: stimuli uncanniness.

Studying affective reactions in socio-cognitive atypical conditions could unlock insights for building more likeable social robots, as well as for shedding light on the complex nature of socio-cognitive dysfunctions.

Author/s: Clara Gangemi, Caterina Vannucci, Francesco Bossi, Lorenzo Cominelli, Enzo Pasquale Scilingo, Pietro Pietrini

Type: Poster

A Bridge Between Body and Environment in Egocentric-Allocentric Switching Processes: Evidence from Behavioural and Neuroimaging Studies

Speaker: Orti, Renato

Track: Space, time and number

Abstract

While eating, we represent the position of cutlery either relative to ourselves (subject-object) or relative to the plate (object-object). In general, we encode object positions using either an egocentric or allocentric frame of reference.

However, to achieve a goal, we frequently need to utilize both representations, switching between an egocentric spatial representation (fork-hand) and an allocentric one (fork-plate), and vice versa. While some studies have begun to investigate the nature of these visuo-spatial translation processes, aspects such as the effect of environmental characteristics, age, the related cognitive load, and the underlying brain areas remain unexplored. In the present project, visuo-spatial translation processes were investigated using an ad hoc designed task (Ego-Allo Switching Task). Participants memorized triads of objects and were subsequently asked to provide judgments of relative distance in both translation (from-egocentric-to-allocentric, from-allocentric-to-egocentric) and non-translation (egocentric-only, allocentric-only) conditions. Studies 1-2 demonstrated that 'misaligned' or 'non-orthogonal' virtual environments negatively impact visuospatial translation processes, particularly when starting from an allocentric frame of reference (fromallocentric-to-egocentric). Similarly, Studies 3-4 showed that typical aging disproportionately impairs visuo-spatial translation processes starting from a metric allocentric spatial representation.

Through cognitive pupillometry technique, Study 5 then demonstrated that the visuo-spatial translation processes from-allocentric-to-egocentric elicit a greater cognitive load compared to those fromegocentric-to-allocentric. Finally, Study 6 investigated the cortical correlates underlying visuo-spatial translation processes using fNIRS, revealing the involvement of fronto-parieto-temporal regions, and particularly the temporo-parietal junction, during the translation between frames of reference.

Overall, this work offers new insights into endogenous and exogenous factors influencing visuospatial translation processes between frames of reference, with potential applications in both research and user-centered design, especially for the elderly population.

Author/s: Renato Orti

Type: PhD prize

Space, time and motion in a multisensory world

Speaker: Bertonati, Giorgia

Track: Space, time and number

Abstract

The present doctoral thesis aims at investigating how humans represent space, time, and motion through auditory and visual sensory modalities. It has been demonstrated that hearing prevails in representing the time domain and vision in representing the space domain. Given this strong link between sensory modality and domain of representation, one objective of this thesis is to deepen the knowledge of the neural organization of multisensory spatio-temporal skills in healthy adults. In addition, by using blindness as a model to unravel the role of vision in the development of spatio-temporal abilities, this thesis explores the interaction of space and time in the acoustic motion perception of early blind individuals. This interaction was also investigated by questioning how the brain processes spatio-temporal cues of external events when it comes to manually intercepting moving objects with one hand.

Studies of the present dissertation indicate the following results:

- i) the early cortical modulation of sensory areas depends on the domain of representation to process, with auditory areas mainly involved in the multisensory processing of temporal inputs, and visual areas of spatial inputs; the neural modulation of visual areas for the spatial domain is also influenced by the kind of spatial layout representing multisensory stimuli.
- ii) the lack of visual experience in the first years of life influences the ability to process the speed of moving sounds by altering how blind individuals make use of the sounds' temporal features.
- iii) people manually intercepting a moving object take into consideration the item's spatio-temporal cues, by adjusting their interceptive movements according to the object's speed.

Finally, in light of the above results, this dissertation incorporates the development of a novel portable device, named MultiTab, for the behavioral evaluation of the processing of space, time, and motor responses, through the visual and acoustic sensory modality.

