



Tenerife
25-28 September

Oral Sessions

ABSTRACTS

ORAL SESSION 1

Thursday 26th

14:40-17:20

Auditorio

Neuroscience of Language

OS1.AUD.1 WHEN THE CONTEXT MODULATES LANGUAGE PROCESSING: A BEHAVIORAL AND ELECTROPHYSIOLOGICAL STUDY

Beauprez S.-A., Laroche B., Perret C., & Bidet-Ildei C.
Centre de Recherches sur la Cognition et l'Apprentissage (CeRCA), France
 Presenting author: Sophie-Anne Beauprez

In our everyday life, we perceive others performing actions in a context. It is crucial since it provides information participating to the understanding of this action. The aim of the study was to investigate how this context could modulate language processing. We recorded behavioral and electrophysiological measures of participants performing a semantic decision task involving a verb after observing a picture depicting an action performed in a usual or an unusual context. The results revealed different behavioral and topographical pattern responses according to the context in which an action is presented. Action verb processing was facilitated by the prior observation of an action, only in the usual context. Moreover, the topographic analysis revealed that this facilitation was related to reduced processing times for the semantic access to the verb and for the motor preparation for the answer. Altogether, these findings demonstrate that the context is crucial in the action-language relationship.

OS1.AUD.2 LANGUAGE CONTROL PROCESSES: DOMAIN GENERAL OR DOMAIN-SPECIFIC?

Attout, L. & Majerus, S.
University of Liège, Belgium
 Presenting author: Lucie Attout

There remain major doubts about the nature and domain specificity of inhibitory control processes, both within and between cognitive domains. The present fMRI study assessed the neural substrates associated with inhibitory control processes within in the language domain, by comparing phonological versus semantic control

processes. Thirty-four elderly participants (59.6 ± 6.1 years old) performed phonological similarity and semantic similarity judgment tasks involving the inhibition of highly or weakly interfering stimuli. A direct contrast between the two task conditions revealed two distinct networks: a temporo-parietal network for phonological control and a temporo-frontal network for semantic control. Common activity was observed in a large dorsal attention network including bilaterally the insula. Moreover, multivariate voxel pattern analysis showed reliable decoding of neural patterns associated with high versus weak inhibitory control in both tasks. These results provide novel evidence for a dissociation between phonological and semantic language control processes.

OS1.AUD.3 THE N170 COMPONENT: AN ELECTROPHYSIOLOGICAL INDEX OF LEXICAL ACCESS IN GOOD AND POOR READERS?

Mahé, G.¹, Bonnefond, A.², & Nadège, D.C.²
1 SCALab - University of Lille; 2 University of Strasbourg
 Presenting author: Gwendoline Mahé

The aim of the present study was to determine the lexical characteristics of the N170 component according to reading skills. Good and poor readers performed two lexical decision tasks on which lexical access availability (format familiarity with stimuli displayed horizontally or vertically in a marquee format) and task difficulty (with separated or mixed horizontal and vertical blocks) were manipulated. Results revealed an impact of both reading skills and task difficulty on N170 lexicality effect, with specific effects at right sites related to poor reading skills and an increase of the lexicality effect with task difficulty. Surprisingly, format familiarity did not affect N170 lexicality effect. Spatio-temporal segmentation analysis revealed the engagement of a similar visual word form analysis for both formats, with only a longer duration to complete those processes for the unfamiliar format. The present findings revealed new insights concerning early lexical access in good and poor readers.

OS1.AUD.4 INTEGRATING FORM AND MEANING IN THE LEFT PARIETAL CORTEX.

Quiñones, I.¹, Molinaro N.^{1,2}, Caballero C.¹, Mancini S.¹, Hernández-Cabrera J.A.³, Barber H.³, & Carreiras M.^{1,2,4}

1 BCBL. Basque Center on Cognition, Brain and Language, Donostia, Spain; 2 IKERBASQUE, Basque Foundation for Science, Bilbao, Spain; 3 Universidad de La Laguna, Spain; 4 University of the Basque Country, UPV/EHU, Bilbao, Spain.

Presenting author: Ileana Quiñones

Assessing the synchrony and interplay between distributed neural regions should be critical to understanding how the language system operates. We investigated the possible neuro-functional link between form and meaning during sentence comprehension by combining a classical whole-brain approach addressed to characterize brain activation patterns as a function of our conditions and a network-based approach aimed at pinpointing the topology and dynamics of those regions emerging as critical. Capitalizing the Spanish gender agreement system, we experimentally disengage formal and conceptual factors: nouns-adjectives gender congruency and the type of gender system a noun belongs to – i.e., conceptual or formal depending on the availability of semantic gender information. Left IFG, as well as left MTG/STG emerged as critical areas for the computation of grammatical relations. However, critically, we identified the interplay between the AG and the left perisylvian language-specific circuit as a crucial hub for the achievement of a coherent and meaningful message.

OS1.AUD.5 CATECHOLAMINERGIC MODULATION OF THE SEMANTIC PROCESSING IN SENTENCE COMPREHENSION

Tan, Y. & Hagoort, P.

Max Planck Institute of Psycholinguistics, The Netherlands

Presenting author: Yingying Tan

This study investigated the role of catecholamine (CA) neurotransmitters (e.g., dopamine) in language comprehension by examining the effects of methylphenidate, which is a CA agonist, on the electroencephalogram (EEG) response related to semantic processing. This study used a double-blind, placebo-controlled, within-subject design. Forty-eight healthy participants read semantic congruent or incongruent sentences after receiving 20 mg methylphenidate or a placebo, while brain activities were monitored with an EEG recording. Importantly, the results showed that MPH has a task-dependent neuropharmacological effect on

semantic processing. When semantic processing was task-irrelevant, MPH enhanced the detection of semantic incongruence as indexed by a larger N400 effect; when semantic processing was task-relevant, MPH induced a smaller reduction in the N400 response in the congruent condition, which was followed by a larger late positive complex effect. These results suggest that CA-related neurotransmitters enhance language processing possibly through providing a relevance signal amplifying the salience of semantic processing.

OS1.AUD.6 INFLUENCE OF PHONOLOGICAL AND SEMANTIC FACTORS ON THE ACQUISITION OF NOVEL WRITTEN WORD-FORMS: ERP EVIDENCE

Bermúdez-Margaretto, B.¹, Beltrán, D.², Shtyrov, Y.³, Domínguez, A.², & Cuetos, F.⁴

1 National Research University - Higher School of Economics, Moscow, Russia; 2 Universidad de La Laguna, Tenerife, Spain; 3 Aarhus University, Aarhus, Denmark; 4 Universidad de Oviedo, Oviedo, Spain

Presenting author: Beatriz Bermúdez-Margaretto

Acquisition of new vocabulary is usually mediated by previous experience with language. In visual domain, orthographically unfamiliar forms may already have corresponding phonological or even conceptual representations in linguistic system, which facilitates orthographic learning. The neural correlates of this advantage were investigated by recording EEG during reading novel and familiar words. Participants were divided into three groups (n=26 each) for a previous training (six exposures) with: (1) only phonology of novel words (auditory exposure), (2) both phonology and meaning (auditory+picture), or (3) no training. Already at the first visual presentation, early neural responses to novel words, reflected in P200, become indistinguishable from familiar words, regardless of the phonological or semantic nature of training. The no-training condition, however, showed a clear lexicality effect: stronger P200 responses for familiar than novel words. These results suggest the key role of phonology in orthographically transparent reading systems, enabling rapid build-up of novel word-form representations.