Author/s: Giorgia Bertonati

Type: PhD prize

Interaction Information in fibromyalgic patients: an highorder analysis of EEG connectivity in response to Laser-Evoked Potentials

Speaker: Clemente, Livio

Track: Space, time and number

Abstract

Laser-evoked potentials (LEP) are widely used to investigate the nociceptive pathway in patients with Fibromyalgia (FM). Since FM causes widespread pain and cognitive impairment, it presents diagnosis and treatment challenges.

Quantifying the interaction Information (II), a higher-order information theoretic quantity, on laser-evoked potentials can provide an analytical measure of its neuronal effects. This analysis may improve our understanding of the complex neurophysiological mechanisms underlying FM, potentially informing more personalized treatment strategies and enhancing patient prognosis. Ninety-three subjects were enrolled and subsequently assigned into four groups according to the results of the skin biopsy (controls n. 14; normal skin biopsy n. 19; proximal denervation n. 53; distal and proximal denervation n. 7).

LEPs were recorded with a 64 channel EEG headset in three different sites (hand, knee, and feet). The exams consisted in 30 stimulations per site, after which the the perception of pain intensity was estimated through the Visual Analog Scale (VAS). We looked at the temporal interactions at the Cz electrode where the LEP is generally expressed. The EEG data were transformed via the Gaussian copula normalization and then, Information-theoretic quantities were calculated based on the transformed data. Statistical significance of the information-theoretic quantities was approached by cluster-based permutation testing, which corrects for multiple testing on all possible time point combinations without comprising power.

This methodology represents a novel approach in the study of FM, highlighting the application of advanced information-theoretic analyses in the study of complex chronic conditions.

Author/s: Livio Clemente, Daniele Marinazzo, Marianna La Rocca, Marina de Tommaso, Sebastiano Stramaglia

Type: Talk in simposio

Multi-dimensional third-order statistical method to analyze cross-frequency coupling in EEG/MEG

Speaker: Basti, Alessio

Track: Space, time and number

Abstract

In this presentation, I will begin by discussing the established methods for conducting cross-frequency analysis in functional neuroimaging. Following this, I will introduce a novel statistical approach known as Multi-dimensional Antisymmetric Cross-Bicoherence (MACB, [1]). Grounded in bispectral analysis, MACB aims to identify quadratic lagged phase-interactions among vector time series within the frequency domain, with particular relevance to electro/magnetoencephalographic signals. One significant advantage of MACB is its invariance under the choice of physical coordinate system in neuro-electromagnetic inverse procedures. Additionally, MACB addresses the challenge of information loss associated with dimensionality reduction analysis, a requirement in other standard approaches. Through extensive synthetic experiments, I will demonstrate MACB's superior performance compared to alternative metrics, particularly evident when dealing with shorter data lengths or higher dimensions of single data spaces. In conclusion, this talk will explore the potential of using the introduced multi-dimensional third-order statistical method to enhance the understanding of neural cross-frequency phase couplings.

[1] Basti, A., Nolte, G., Guidotti, R., Ilmoniemi, R. J., Romani, G. L., Pizzella, V., & Marzetti, L. (2024). A bicoherence approach to analyze multi-dimensional cross-frequency coupling in EEG/MEG data. *Scientific Reports*, 14(1), 8461.

Author/s: Alessio Basti

Type: Talk in simposio

Study of brain high-order interactions to evaluate therapy effects in migraine patients

Speaker: La Rocca, Marianna

Track: Space, time and number

Abstract

Monoclonal antibodies against calcitonin gene-related peptides (CGRP) such as Galcanezumab (GCA), have revolutionized the therapeutic scenario in migraine. Even though they are clinically effective, how anti-CGRP treatment reduces migraine attacks still remains unclear.

We carried out an observational case-control study aimed at studying how the interaction between metabolic and electrical brain connectivity changes after 3 months of treatment with Galcanezumab in order to have a better insight on the GCA action and effects. Network representation is becoming increasingly popular for the description of brain connectivity, however the traditional methods to evaluate network links based on pairwise interaction measures cannot reveal high-order effects involving more than two nodes.