OS1.AUD.7 AN OSCILLATORY MODEL OF NOUN-VERB DISSOCIATIONS: MEG EVIDENCE FROM HEALTHY PARTICIPANTS AND BRAIN TUMOR PATIENTS

Amoruso, L.^{1,2}, Molinaro, N.^{1,2}, Geng, S.¹, Quiñones, I.¹, Timofeeva, P.¹, Gisbert-Muñoz, S.¹, Gil-Robles, S.^{3,4}, Iñigo Pomposo, I.⁴, & Carreiras, M.^{1,2,5}

1 Basque Center on Cognition, Brain and Language (BCBL), Spain; 2 IKERBASQUE, Basque Foundation for Science, Spain; 3 Hospital Quiron, Spain; 4 BioCruces Research Institute, Spain; 5 University of the Basque Country, UPV/EHU, Spain

Presenting author: Lucia Amoruso

In the present study, we measured spatiotemporal dynamics of MEG oscillations in the intact and the damaged brain during noun and verb naming. This investigation was motivated by current lack of agreement as to the extent of the functional/anatomical dissociation underpinning the noun-verb dichotomy. Overall, we found that the production of concrete nouns and motion verbs in the context of a minimal sentence showed different spectro-temporal responses and distinct underlying cortical sources in healthy participants. When testing this model in brain tumor patients, we found a specific dissociation in the beta frequency-range: patients with temporal damage exhibited functional compensation only for object naming, while patients with fronto-parietal damage exhibited compensation only for action naming. Together, these findings suggest the involvement of partially different networks for both categories, at least when underscoring semantic distinctions between them, and provide evidence for a role of beta oscillations as a marker of language preservation.

OS1.AUD.8 ALTERATIONS OF NEURAL LANGUAGE PROCESSING IN HEALTHY AGING: EVIDENCE FROM PASSIVE NEUROMAGNETIC RESPONSES TO SPEECH

Hyder, R.¹, Højlund, A.¹, Jensen, M.¹, Østergaard, K.², & Shtyrov, Y.¹

1 Aarhus University, Denmark; 2 Aarhus University Hospital, Denmark

Presenting author: Rasha Hyder

Assessment of neurocognitive status of language comprehension often relies on overt behaviour, which is only a proxy measure of brain function. To scrutinise aging influence on the functioning of language neural circuits independently from focused attention and behavioural tasks, we designed a novel paradigm which allows quantifying a range of neurolinguistic processes in a task-free unattended manner. This is achieved by recording the brain's responses to different speech sounds using magneto- and electroencephalography

(MEG/EEG). This paradigm was applied to healthy young and elderly participants who were presented with an unattended sequence of speech stimuli with tightly controlled lexical, semantic and syntactic contrasts. The results revealed a range of effects of aging on different levels of linguistic processing: reduced, delayed and topographically shifted lexico-semantic ERFs and fully absent correlates of automatic syntactic parsing. We will discuss implications of this approach to the study of neurolinguistics processing in healthy ageing and neurodegeneration.

Cibeles Room

Perception

OS1.CIB.1 ACCELERATED PERCEPTION: THE ATTENTIONAL BOW WAVE PHENOMENON

Akyürek, E.G.¹ & Wolff, M.J.^{1,2}

1 University of Groningen, The Netherlands; 2 University of Oxford, United Kingdom

Presenting author: Elkan Akyürek

The speed at which we process perceptual information is typically estimated by tracking activity evoked by a single, isolated stimulus in the brain. Although this provides important knowledge, it cannot characterize what happens during dynamic perception. This is most unfortunate, because perceptual input constantly changes in the real world, and our perceptual system rarely deals with individual, isolated stimuli. Limited progress has been made in this direction, due to the fact that successive stimuli often interfere with one another (e.g., by masking), and because signal overlap makes brain activity hard to attribute to any one stimulus in a rapid sequence. We overcame these difficulties by applying multivariate pattern analysis to EEG recorded in a temporal integration task that avoided destructive masking. We observed a novel phenomenon: Stimulus processing was not slowed down by a shortly preceding stimulus, but accelerated instead. This “bow wave” phenomenon seemed to be attentional in nature.

OS1.CIB.2 STUDYING PERCEPTION WITH SUBMILLESCOND COMPLEX IMAGES

Beauny, A., de Heering, A., Muñoz-Moldes, S., Martin, J.-R., de Beir, A., & Cleeremans, A.

Université libre de Bruxelles

Presenting author: Axel Cleeremans

Unconscious perception remains controversial. Here, we used psychophysical methods applied to unmasked visual stimuli presented for extremely short durations (in the μ sec range) by means of a custom-built modern tachistoscope. In a first phase, natural or urban scenes were either absent or present on the screen, and participants evaluated their subjective perception using a 3-points scale (no stimulus, stimulus detection or stimulus

identification). Responses were tracked by means of two staircases. One aimed to define the threshold of subjective detection; the second aimed to define the identification threshold. In a second phase, participants performed an objective categorization task in which they had to decide whether each image was natural vs. urban. A third staircase was used to build a psychometric curve reflecting objective categorization performance. We found that objective performance, here assumed to reflect the contribution of both conscious and unconscious trials, cannot be explained based exclusively on conscious trials.

OS1.CIB.3 PUTTING THE WORLD IN MIND: THE CASE OF QUANTITY PERCEPTION

Katzin, N., Salti, M., & Henik, A.

Ben Gurion University of the Negev

Presenting author: Naama Katzin

Enumeration up to four, subitizing, is accurate and fast with only 50-80ms increase per item. Enumeration above four, estimation, is less accurate and more time consuming with an additional cost of 200ms per item. Subitizing and estimation are considered two distinct processes. We suggest that the shape of the convex hull, the polygon created by the smallest set (of dots) that contains all stimuli, may account for both processes. We first show. Using geometric probability, the correlation between shape of convex hull and numerosity. Then, in two experiments we show that enumeration of dot arrays is modulated by the number of vertices on the convex hull. Namely, a low number of vertices on the convex hull yields an underestimation of numerosity; a high number of vertices on the convex hull yields an overestimation of numerosity. We suggest that the perceptual system utilizes convex hull as a heuristic to estimate numerosity.

OS1.CIB.4 SYNAESTHESIA AND EXPERTISE SHARE COMMON COGNITIVE PROFILES

Rothen, N.^{1,2} & Ovalle Fresa, R.^{1,2}

1 *University of Bern, Bern, Switzerland*; 2 *Swiss Distance Learning University, Brig, Switzerland*

Presenting author: Rothen Nicolas

Synaesthesia is associated with extraordinary experiences elicited in the presence of an appropriate inducing stimulus. For instance, in grapheme colour synaesthesia (GCS) an achromatic letter may elicit a highly specific colour experience. Previous studies reported enhanced colour perception in GCS and other studies provided empirical evidence for enhanced colour memory in GCS. This led to the suggestion that enhanced perceptual processing in synaesthesia may be responsible for enhanced memory performance. However, perceptual processing and memory performance has never been directly compared in a single study. Thus, it was our primary goal to compare perceptual processing and memory performance in a group of GCS, non-synaesthetic colour experts (NCE) and non-synaesthetic controls (NSC). GCS and NCE outperformed NSC in both, perceptual processing and memory tasks, while GCS and NCE showed similar performance in both tasks. We conclude that enhanced memory performance in GCS and NCE is associated with enhanced perceptual processing.

OS1.CIB.5 HOW LANGUAGE SHAPES CATEGORICAL PERCEPTION OF EVERYDAY OBJECTS: ELECTROPHYSIOLOGICAL EVIDENCE IN SPANISH-ENGLISH BILINGUALS AND MONOLINGUAL CONTROLS

Casaponsa, A.¹, García-Guerrero, A.², Martínez, A.³, Thierry, G.⁴, & Athanasopoulos, P.¹

1 *Lancaster University, UK*; 2 *University of Deusto, Spain*; 3 *Valladolid University, Spain*; 4 *Bangor University, UK*.

Presenting author: Aina Casaponsa

Languages label categorical distinctions differently. Learning a new language thus entails internalizing new categorical boundaries. Here, we investigate the neural correlates of categorical perception of objects that might arise from differences in terminology between languages and categorical restructuring in the bilingual mind. Twenty Spanish-English bilinguals, 20 English monolinguals, and 20 Spanish monolinguals performed a visual oddball detection task whilst objects were presented in the peripheral visual field. Object categories differed based on terminology between Spanish and English: 'taza' = mug + cup, 'copa' + 'vaso' = glass. Whilst monolinguals showed increased visual mismatch negativity (vMMN) for categorical contrasts distinguished by their L1, bilinguals showed a vMMN increase for

categories distinguished by either language. We conclude that categorical perception of objects is not only shaped by the native language but is also subject to plasticity associated with the learning of a new language.

OS1.CIB.6 THE QUEST FOR FAST MODULATION OF COLOUR PERCEPTION BY LANGUAGE OF OPERATION: GEARING UP TOWARDS PRE-REGISTRATION

Thierry, G.¹, Mortimore L.¹, Casaponsa, A.², Tomoschuk, B.³, Wu Y.J.⁴, & Athanasopoulos, P.²

1 *Bangor University, Wales*; 2 *Lancaster University, UK*; 3 *University of California, San Diego (UCSD), USA*; & 4 *Ningbo University, China*.

Presenting author: G. Thierry

We previously tested whether the existence of two basic colour terms for blue in Greek, ghalazio ('light blue') and ble ('dark blue'), lead to a greater perceptual contrast in Greek than English speakers (Thierry et al., 2009). Since our initial observations of the predicted interaction between language group and colour (blue, green) on visual mismatch negativity (vMMN) amplitude, we have sought to test whether colour perception can be modulated by language of operation within the same Greek-English bilinguals. Here, participants made semantic decisions on centrally presented Greek or English words whilst 4 coloured squares were flashed parafoveally within an oddball sequence. We expected greater vMMN for blue than green contrasts in the Greek but not the English context. We found a vMMN modulation but failed to observe the critical colour by language interaction. We will pre-register the next iteration using auditory instead of visual words to set the language context.

OS1.CIB.7 WHAT CAN CONTINUOUS RESPONSES TELL US ABOUT PHONEME CATEGORIZATION?

Kapnoula, E.C.¹ & McMurray, B.²

1 *Basque Center on Cognition, Brain and Language (BCBL), Spain*; 2 *University of Iowa (UI), USA*

Presenting author: Efthymia Kapnoula

Listeners map continuous acoustic information into distinct phoneme categories. To study this process, we routinely collect binary responses (e.g., in 2AFC tasks) and use categorization slope as a measure of categorization quality. However, a plethora of findings shows that listeners are sensitive to within-category acoustic differences and capturing this sensitivity using binary responses is problematic; a shallower categorization slope could reflect a more gradient mode of perception, or

inconsistent categorization (noisy/poor speech perception). We present a behavioral paradigm that allows us to measure gradient activation of phoneme categories in a more direct way. As reported by Kapnola et al (2017), this measure is not correlated with consistency of binary responses, meaning that it assesses a different aspect of phoneme categorization than that assessed by 2AFC-type tasks. Furthermore, our measure is validated by EEG data showing that sensitivity to within-category differences can be traced back to early processing of acoustic information.

OS1.CIB.8 FUNCTIONAL HIERARCHY FOR TACTILE PROCESSING IN THE VISUAL CORTEX OF SIGHTED ADULTS: CHRONOMETRIC TMS (TRANSCRANIAL MAGNETIC STIMULATION) STUDY

Matuszewski, J.¹, Bola, Ł.^{1,2,3}, Kossowski, B.¹, Banaszekiewicz, A.¹, Paplińska, M.⁴, Szwed, M.², Jednoróg, K.¹, Draganski, B.⁵, & Marchewka, A.¹

1 Nencki Institute of Experimental Biology of Polish Academy of Sciences, Poland; 2 Jagiellonian University, Poland; 3 Harvard University, USA; 4 University of York, UK; 5 Academy of Special Education, Poland

Presenting author: Jacek Matuszewski

Perception via different senses was thought to be supported by separate brain systems. However, studies show that the visual cortex in typical, sighted adults can be involved in tactile perceptual processing. Here, we investigated the spatio-temporal dynamics of this involvement during tactile Braille reading. Sighted Braille readers read single letters tactually. During reading, TMS was applied to their early visual cortex, visual word form area (VWFA) and early somatosensory cortex, at five time windows from 20 to 520ms after Braille letter presentation. Subjects' accuracy decreased when TMS was applied to the early visual cortex, 120-220ms after the Braille letter presentation, and when it was applied to the VWFA, 320-420ms after the Braille letter presentation. Our results indicate that, in sighted people, the involvement of the visual cortex in tactile perception follows canonical visual hierarchy and suggest that visual cortex might support spatial perception in a task-specific sensory-independent manner.

Estambul Room

Language Processing I

OS1.EST.1 TRANSDPOSED-WORD EFFECTS IN THE SAME-DIFFERENT MATCHING TASK

Pegado, F.¹ & Grainger, J.²

Aix-Marseille University, France

Presenting author: Felipe Pegado

To probe the position code for word order during reading, two sequences of five words (the reference and the target sequences) were briefly presented one after the other in a same-different matching task. The reference sequence could be grammatically correct or incorrect (scrambled order). We manipulated the nature of the target sequence by repeating, replacing or transposing words. In Experiment 1, 'same' responses were easier with grammatically correct sequences, and 'different' responses were much harder for transposed than replaced words. This transposed-word effect was found to be independent of the grammaticality of the reference. Experiment 2 introduced a delay of one second between the reference and target and replicated the findings. Our data suggest a noisy bottom-up association of word identities to word location in a line of text, a process that requires a certain amount of parallel processing of words and that remains active over a short delay.

OS1.EST.2 THE EFFECT OF SEMANTIC DIVERSITY ON SERIAL RECALL FOR WORDS

Hsiao, Y., Mak, M.H.C., & Nation, K.

University of Oxford, UK

Presenting author: Yaling Hsiao

We investigated whether semantic diversity (SemD) influences immediate serial recall for words. SemD was calculated using LSA to quantify the degree of semantic similarity in the contexts a word appears across a large corpus. Word lists were formed of high vs. low diversity words. SemD was crossed with imageability. Words were presented visually in serial order, and 40 participants recalled the list in correct order. There was no main effect of imageability or SemD, but SemD was modulated by list position and imageability. Among high-imageability words, more high-SemD words were recalled in the first

position. In contrast, more low-SemD words were recalled in the second half of the list, again only in the high-imageability condition. These findings suggest that the availability of more semantic connections privileges recall for high-SemD words in terms of the primacy effect, but induces more competition between items later on in serial recall.

OS1.EST.3 EXPLORING SEMANTIC VARIABLES IN LANGUAGE PRODUCTION: BEHAVIOURAL AND ELECTROPHYSIOLOGICAL EVIDENCE

Lampe, L.^{1,2}, Bürki, A.³, Hameau, S.¹, Fieder, N.⁴, & Nickels, L.¹

1 Macquarie University, Australia; 2 International Doctorate for Experimental Approaches into Brain and Language (IDEALAB), Universities of Groningen (The Netherlands), Newcastle (United Kingdom), Potsdam (Germany), Trento (Italy) & Macquarie University

Presenting author: Leonie Lampe

In word production, word meaning is accessed before form selection. We extend previous work that has suggested that item-inherent aspects of meaning (semantic variables) can have effects on word production in opposing directions, which some authors attribute to different levels of processing: facilitation via conceptual overlap and inhibition via lexical competition. We simultaneously examine six feature-based semantic variables (number of near semantic neighbours and features, semantic similarity, typicality, intercorrelational density, distinctiveness). This work informs theory by (1) clarifying and dissociating effects of these semantic variables on word production; and (2) studying their temporal dynamics using EEG. Response times, naming accuracy, and EEG data is being collected for 40 subjects naming 297 pictures. We will determine the effects of the semantic variables on behavioural measures and mean EEG amplitude, while controlling for other psycholinguistic variables. Results will be presented and implications for semantic and word production models will be discussed.