High-order interactions are required across brain regions to perform specific functions. These functional interdependencies are described by synergistic information that can be obtained by combining the information from all the sources considered and redundant information that can be provided by any single source. We applied innovative graph theory methods to electroencephalographic (EEG) and functional near infrared spectroscopy (fNIRS) from 20 migraine patients and 10 controls by extending the concept of pairwise connectivity to higher-order interactions.

Our results show how two nodes interact in a redundant or synergistic way with the rest of the network in migraine patients before and after 3 month of treatment with GCA giving important information on how GCA makes EEG and fNIRS hyperconnectivity due to migraine revert into normal ranges.

Author/s: Marianna La Rocca, Livio Clemente, Sebastiano Stramaglia, Marina De Tommaso

Type: Talk in simposio

Calculation skills in daily life: the correct answer is not Is always the exact one!

Speaker: Zonca, Sara

Track: Space, time and number

Abstract

Typically, “reckoning” is considered a skill that allows one to perform arithmetic operations quickly and accurately. Actually, exact computation is only the best known and with the late onset of the solving processes, while estimating the result of an operation (e.g., $28+17 < \text{or} > 50?$) or of a magnitude (e.g., How many apricots are there in 1 kg?) are skills that follow their developmental trajectories, some of which are also early, but whose relevance is relatively underestimated. In any case, these are multicomponent skills that we know differ in both cognitive and neurofunctional terms, but some of them remain underinvestigated.

Moreover, despite what is stated in national guidelines, in educational and clinical settings, the ability to use these skills in an ecological context is rarely given attention. In an exploratory study of a large sample of young adults, arithmetic computation skills (e.g., $34+8?$), situated computation skills (e.g., “You have 2 1/2 hours before you have to leave and you still have to listen to a 1-hour 45-minute lecture.

How much free time do you have left?”) and estimation of ecological magnitudes (e.g., ‘How much does a bicycle weigh?’) are investigated with to test for associations and differences between type of computation required and type of dimension expected (i.e., time, finances, numerosity, space, capacity, weight, etc.).

In discussing the results, space will be given to the relevance of individual differences taking into account variability in developmental trajectories (e.g., presence or absence of an SLD).

Author/s: Sara Zonca, Marzia Bizzaro, Luisa Girelli

Type: Mini-talks

Close to me in space or time? Climate change awareness and worry predicts pro-environmental behavior through the mediation of temporal, but not spatial, psychological distance

Speaker: Cannito, Loreta

Track: Space, time and number

Abstract

In line with the Construal Level Theory, in recent years psychological distance (PD) from climate change have been appointed as one of the most relevant barriers to risk perception of climate change and motivation toward sustainable behaviors, thus suggesting that changing PD may play a critical role in determining individuals engagement in pro-environmental actions.

Despite growing research, there is still conflicting opinion regarding how PD may exert its effects, since mixed results have been reported. In this study we investigated two main ideas: at first, the hypothesis that the complex relationship between PD and pro-environmental behaviors is modulated by both cognitive and affective information processing and that lacking one component may lead to reduced influence of PD on pro-environmental behaviors; secondly, different dimensions of PD may exert different influence on pro-environmental behaviors.

To this purpose, participants completed a survey investigating their perceived PD from climate change on temporal and spatial levels, awareness of climate change (cognitive factor), worry about climate change (affective factor) and engagement with sustainable behaviors. Results highlighted that awareness of climate change (cognitive factor) do not directly predict pro-environmental behavior, but through the serial indirect effects of temporal perceived psychological distance and climate change worry (affective factor). This relationship is not significant when considering spatial perceived distance.

These results may contribute to the literature investigating the effect of PD on sustainable behavior, by also informing policy making. Moreover, our results may contribute to the debate on the relationship between mental construals of temporal and spatial distance.

Author/s: Loreta Cannito, Gianluigi Serio, Eugenio Trotta, Paola Palladino

Type: Mini-talks

Exploring the Interplay between Interoception and Navigational Abilities: Insights from Virtual and Real Environments

Speaker: Dolce, Erica

Track: Space, time and number

Abstract

Despite significant progress in understanding human navigation, debates persist regarding the role of different sensory inputs and their contribution to individual differences in navigational performance. While recent research indicates that humans predominantly rely on visual information (Huffman and Ekstrom, 2019), empirical evidence supports the significance of body-based cues as well. The environmental scale and kind of navigational tasks may explain the mixed findings.

Yet, studies have overlooked interoceptive information processing and its potential impact on navigational abilities. Here, we present two studies aiming to explore the role of interindividual variability in interoceptive information processing, in terms of interoceptive accuracy (IAcc), awareness (IAw), and sensitivity (ISe), in performing navigational tasks.

In study 1, 110 participants completed desktop-based virtual navigational tasks probing landmark, route, and survey knowledge alongside IAcc, IAw, and ISe measures. In study 2, 50 participants completed a similar protocol, but the navigational tasks involved moving in a real environment.

The recognition of landmarks seen in a virtual environment was negatively associated with IAcc. However, individuals with higher IAcc retraced a path seen in the real environment faster (study 2). This suggests that while a heightened ability to accurately perceive bodily sensations may detract from attending to external cues, at least in desktop-based virtual environments, it enhances navigation in tasks that are based on an egocentric frame of reference and involve walking in a real environment. These findings underscore the complex relationship between the processing of body-based information and navigational abilities, offering insights to explain individual differences in spatial navigation.

Author/s: Erica Dolce, Maria Laura Gidari, Anna Longo, Vittoria Siciliano, Silvia Canino, Fabrizia D'Antonio, Antonella Di Vita, Simona Raimo, Liana Palermo

Type: Mini-talks

Fostering spatial navigational abilities in children through a new computer game based on observational learning: a pilot study

Speaker: Pullano, Luca

Track: Space, time and number

Abstract

Spatial navigation is a complex, fundamental ability crucial to daily life and it develops gradually during childhood. Some studies showed that it is possible to promote the development of spatial navigational abilities through specific training.

In a recent study, we demonstrated that training based on observational learning - implemented in a real environment - fostered an earlier acquisition of high-level spatial navigational skills in children. The main aim of the present study was to investigate whether the same beneficial effect could also be obtained in a virtual environment. With this aim, we implemented a new navigational computer game based on observational learning that we administered to 19 children (9 M and 10 F, mean age = 7.07 ± 0.33).

To verify the training effect and to investigate the possible generalization to new environments, we administered - or not - the observational training and tested children on a modified version of the Open Field with multiple rewards task. Two navigational tasks were used: one for the egocentric encoding (route-knowledge task) and another one for the allocentric encoding (configural knowledge task). We found that observational training improved both egocentric and allocentric encoding, as testified by some measured parameters, such as time employed to solve the task, distance virtually walked, and search efficiency. An improvement was also observed in the new environment, indicating the presence of a generalization effect.

Overall, these preliminary findings seem to confirm the beneficial effect of observational training and extend its effectiveness even in a virtual environment.

Author/s: Luca Pullano, Santo Di Nuovo, Francesca Foti

Type: Mini-talks

Measurement of the test-retest reliability of the SNARC effect in parity judgment and magnitude comparison tasks

Speaker: Vicovaro, Michele

Track: Space, time and number

Abstract

The predominant theories of numerical cognition describe the SNARC effect as the result of a stable spatial representation of numbers along a horizontal axis. Specifically, small and large numbers would be stably associated with the left and right sides of space, respectively. Due to the stability of such a representation, it seems reasonable to hypothesize that the SNARC effect could be a highly replicable phenomenon, with negligible temporal fluctuations, at least in the short term. The present study aims to test the stability of the effect by providing an accurate and generalizable estimate of its test-retest reliability.

Two different groups of participants ($N \approx 150$ each) were involved in a magnitude comparison task or a parity judgment task across two distinct sessions, separated by at least two weeks. The test-retest reliability of the SNARC effect was particularly low in the parity judgment task, while it was noticeably higher in the magnitude comparison task. This suggests the existence of intrinsic, but largely unexplored, differences between the two tasks traditionally used to measure the SNARC effect. More generally, these results challenge theories that view the SNARC effect as the product of a stable and well-established association between numbers and space.