OS1.EST.4 HOW WELL DO WORD RECOGNITION MEASURES CORRELATE? EFFECTS OF LANGUAGE CONTEXT AND REPEATED PRESENTATIONS

Dirix, N., Brysbaert, M., & Duyck, W.

Universiteit Gent

Presenting author: Nicolas Dirix

We assessed the extent to which different word recognition time measures converge, using large databases of lexical decision times and eyetracking measures. We observed a low proportion of shared variance between these measures, which limits the validity of lexical decision times to real-life reading. A second analysis of two different eyetracking corpora compared the eyetracking reading times for short paragraphs with those from reading of an entire book. Our results revealed that the correlations between eyetracking reading times of identical words in two different corpora are also low, suggesting that the higher-order language context in which words are presented plays a crucial role. Finally, our findings indicate that lexical decision times better resemble the average processing time of multiple presentations of the same word, across different language contexts.

OS1.EST.5 PREDICTIONS OF A NEW MODEL OF READING

Snell, J. & Grainger, J.

Aix-Marseille University, France; CNRS, France

Presenting author: Joshua Snell

Reading research has long endorsed the view that words are processed strictly one-by-one. A primary pillar of this notion is the absence of certain influences from upcoming words on readers' eye movements. Here we assert that the field has followed an inappropriate rationale, and that inferences about the reading system warrant treading beyond the methodological scope of eye movements in sentence reading. Recent considerations of how the system organizes linguistic input have led to the development of a new model of reading, OB1-reader. This model has sparked fresh predictions in- and outside the realm of text reading, with ensuing research begging refutation of the seriality assumption. Here we will highlight some key phenomena in support of the model, and, more generally, parallelism: sentence superiority effects and flexible word position coding. It will become clear that both theoretically and methodologically, reading research is ready for a paradigm shift.

OS1.EST.6 SIMULATING NAMING, LEXICAL DECISION AND PROGRESSIVE DEMASKING WITH BRAID-PHON, A BAYESIAN MODEL OF READING ALOUD

Saghiran, A., Diard, J., & Valdois, S.

LPNC, CNRS, Université Grenoble Alpes, France

Presenting author: Ali Saghiran

Within a Bayesian modeling framework, we propose BRAID-Phon, a new computational model of expert reading, in which cognitive tasks are mathematically expressed and simulated using Bayesian inference. The model incorporates a fully described word recognition model. Beyond orthographic and phonological knowledge, it includes two visual components (i.e., the acuity gradient and lateral interference between letters) and a visuo-attentional component in which a visuo-attentional distribution modulates sensory information processing. We show that attentional control allows reading words and non-words, in a single-route architecture. In this study, we use the BRAID-Phon model to simulate three cognitive tasks: word naming, lexical decision and progressive demasking. The model's behavior is compared with observations from the Chronolex dataset: we analyze predicted reaction times and specific effects related to some psycholinguistic variables (e.g., effect of the initial phoneme, or orthographic and phonological distance to neighbors) and differential length effects depending on the task.

OS1.EST.7 SLEEP DEPRIVATION DOES NOT PREVENT LEARNING AND GENERALISATION OF A NEW ARTIFICIAL SCRIPT

Tamminen, J., Newbury, C.R., Vinals, L.1, Crowley, R., Cevoli, B., & Rastle, K.

Royal Holloway University of London (RHUL), UK

Presenting author: Chloe Newbury

Sleep-dependent memory consolidation contributes to language acquisition and generalisation of linguistic knowledge. Effects of sleep deprivation on these processes are however unexamined. Adult participants learned pseudowords in an artificial script to investigate whether general linguistic knowledge is affected by sleep deprivation before encoding (Experiment 1) and post-encoding (Experiment 2). Acquisition of trained words was assessed with a recognition task and reading and spelling of trained words. Reading and spelling of untrained words assessed generalisation, and knowledge of letter-phoneme mappings assessed memory for linguistic rules. Sleep deprivation did not consistently impair recognition, reading, or spelling, although correct responses in the recognition task were slower with post-encoding sleep deprivation. This demonstrates little

impact on language acquisition and generalisation. Explicit knowledge of letter-phoneme mappings was impaired, suggesting that the impact of sleep deprivation may be restricted to explicit memory for linguistic rules, and does not affect the application of those rules in reading.

OS1.EST.8 LEARNING MORPHOLOGICALLY COMPLEX SPOKEN WORDS: ORTHOGRAPHIC EXPECTATIONS OF EMBEDDED STEMS ARE FORMED PRIOR TO PRINT EXPOSURE

Beyersmann, E.¹, Wegener, S.¹, Nation, K.², Prokupczuk, A.³, Wang, H.-C.¹, & Castles, A.¹

1 Macquarie University, Australia; 2 University of Oxford, UK; 3 University of Leipzig, Germany

Presenting author: Elisabeth Beyersmann

It has recently been suggested that orthographic predictions of newly learned spoken words are generated prior to print exposure. Here we ask if the information that is available in spoken words goes beyond the mappings between phonology and orthography. Adults were taught the oral form of morphologically complex words ('bypes', 'byping', 'byped'), consisting of a novel stem ('bype') and an existing inflectional affix ('-s', '-ing', '-ed'). Half of the stems had a predictable, half an unpredictable spelling. Following oral training, participants saw the printed form of novel stems for the first time. Word stems (half trained, half untrained) were embedded in sentences, and eye movements were monitored. Reading times were shorter for trained than untrained stems, and for stems with predictable than unpredictable spelling. Crucially, there was an interaction between spelling predictability and training, suggesting that orthographic expectations of embedded stems are already formed during spoken word learning.

Atenas Room

Emotion

OS1.ATE.1 AUTONOMIC AND MUSCLE ACTIVATION IN RESPONSE TO AUDITORY WORDS: THE ROLE OF AFFECTIVE PROPERTIES AND CONCRETENESS

Marelli, M.^{1,2}, Vergallito, A.^{1,2}, Petill, M.A.^{1,2}, & Cattaneo, L.³

1 University of Milano-Bicocca, Italy; 2 NeuroMI, Italy; 3 University of Verona, Italy

Presenting author: Marco Marelli

The present study investigates to what extent the autonomic system is involved in linguistic processes. 500 Italian words were auditorily presented to 20 native speakers. Changes in heart rate were measured during the passive listening of words. Automatic activation of facial muscles was also registered. Experimental stimuli were selected to vary for affective properties (valence, i.e. the degree of positivity of the word, and arousal, i.e. the amount of emotional activation brought by the word) and concreteness. These three variables were found to interact in predicting both heart rate and facial muscle activity. The results provide evidence for the involvement of the autonomic system in word processing. This involvement depends on affective aspects, however it is mostly observed for abstract words, in line with proposals postulating that emotions play a central role in the grounding of abstract concepts.

OS1.ATE.2 THE MECHANISMS OF SOURCE REVALUATION IN EVALUATIVE CONDITIONING

Balas, R., Sarzyńska, J., Taraday, M., Łakuta, P., Rosocha, A., & Osęka, L.

Institute of Psychology Polish Academy of Sciences

Presenting author: Adriana Rosocha

Evaluative conditioning (EC) is defined as a change in object's evaluation due to its repeated pairing with an affective stimulus (an US). Although EC effects are robust and well-replicated the attributes and mechanisms of evaluative learning are under constant dispute. The presented research (N = 240) refers to an impact of US revaluation on conditioned response to paired CS. We aimed to see if CS-US associative strength and

propositional knowledge both moderate US revaluation. To do that we manipulated two factors: a) US revaluation strength and b) the way US revaluation was presented (repeated exposures vs instruction). The results indicate that stronger revaluation of US generates stronger CS change. Moreover, revaluation with repeated exposures is more effective than revaluation based on verbal instruction. These results suggest interdependent mechanisms of EC: associative and propositional.

OS1.ATE.3 REGULAR EXERCISE IS ASSOCIATED WITH GREATER ABILITY TO CONTROL NEGATIVE EMOTIONS: AN ERP EVIDENCE

Ligeza, T.S., Kałamała, P., Tarnawczyk, O., Maciejczyk, M., & Wyczesany, M.

Jagiellonian University in Krakow, Poland

Presenting author: Tomasz S. Ligeza

The study aimed to investigate the relationship between the frequency of physical exercise and the ability to control negative emotions in adult women. We assessed 26 frequently active and 26 infrequently active adult women using behavioral and electrophysiological measures during an emotion regulation task. To control negative emotions, participants were trained in reappraisal, a cognitive strategy which involves reinterpretation of emotional stimuli (here negative emotional pictures). Although no significant effects were observed in the case of behavioral results, some of the late positive potential (LPP, an electrophysiological marker of emotional response) showed that the more frequently active group displayed better efficacy of negative emotion regulation (i.e., greater difference in response to reinterpreted vs passively watched negative pictures). The study suggests that frequent physical activity may lead to better efficacy of controlling negative emotions in women.

OS1.ATE.4 IN SEARCH OF EFFECTS SPECIFIC TO COGNITIVE CHANGE DURING REAPPRAISAL: A MAGNETOENCEPHALOGRAPHY STUDY

Wyczesany, M.¹, Ligeza, T.S.¹, Wiens, N.², & Junghöfer, M.²

1 Jagiellonian University in Krakow, Poland; 2 University of Münster

Presenting author: Miroslaw Wyczesany

Reappraisal is an emotion regulation strategy, based on the cognitive change (modifying the interpretation of affective stimuli). However, before the cognitive change can occur, reappraisal requires effortful elaboration of emotional stimuli. As such, cognitive effort itself can lower intensity of emotional reactions. In the study, we aimed at isolating effects specific to cognitive change from unspecific effects of cognitive effort. Participants were trained in either a reappraisal task, or a cognitive elaboration task without the cognitive change during negative pictures presentation. Using magnetoencephalography and source analysis we found that brain activations associated with emotional processing were indistinguishable across the two groups shortly after picture onset (<300ms). However, at a later time (300-600ms) the reappraisal group showed greater reduction of visual cortex activity in response to negative stimuli. The results suggest that the effect specific to cognitive change are observed relatively late and are preceded by unspecific effects of cognitive effort.

OS1.ATE.5 THE NEURAL CORRELATES OF EMOTIONAL FLEXIBILITY: FMRI STUDY

Biró, B.¹, Cserjési, R.¹, & Kökönyei, G.Y.^{1,2}

1 Eötvös Loránd University, Budapest, Hungary; 2 Semmelweis University Budapest, Hungary

Presenting author: Brigitte Biró

The ability to effectively shift between different emotions can reduce negative affects, stress and depression while enhancing communication and positive emotions. Therefore, we aimed to develop a new task to measure how a person can shift between emotional valences (negative and positive) when the context changes. Thirtysix healthy people participated in our study. Whilst performing the Emotional Shift Task (EST) fMRI technique was used. The EST consists of pairs of pictures. In each pair the first picture is always a detail from the second (whole) picture. The valence of the firstly presented detail changes when it is placed into a context and so should change the elicited emotion. The reaction time and the number of the correct answers were also registered. Based on the literature working with the same interests as our, we hypothesized that the amygdala, insula, ACC,

dmPFC, and striatal regions would be activated when shifting.

OS1.ATE.6 NEURONAL NETWORKS FOR MINDFULNESS ACCEPTANCE AND COGNITIVE REAPPRAISAL IN MAJOR DEPRESSIVE DISORDER? AN FMRI STUDY OF EMOTION REGULATION

Kulesza, M.¹, Rękawek, K.², Holas, P.², Żołnierczyk-Zreda, D.³, Poleszczyk, A.⁴, Sokół-Szawłowska, M.⁴, Marchewka, A.¹, & Wypych, M.¹

1 Nencki Institute of Experimental Biology of Polish Academy of Sciences, Poland; 2 University of Warsaw, Poland; 3 Central Institute for Labour Protection? National Research Institute, Poland; 4 Institute of Psychiatry and Neurology, Poland

Presenting author: Maria Kulesza

Emotion regulation (ER) is disrupted in major depressive disorder (MDD), causing variety of emotional problems such as ruminative negative thinking. Here, we administered two ER strategies – mindfulness acceptance (MA), focused on being aware to “here and now”, and cognitive reappraisal (CR), based on reinterpreting emotionally negative stimuli. Currently depressed patients (n=66) underwent 30min training in both strategies and were asked to use them alternately during fMRI procedure. Comparison of MA and CR to control condition showed distinct neuronal signatures. MA engaged insula, angular gyrus (AG), posterior cingulate cortex (PCC) and precuneus - regions related to processing information about the self. CR showed activations in AG, thalamus, PCC, superior and middle frontal gyri – regions involved in e.g. working memory and inward attention. This shows that both strategies could be distinguished on neuronal level in MDD, involving brain regions normally active in healthy people during ER tasks.

OS1.ATE.7 THE INNER COMPONENTS OF THE AESTHETIC EXPERIENCE

Bechi Gabrielli, G.¹, Giulietti, G.¹, Mastandrea, S.², Biasci, V.², Bozzali, M.^{1,3}, & Fagioli, S.^{1,2}

1 Neuroimaging Laboratory, IRCCS Santa Lucia Foundation, Rome, Italy; 2 University of Sussex, Brighton; 3 University of Roma TRE, Rome, Italy.

Presenting author: Giulia Bechi Gabrielli

Background: Aesthetic judgment is biased by context and emotional content. We investigated the relationship between internal features of aesthetic experiences (attention, emotion, understanding) and aesthetic judgment.

Method: 23 art-naive participants performed an affective misattribution task. They judged pleasantness of neutral stimulus preceded by positive, negative and neutral artistic and non-artistic pictures. Participants were administered with Aesthetic Experience Questionnaire (AEQ). T1-3D images were acquired for ten participants through 3T-MRI scanner.

Results: Positive pictures liked more, irrespective of artistic context. Positive bias towards negative artistic pictures was associated with the attentional dimension of aesthetic experience. Imaging analysis revealed a negative correlation between cortical gyrification and AEQ empathetic dimension in right middle temporal gyrus, SMA and paracentral lobule.

Discussion: Enjoying sadness in visual art depends on attentional dimension of aesthetic experience. Moreover, aesthetic experience was mediated by cortical complexity: less complexity of attentional areas was related to an empathic approach of artwork.