The low test-retest reliability of the SNARC effect also calls for caution when interpreting studies on individual differences that rely on the analysis of correlations between the SNARC effect and other independent constructs, such as mathematical abilities.

Author/s: Michele Vicovaro, Andrea Spoto, Mario Dalmaso

Type: Mini-talks

Modulating the relationship between interoception and the physiological experience of time through transauricular vagus nerve stimulation (taVNS).

Speaker: De Martino, Maria Luisa

Track: Space, time and number

Abstract

The integration of bodily interoceptive visceral signals is posited to play a central role in the physiological experience of time. To investigate this relationship in greater depth, we utilized non-invasive transcutaneous auricular vagus nerve stimulation (taVNS), which has been shown to exert modulatory effects on various higher-order cognitive processes.

The vagal system, which is essential for maintaining bodily homeostasis, is widely connected to multiple cortical and subcortical regions. In this study, healthy participants were engaged in both explicit and implicit temporal tasks across two distinct experimental sessions involving either active taVNS stimulation or sham (offline) conditions. In the predictive timing task participants observed a white circle on a gray background, overlaid with an occluding circular band.

During each trial, a ball moved from the center toward the periphery, undergoing a velocity change as it passed under the occluder. Participants were then prompted to indicate whether the ball re-emerged from behind the occluder earlier or later than expected. Interoceptive abilities were concurrently assessed using the Heartbeat Counting Task. Preliminary analyses, conducted using the Wilcoxon-Mann-Whitney test, suggest an enhancement in task performance under active stimulation conditions, particularly in predictive timing tasks.

Notably, the positive correlations between temporal processing abilities and interoceptive accuracy observed during sham were absent in the active stimulation condition. These findings suggest that taVNS may influence brain activity within regions critical for implicit temporal processing (e.g., superior temporal cortex, inferior parietal cortex).

Conversely this technique, by interfering with the interoceptive sphere, seems to mitigate its connection with temporal processes.

Author/s: Maria Luisa De Martino, Angelica Scuderi, Erik Leemhuis, Mariella Pazzaglia

Type: Mini-talks

SNARC-like effects across different temporal ranges

Speaker: Mariconda, Alberto

Track: Space, time and number

Abstract

Tempo in music context is defined as the speed of an auditory sequence. Recent findings revealed a SNARC-like effect for tempo, suggesting that tempo and space are associated (De Tommaso & Prpic, 2020; Mariconda et al., 2024). Indeed, people tend to respond faster with a left-key to relatively slow tempos and faster with a right-key to relatively fast tempos. In particular, a work by De Tommaso and Prpic (2020) systematically investigating the SNARC-like effect across different tempo ranges revealed a clear effect only within the fast tempo range.

In the present study, the work by De Tommaso and Prpic (2020) was conceptually replicated, further investigating the association between space and tempo across different tempo ranges (40-200 bpm “full”, 40-104 bpm “slow” or 133-201 “fast”). Specifically, Experiment 1 aimed to test the occurrence of a SNARC-like effect in the full tempo range, whereas Experiment 2 aimed to further investigate its occurrence in the slow and fast tempo ranges, separately. Experiment 1 revealed a spatial association in the full tempo range. In Experiment 2 the occurrence of the SNARC-like effect was confirmed in the fast tempo range but contradictory results emerged in the slow tempo range.

Overall, these results highlight a consistent SNARC-like effect for full and fast tempo range, whereas further research is needed to clarify this phenomenon in the slow tempo range.

Author/s: Alberto Mariconda, Mauro Murgia, Matteo De Tommaso, Tiziano Agostini, Valter Prpic

Type: Mini-talks

The influence of sensory modality on contextual processing: evidence from temporal and spatial perception.

Speaker: Tonelli, Alessia

Track: Space, time and number

Abstract

When tackling sensory ambiguity, our brains employ diverse strategies to navigate and resolve challenges, such as using contextual information and prior experiences, which are pivotal in shaping our perceptions. Central tendency is a phenomenon where perception gravitates towards the average stimuli encountered in prior experiences, especially within the same sensory modality. An intriguing question arises regarding potentially more reliable prior experiences from a different sensory modality. We investigated this through an estimation task, exploring if perception in one modality can benefit from a more reliable cross-modal prior. Participants estimated temporal or spatial aspects of randomly presented auditory or visual stimuli, each with distinct averages. Our findings from these tasks revealed a bias toward the more reliable modality, emphasizing the role of modality-specific contextual information over central-tendency-based cues.

Moreover, we conducted analyses using various prior models to identify the most fitting model for our experimental data. This analysis underscored the importance of relying on priors from the most reliable modality specific to the task, emphasizing the brain's ability to discern and leverage the most relevant contextual information available from any sensory modality to resolve perceptual ambiguities effectively. In conclusion, our study sheds light on the dynamic interplay between sensory modalities, contextual information, and prior experiences in shaping human perception. This deeper understanding contributes to our broader knowledge of perceptual mechanisms and their implications for real-world tasks and challenges.

Author/s: Alessia Tonelli, Cameron K. Phan, David Alais

Type: Mini-talks

The Social Side of The STEARC Effect: Spatial Representation of Face Age in Explicit and Implicit Tasks

Speaker: Pileggi, Stefano

Track: Space, time and number

Abstract

Time can be conceptualized in spatial dimensions, as evidenced by the STEARC effect (Bonato et al., 2012). In recent work by Dalmaso et al. (2023), Western participants categorized the age of a central target male face as either younger or older than a reference face. The findings revealed that the perceived age was mapped from left to right. In the present study, we further examined whether a spatial mapping of face age implicitly emerges when an irrelevant dimension (male vs. female) is judged.

Experiment 1 is a conceptual replication of the original study, in which participants were asked to explicitly categorize face age (younger vs. older), using a new set of stimuli (male and female faces). The results further confirmed the spatial mapping of face age when using an explicit task, with younger faces associated to the left and older faces to the right.

In Experiment 2, a new set of participants categorized the gender of faces (male vs. female). The results confirmed the same pattern as previous experiments, also when face age was an implicit dimension. Similar to other studies on spatial associations for magnitudes, in the implicit task the effect appears smaller (Macnamara et al. 2018). Overall, these results confirm that face age can be mapped from left to right, using both explicit and implicit tasks.

Further results will be presented on the distance effect, as well as on the role of other variables (i.e. gender of the stimuli/participants and their congruency).

Author/s: Stefano Pileggi, Michele Vicovaro, Mauro Murgia, Mario Dalmaso

Type: Mini-talks

Impact of Implied Motion on Time Perception and Human Spatio-Temporal Dynamics

Speaker: De Tommaso, Matteo

Track: Space, time and number

Abstract

The psychological perception of time can expand or contract based on various non-temporal dimensions, one of which is motion. Prior research has established that moving subjects are perceived to last longer than static ones, even when motion is implied through static images depicting dynamic scenes. This study further examines how implied motion and subject category - distinguishing between inert objects and humans - affect time perception. Participants engaged in a temporal bisection task to evaluate the duration of still images that depicted either static or moving, objects or human subjects.

Our findings indicate that images of moving subjects, especially humans, are perceived as lasting longer than those of static subjects and inert objects, respectively. Additionally, reaction time analysis revealed a notable interaction between image orientation and duration: participants responded faster to rightward-oriented images at longer durations and to leftward-oriented images at shorter durations, a relationship that was exclusively observed with images of moving humans. These results highlight that both the type of content and the depiction of motion significantly influence time perception.

The distinct spatio-temporal associations for moving humans suggest a specialized processing bias, potentially rooted in evolutionary or social factors, underscoring the complexity of how humans interpret temporal information in visually dynamic contexts.