OS1.ATE.8 SETTING THE ALARM WHILE YOU SLEEP

Dumay, N.^{1,2}, Nash, A.¹, & Starr, L.¹

1 University of Exeter, United Kingdom; 2 Basque Center on Cognition, Brain and Language (BCBL), Spain

Presenting author: Nicolas Dumay

This study examined whether new alarming words require sleep to hijack attention. Participants learnt two sets of associations between made-up words ('drott') and alarming or neutral pictures ('a dead sheep' vs. a 'munching cow') 12 hours apart. The Sleep participants learnt Set-1 words at 8 pm, whereas the Wake participants learnt them at 8 am. Acquisition was easier in the morning, but alarming and neutral associations had similar learning rates. Stroop colour classification administered after learning Set 2 showed hints of immediate emotional interference, but a robust effect only after sleep and no effect after wake. An auditory analogue involving pause detection showed the same interference, again only after sleep. Meanwhile, speeded recognition showed more reminiscence after sleep, and in that case, faster latencies for alarming words, thus confirming attentional capture. In sum, sleep (or some associated act) gives alarming words the power to hijack attention in the long term.

St Tropez Room

Multitasking

OS1.StT.1 ATTENTIONAL FLEXIBILITY IS IMBALANCED: ASYMMETRIC COST FOR SWITCHES BETWEEN EXTERNAL AND INTERNAL ATTENTION

Verschooren, S., Liefoghe, B., Brass, M., & Pourtois, G.
Ghent University

Presenting author: Sam Verschooren

Whereas the effects of attention switches occurring within perception or memory are relatively well understood, much less is known about switches of attention between them. We present here a new paradigm, in which participants performed a simple probe-to-target matching task where targets were either perceived on screen or accessed in working memory. Across successive trials, repetitions or alternations (in both directions) between these two conditions were created, and eventually compared to each other. Experiment 1 revealed an asymmetric cost, being substantially larger when switching from (external) perception to (internal) memory than the other way around. In Experiments 2-4, we ruled out an imbalance in practice, learning, and preparation as alternative interpretations for this asymmetry. We provide an initial proposal towards explaining this robust finding, but further research will be necessary to meet this challenge.

OS1.StT.2 CAN PARTICIPANTS FLEXIBLY ADAPT THEIR TASK CHOICE IN THE SELF-ORGANIZED TASK SWITCHING PARADIGM?

Kiesel, A.¹, Mittelstädt, V.¹, & Miller, J.²

1 University of Freiburg, Germany; 2 University of Otago, New Zealand

Presenting author: Andrea Kiesel

We recently proposed a variant of the voluntary task-switching procedure in which participants freely choose which task to perform, yet the stimulus for the previously performed task is presented with increasing delay depending on the number of successive repetitions. In two experiments, we assessed how flexibly participants adapt to the tradeoff between waiting time for repetition stimuli and task-switch costs when freely choosing task

order. To manipulate switch costs, we varied the response-to-stimulus interval (RSI) either blockwise or trialwise. Switch rate decreased and waiting time increased with larger switch costs in both conditions. However, the waiting times for the repetition stimulus matched the switch costs only for blockwise but not for trialwise variations of switch costs. These results suggest that people use a general strategy of preferring to switch more often when switching is predictably easier, possibly implemented by preparatory task selection processes carried out in advance of each trial.

OS1.StT.3 STRUCTURAL CONSTRAINTS AND PLASTICITY IN MULTIMODAL MULTITASKING: PRACTICING MODALITY MAPPINGS IN TASK SWITCHING

Koch, I., Fintor, E., & Stephan, D.N.

RWTH Aachen University, Aachen, Germany

Presenting author: Iring Koch

Multitasking is typically multimodal. Recent studies showed that performance costs of multitasking (e.g., when switching tasks) are smaller with modality-compatible stimulus-response (S-R) mappings. Modality compatibility (MC) refers to the similarity of the stimulus modality and the sensory response effects (e.g., speaking produces sounds, compatible with auditory-vocal mapping). We approach MC effects from a learning perspective, arguing that learnt response-effect (R-E) contingencies create mapping preferences. Therefore, we explored the influence of preceding mapping learning on task switching costs. In Study 1, we varied a MC compatible or incompatible S-R practice across groups and found a decreased MC effect with incompatible S-R practice. In Study 2, we varied compatible vs. incompatible R-E practice and found that it affects subsequent mapping preferences in a free choice condition but has no influence on task switch costs. Together, the data suggest that long-term modality mappings can be easily changed based on short-term associations

OS1.StT.4 INDUCING PREDICTION ERRORS DURING PREPARATION FOR A TASK SWITCH

Kleinsorge, T. & Scheil, J.

Leibniz Research Centre for Working Environment and Human Factors, Germany

Presenting author: Thomas Kleinsorge

We examined effects of distractor stimuli that were presented during the preparation interval of a cued task-switching procedure. These stimuli formed either a regular 3-element sequence (80 % of trials) or deviated from this sequence with respect to the last stimulus (20 %). When the distractor stimuli shared elementary features (edges, curvature, lines) with the task cues, we observed a) a negative preparation effect (larger RT and switch cost with a long as compared to a short preparation interval) and b) smaller switch costs with irregular as compared to regular sequences. Both effects were absent when the task-irrelevant stimuli consisted of features (colors) that did not overlap with the task cues. We assume that sequences of distractor stimuli with overlapping features attract attention and induce predictions of the following elements, resulting in prediction errors in case of a deviant, which in turn increase the amount of controlled processing.

OS1.StT.5 THE ROLE OF CUE SWITCHING AND TASK-PAIR SWITCHING AT THE GLOBAL LEVEL OF DUAL-TASK PROCESSING

Hirsch, P. & Koch, I.

RWTH Aachen University, Germany

Presenting author: Patricia Hirsch

By implementing task-pair switching into the psychological refractory period (PRP) paradigm, previous research showed that performance is worse in task-pair switches (e.g., task-pair 1 with Task A as Task 1 and Task C as Task 2 -> task-pair 2 with Task B as Task 1 and Task C as Task 2) than task-pair repetitions (e.g., task-pair 2 -> task-pair 2). This task-pair switch cost suggests that the identity of the individual tasks performed in a dual task is jointly represented in a single mental representation. However, since previous research used one cue per task-pair, it remains unclear whether the observed switch cost is due to the switching of task-pairs or cues. In the present study, we, therefore, used two cues per task-pair. In addition to cue switch costs, we observed task-pair switch costs, indicating that task-pair switching per se produces a cost that cannot be explained by cue switching itself.

OS1.StT.6 DISTRIBUTING ATTENTION: THE CEREBELLUM'S ROLE IN MOTOR-COGNITIVE DUAL-TASKING

Künstler, E.C.S., Klingner, C.M., Günther, A., Finke, K., Witte, O.W., & Bublak, P.

Jena University Hospital, Jena, Germany

Presenting author: Erika Künstler

Beyond coordinating movement, the cerebellum supports executive functions such as motor-cognitive dual-tasking. The precise role of the cerebellum is, however, unclear; does it integrate individual task networks into one distinct dual-task network? To test this, 26 cerebellar infarct patients and 26 healthy controls performed a visual task and a motor task. Patients showed no residual fine motor deficits. Both groups showed similar visual processing rates and visual short-term memory storage capacities in both single- and dual-task conditions, and performed comparably in the motor task in the single-task condition. However, patients were less accurate in the motor task in the dual-task condition. Resting state fMRI analyses indicated a correlation between the motor dual-task costs and the connectivity between the cerebellum and the ventral attention network in healthy controls, but not in patients. These findings suggest that the cerebellum plays a decisive role in coordinating cognitive resources across tasks during motor-cognitive dual-tasking.