Author/s: Matteo De Tommaso, Rossana Actis Grosso

Type: Poster

The effect of hand actions on numerical magnitude and order processing

Speaker: Ranzini, Mariagrazia

Track: Space, time and number

Abstract

Many studies suggest that numerical abilities develop through sensorimotor interaction with the environment. In line with this view, it has been shown that repeated execution of grasping or pointing action impacted the performance in a subsequent number magnitude task. Specifically, the distance effect, a typical numerical effect consisting in faster response times when comparing farer (e.g., 1-5) rather than closer (e.g., 4-5) numbers, was enhanced after grasping and reduced after pointing. In this study, we confirm and extend previous findings by investigating the role of grasping and pointing in the processing of number magnitude and order. Thirty-seven participants executed hand actions followed by numerical trials.

Specifically, they repeated either pointing or grasping, prior to execution of either magnitude comparison (e.g., "Is 4 larger than 5?") or order judgment (e.g., "Are 4 5 6 in order?"). An ANOVA was conducted for each task, with type of action, number magnitude, and number distance as within-subjects factors, and with task order and action order as between-subjects factors. We found that in magnitude comparison the distance effect disappeared after pointing, while the effect was preserved after grasping. In the order task, no difference between grasping and pointing conditions was observed; however, the factor action interacted with numerical distance, and with the order in which the actions were performed.

Overall, these results confirm previous findings on the involvement of sensorimotor mechanisms in the processing of cardinal numbers. However, further investigations are needed to clarify the role of action mechanisms in the processing of ordinal numbers.

Author/s: Mariagrazia Ranzini, Sonia Betti, Luisa Sartori

Type: Poster

Do Hand Gestures interact with Random Number Generation?

Speaker: De Muynck, Glenn

Track: Space, time and number

Abstract

Several studies show that spatial cognition interacts with numerical cognition in various ways. For instance, numbers interact with space through manual movements, where smaller numerical magnitudes are associated with precision vs. power grips. One of the tasks used to probe mental number space associations is random number generation (RNG). Studies show that participants generate larger numbers when moving their heads to the right or upwards. Furthermore, recent observational studies demonstrate that people frequently use gestures when talking about numerical quantities.

In a pre-registered study, we explored whether performing natural manual gestures could modulate RNG: greater quantities may be more likely to be generated during outward-moving gestures and lesser quantities during inwards gestures. Further, we aimed to explore whether this association is modulated by both mathematical expertise, assessed by collecting numeracy data through the Subjective Numeracy Scale (SNS), and propensity to gesture, as assessed by the Brief Assessment of Gesture scale (BAGS). Preliminary results ($N = 60$) support our hypothesis, showing that higher random numbers are more frequently produced with outward movements, while lower random numbers are more frequently produced with inward movements. However, so far, no significant correlations have been found between individual differences, as measured by numeracy (SNS) and gestures (BAG) scales, and the magnitude difference between conditions.

To gain a clear understanding of the role of expertise in this effect, we aim to strengthen the individual differences, involving participants with different mathematical backgrounds and varying cross-cultural propensities to gesture (e.g., Italian vs. English individuals).

Author/s: Glenn De Muynck, Anna Borghi, Caterina Villani, Luisa Lugli, Bodo Winter

Type: Poster

Emotional Temporal Distortions: Exploring Pupil Dilation as a Gateway to Temporal Processing

Speaker: Mioni, Giovanna

Track: Space, time and number

Abstract

The subjective perception of time is known to be influenced by our emotional states, yet the precise mechanisms governing this relationship remain elusive. This exploratory study aims to shed light on the intricate relationship between emotionally induced physiological arousal and our temporal perception, focusing specifically on pupil dilation as a physiological indicator.

Through a randomized experimental design targeting participants aged 18 to 25, we aimed to investigate whether variations in arousal levels in response to negative stimuli correlated with observable changes in pupil dilation. Additionally, we aimed at determining whether these fluctuations can serve as reliable predictors of the extent of temporal distortion experienced during emotionally charged events.

Participants were presented with stimuli from the International Affective Picture System and performed a time reproduction task while their pupil dilation was tracked using an EyeLink 1000 plus system. The data were analyzed using generalized linear mixed models, aiming to uncover whether exposure to negative stimuli correlated with increased pupil dilation and influenced temporal perception.

The results showed that a higher degree of constriction was associated with the negativity level of the images, whereby more negative stimuli resulted in greater constriction. Additionally, concerning time perception, we observed a greater overestimation of temporal duration for stimuli categorized as negative-high compared to neutral ones, and an underestimation for stimuli categorized as negative-low compared to neutral ones.

This study sought to deepen our understanding of how emotions, physiological responses, and our subjective perception of time intertwine.

Author/s: Luigi Micillo, Mariagrazia Capizzi, Giovanna Mioni

Type: Poster

Spatial orientation and cognitive maps: piloting a new, virtual tool

Speaker: Umiltà, Alberto

Track: Space, time and number

Abstract

Recent advancements in virtual reality (VR) have provided new avenues for investigating cognitive processes, particularly spatial orientation and creating cognitive maps. This study aims to develop and validate a Virtual Spatial Configuration Task (VSCT) within a VR environment using the established Spatial Configuration Task (SCT) paradigm. The classical SCT involves participants identifying the camera's location among five stationary geometric objects displayed on a screen environment, facilitating spatial mental representation formation.

In the VSCT, participants (N=7) navigate a VR environment, exploring their surroundings limited through eye and head movements only.

Participants encounter three objects at a time (two in front and one behind) and must memorize their positions through repeated exploration. Subsequently, participants must recall the spatial positions of these objects. The control group (N=7) undergoes the Rey Auditory Verbal Learning Test (RAVLT), a standard verbal memory assessment.

We expect that accuracy performance will be similar in SCT and VSCT, validating the efficacy of the latter. Moreover, we anticipate better performance at the SCT for the experimental group, given the immersive nature of VSCT.

A preliminary analysis (N=7) of participants to assess VSCT accuracy, compared to the already validated SCT. A positive correlation emerged between accuracy scores on SCT and VSCT, $R(df5) = 0.93$, $p = 0.0019$, but not between RAVLT and SCT.

Results are anticipated to validate the efficacy of the VSCT as a cognitive assessment tool and shed light on the potential of VR technology in stimulating spatial cognitive processes

Author/s: Alberto Umiltà, Alessia Tessari, Ford Clayton Burles, Giorgio Li Pira, Giovanni Ottoboni

Type: Poster

The effectiveness of functional Near-Infrared Spectroscopy (fNIRS) for investigating sensorimotor processing in numerical cognition throughout the lifespan.

Speaker: Noacco, Sara

Track: Space, time and number

Abstract

Numerical skills are crucial in various daily life activities, such as activities involving money, understanding numbers and mathematical concepts, comparing magnitudes, and performing calculations. The established link between number processing and sensorimotor mechanisms related to hand actions is well-documented in behavioral research. Embodied cognition theories propose that sensorimotor processes form the foundation for mental representations of numbers. According to action-based theories of cognition, number abilities develop dynamically through interaction with the environment, such as representing numbers, counting, or using fingers for calculations. How can we predict numerical abilities by observing sensorimotor activity across the lifespan?

In this regard, Functional Near-Infrared Spectroscopy (fNIRS) serves as an excellent investigative method for exploring the link between numbers and sensorimotor action across all age groups. The fNIRS is a non-invasive neuroimaging technique that enables monitoring of brain activity by measuring changes in the concentration of oxyhaemoglobin and deoxyhemoglobin in the blood. It provides an effective compromise between spatial (approximately 1 cm) and temporal (approximately 10 Hz) resolution, and demonstrates relative tolerance to movement artifacts. It is non-invasive, and allows testing without physical constraints, offering a promising opportunity to study the neural correlates of sensorimotor and cognitive processing. fNIRS is commonly employed in studies involving children and neonates. Additionally, it is a straightforward technique for testing elderly populations. In this presentation I will shed light on the potential of fNIRS in elucidating the intricate relationship between sensorimotor activity and numerical abilities across the lifespan.

Author/s: Sara Noacco, Simone Cutini, Mariagrazia Ranzini

Type: Poster

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