OS1.StT.7 A GESTALT ACCOUNT OF ACTION CONTROL: EVIDENCE AGAINST STRUCTURALISM

Huestegge, L.¹, Pieczykolan, A.², & Koch, I.²*1 Würzburg University, Germany; 2 RWTH Aachen University, Germany*

Presenting author: Lynn Huestegge

Structuralist accounts of behavior are pervasive in cognitive psychology. For example, multitasking theories typically assume that dual-task processing essentially consists of two combined single-task processing streams, plus some additional mechanism to account for performance costs (e.g., prolongation/interruption of task processing stages, or altered activation/inhibition dynamics etc.). Here, this structuralist assumption is put to a test by having participants switch between single and dual action demands. We did neither observe partial repetition benefits nor costs. Instead, dual action demands appeared to be represented similar to a third action demand, unrelated to its two components. We interpret these observations by proposing a Gestalt view of action control.

OS1.StT.8 INFLUENCE OF POSTURAL CONTROL DEMAND
ON COGNITIVE CONTROL IN TASK SWITCHING - SHOULD
WE SIT OR SHOULD WE STAND

Stephan, D.N. & Koch, I.

RWTH Aachen University, Germany

Presenting author: Denise Nadine Stephan

In the current study we investigated postural control on cognitive control processes in task switching. The study was conducted using cued auditory-manual task switching under different postural control demands (sitting vs. standing). This design allowed us to explore the effect of postural control on switch costs, mixing costs and the between-task congruency effect. We replicated these standard effects in task switching in all experiments. Importantly, we demonstrated a selective effect of postural control demands in task switching in terms of an increased congruency effect when standing as compared to sitting. This finding suggests that particularly in situations that require keeping two tasks active in parallel, the postural control demands have an influence on the degree to which cognitive control enforces a more serial (shielded) mode. Our results will also be discussed considering the specific influence of stimulus modality (auditory vs. visual) contrasting another current study which used visual-manual task switching.

Tarraco Room

Action

OS1.TAR.1 CONFLICT ADAPTATION FOLLOWING ACTION OBSERVATION

Cracco, E.¹, Braem, S.², & Brass, M.¹

1 Ghent University, Belgium; 2 Vrije Universiteit Brussel, Belgium

Presenting author: Emiel Cracco

Research suggests that we can represent the actions of multiple observed agents in our own motor system. However, it remains unclear how we process observed actions that we cannot simultaneously execute. In recent work, we found that observing such actions activates brain regions associated with motor conflict, suggesting that not only planning but also observing conflicting actions elicits conflict. Here, we ask whether experiencing motor conflict during action observation leads to conflict adaptation. To test this hypothesis, we did two experiments in which participants performed a prime-probe task, after observing either two identical or two different actions. Both experiments revealed a reversed conflict adaptation effect, with larger prime-probe congruency effects after observing two different compared with two identical actions. This is consistent with the adaptation by binding theory of conflict adaptation and suggests that observing conflicting actions modulates cognitive control on unrelated tasks.

OS1.TAR.2 CEREBELLAR CONTRIBUTION TO AFFECTIVE PROCESSING REVEALED BY NON-INVASIVE BRAIN STIMULATION

Cattaneo, Z., & Ferrari, C.

University of Milano Bicocca, Italy

Presenting author: Zaira Cattaneo

Growing evidence suggests that the cerebellum contributes to cognitive, affective and social processing. We will present a series of TMS experiments in which we investigated the possible causal contribution of different cerebellar sectors to processing of socially-relevant information, such as biological motion and emotions conveyed by body postures. In a first study, TMS applied over the cerebellar vermis interfered with participants'

ability to discriminate biological motion. In a following study, we extended the investigation to the role of the cerebellum in body emotion processing, prior neuroimaging evidence suggesting that the left cerebellum may be particularly important for affective processing. We found that (left) cerebellar TMS interfered with body emotion discrimination – supporting prior TMS data on facial emotion processing - but only when the emotion expressed was negative (anger). Overall, our findings point to a critical role of the cerebellum in social and affective processing, with important clinical implications.

OS1.TAR.3 USE OF CONTEXTUAL PRIORS DURING ACTION PREDICTION IN CHILDREN: THE ROLE OF THE CEREBELLUM.

Urgesi, C.^{1,2}, Butti, N.², Amoruso, L.³, Finisguerra, A.², Romaniello, R.², & Borgatti, R.²

1 University of Udine, Italy; 2 Scientific Institute, IRCCS E. Medea, Italy; 3 Basque Center on Cognition, Brain and Language (BCBL), Spain.

Presenting author: Cosimo Urgesi

Understanding others' behaviors involves matching social expectations with perceived movement kinematics. Here, we investigated the role of the cerebellum in action understanding by comparing children (N=17) with congenital cerebellar malformations to age- and IQ-matched children (N=17) with other congenital neurodevelopmental disorders and to children with typical development (N=17). In a familiarization phase, participants were exposed to videos showing a child actor performing two different actions, which were associated to specific contextual cues with pre-established probability of co-occurrence. In a testing phase, participants had to predict the final outcome of the same actions presented in conditions of kinematic ambiguity, thus likely using the contextual priors acquired during the familiarization phase. Differently than both control groups, the responses of cerebellar patients were not biased toward these contextual priors, suggesting that cerebellar alterations may cause specific impairments in

the probabilistic learning of contextual priors, with consequence on motor, cognitive and socio-emotional development.

OS1.TAR.4 GET READY FOR SELF-CONTROL: MIDFRONTAL THETA OSCILLATIONS ARE NEEDED FOR REACTIVE, BUT NOT PROACTIVE NEURAL ADJUSTMENTS DURING BEHAVIOURAL CONFLICTS

Kaiser, J. & Schütz-Bosbach, S.

Ludwig-Maximilian-University Munich, Germany

Presenting author: Jakob Kaiser

Successful self-control during action conflicts relies on neural adjustments of motor and sensory processing. These adjustments can occur reactively (i.e., after conflict occurrence) or proactively (i.e., in preparation prior to conflicts). While midfrontal theta oscillations are known to facilitate reactive top-down control, their relevance for proactive control is unclear. Using EEG (n = 33), we investigated the role of midfrontal oscillations during conflict preparation in a motor conflict task, where a predictive cue either indicated no or an increased likelihood for an action conflict. Increased conflict likelihood led to a preparatory modulation of neural oscillations related to both motor processing (central beta) and sensory processing (posterior alpha). While midfrontal control oscillations significantly increased after conflict occurrence, increased conflict likelihood did not lead to preparatory midfrontal theta increases. This dissociation suggests that, while midfrontal oscillations are related to reactive conflict adjustments, proactive neural adjustment can be implemented without midfrontal oscillatory control.

OS1.TAR.5 CONTRIBUTION OF PERCEPTUAL AND SENSORIMOTOR INFORMATION TO PROSPECTIVE ACTION JUDGEMENTS

Geers, L., Pesenti, M., Vannuscorps, G., & Andres, M.

Université catholique de Louvain (UCLouvain), Belgium

Presenting author: Laurie Geers

The present research aims to study the processes underlying judgements about one's ability to perform an action, which is considered as a fundamental aspect of adaptive behaviour. In a series of experiments, we asked participants to make prospective grasping judgements and we manipulated perceived object size using the Ebbinghaus illusion (a central circle surrounded by small/large circles) and hand posture using concurrent motor tasks. We showed that (1) largeness vs. smallness illusion and squeezing vs. spreading fingers led

participants to underestimate their ability to grasp the central circle (2) the motor task influenced grasping judgements only when the exact same effectors were involved and (3) hand posture did not influence grasping judgements when no illusion distorted perceived size, suggesting that integration of sensorimotor information is weighted on the uncertainty introduced by the illusion (Experiment 3). We concluded that action judgements rely on the interaction of perceptual, cognitive and motor processes.

OS1.TAR.6 TRACKING THE EMERGENCE OF DECLARATIVE AND PROCEDURAL REPRESENTATIONS IN FRONTOPARIETAL CORTICES DURING THE IMPLEMENTATION OF NOVEL TASK SETS

González-García, C., Formica, S., Wisniewski, D., & Brass, M.

Ghent University, Belgium

Presenting author: Carlos González-García

An astonishing aspect of cognitive flexibility concerns the ability to rapidly transform complex symbolic instructions into novel behaviors. Previous research proposes that this process is supported by two differentiated neurocognitive states, namely, the mere maintenance of task (declarative) knowledge, and the subsequent activation of an action-oriented (procedural) state. However, direct evidence for such distinction is still lacking. We conducted an fMRI study in which participants had to encode and execute novel rules at the beginning of each trial. We then implemented a canonical template tracking procedure to capture the emergence of these rules, in a procedural and in a declarative format, before execution. This analysis revealed that, prior to execution, unique and differentiated declarative and procedural representations emerged in frontoparietal areas. Our results provide, for the first time, evidence of independent states supporting task control and shed light on the mechanisms involved in the rapid implementation of novel instructions.

OS1.TAR.7 EVENT COMPLETION DESPITE TEMPORAL ELLIPSES

Papenmeier, F.¹, Huff, M.², & Gäbele, C.¹

1 University of Tübingen, Germany; 2 German Institute for Adult Education, Bonn, Germany

Presenting author: Frank Papenmeier

During the comprehension of dynamically unfolding events – such as when watching a soccer game – observers regularly fill in perceptual gaps with information that was causally implied but actually missing

in the perceptual stream. With our present research, we investigated the influence of temporal ellipses on this so-called event completion effect. Participants watched short soccer video clips and performed a contact detection task for a critical moment of ball contact that was present in 50% of trials. Following this critical moment, a filmic cut appeared and we manipulated the continuation of the clip: causal continuation without ellipses (ball starts flying), half-event ellipsis (ball in the middle of the pass), full-event ellipsis (ball contact with next player), or non-causal continuation (e.g., players moving during a stoppage of the game). We observed event completion in all three causal continuation conditions irrespective the temporal ellipses, indicating that completion is robust against short temporal ellipses.

OS1.TAR.8 NEURAL DYNAMICS SUPPORTING HABIT ACQUISITION AND ADJUSTMENT USING IMPLEMENTATION INTENTIONS

van de Vijver, I. & de Wit, S.

University of Amsterdam, the Netherlands

Presenting author: Irene van de Vijver

Goal-directed behavior is guided by the anticipation of a desired outcome, whereas extensive repetition can turn instrumental actions into outcome-insensitive habits. The use of implementation intentions (concrete 'if-then' plans) may help to overcome habits. In the current study we investigated, first, changes in neural interactions within and between brain areas with increasing habit formation, and second, differences in these interactions during subsequent behavioral adjustment supported by implementation versus goal intentions. We measured EEG while participants performed an outcome-revaluation paradigm, the Sneaky Skateboard Game. After outcome revaluation, participants formulated implementation or goal intentions. Preliminary results suggest that implementation intentions indeed aided behavioral adjustment, especially during trials that required making (as compared to suppressing) a response. At the neural level, we predict decreasing fronto-posterior and increasing visuo-motor connectivity with habit formation. Similarly, we expect that using implementation intentions evokes increased visuo-motor communication, and decreased frontal conflict-related signals after outcome revaluation.

Barcelona Room

Attention

OS1.BAR.1 ATTENTION DEFICITS IN SCHIZOPHRENIA: ALTERED RESISTANCE TO INTERFERENCE, INCREASED SENSITIVITY TO COGNITIVE LOAD, OR BOTH?

Michael, G.A.¹, Dorey, J.-M.^{2,3}, D'Amato, T.^{2,3}, Fabre, D.³, & Padovan, C.³

1 Université Lyon 2, France; 2 Université Lyon 1, France; 3 Centre Hospitalier Le Vinatier, France

Presenting author: George A. Michael

There is evidence that attentional and executive functions are disturbed in schizophrenia. However, recent models question the complete independence of these processes. For instance, it was suggested that inhibitory processes that subtend resistance to interference might be hierarchically dependent from available cognitive resources. Here, using a visual search task under dual tasking conditions with varying degree of difficulty, we show that patients with schizophrenia exhibit both a decreased resistance to interference (i.e., disturbed inhibitory control processes) and increased sensitivity to cognitive load (i.e., disturbed managing of attentional resources). Regression analyses also show that the two processes are completely independent from each other in patients with schizophrenia, whilst the expected hierarchical link is found in the performance of the controls. Finally, in patients, increased sensitivity to cognitive load and general response time is predictive of addictive behavior. The results pinpoint dissociable attentional processes and their role in behavior.

OS1.BAR.2 BETWEEN ATTENTIONAL AND SELF-REFERENTIAL PROCESSES: HOW DOES THE TEMPOROPARIETAL JUNCTION CONTRIBUTE TO BODY-AWARENESS?

Salgues, S., Plancher, G., & Michael, G.A.

Université Lyon 2, France

Presenting author: Sara Salgues

The temporoparietal junction (TPJ) is a multisensory integration area, contributing to many distinct cognitive processes such as attention or theory of mind. It would have a key role in self-awareness when communicating

with other areas, participating in embodiment with the extrastriate body area (EBA) or self-location with the anterior insula (AI). However, as asomatognosias experiences are affiliated with TPJ activity, it remains unclear how this massively connected area contributes to self-awareness. Resting EEG functional connectivity between the TPJ and the AI, and between the TPJ and the EBA was correlated to body-awareness assessed through spontaneous sensations (SPS). Higher connectivity within these cerebral areas was associated to lower perception of SPS over the hand, more in the TPJ-AI than in the TPJ-EBA functional connectivity. These correlations were more numerous in the alpha and theta frequency bands. The contribution to self-awareness of the TPJ, through attentional processes and asomatognosias experiences is discussed.

OS1.BAR.3 THE BIAS FOR ONE'S OWN NAME ACROSS COGNITIVE DOMAINS

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1 King's College London, United Kingdom; 2 University of Oxford, United Kingdom

Presenting author: Annabel Nijhof

Research indicates humans have a strong egocentric bias, processing self-related stimuli in a specialised, preferential manner. Although the phenomenon of self-bias is widely studied, it is also highly fractionated: different aspects of self-processing are usually studied in isolation. Consequently, it is currently unknown how self-biases are related across cognitive domains. In this study, the bias for participants' own name (versus other names) was measured across the attentional and perceptual domains, using two Attentional Blink tasks and a shape-label matching task. Strong evidence of a self-bias was found on all tasks, implicating a processing advantage for one's own name. However, self-bias estimates across the two domains were found to be unrelated, calling into question the idea of 'self-bias' as a singular concept consistent across cognitive domains. These findings may have consequences for models of self-processing generally, and for specific models of atypical self-

processing such as those suggested for Autism Spectrum Disorder.

OS1.BAR.4 DOES AN ARBITRARY SELF-ASSOCIATION OF STIMULI IMPACT THE DISTRIBUTION OF ATTENTION?

Orellana-Corrales, G.¹, Matschke, C.², & Wesslein, A.K.¹
 1 Eberhard Karls Universität Tübingen, Germany; 2 Leibniz-Institut für Wissensmedien, Germany
 Presenting author: Gabriela Orellana-Corrales

After geometric shapes have been associated to persons, reaction times (RT) are faster when verifying the correct self-associated shape-label pairing than any other-related pairing. We tested whether only presenting the newly self-associated shape suffices to elicit prioritization effects. After associating two shapes with themselves vs. a stranger, 28 students performed a cuing task. Participants had to indicate the location of a dot occurring either at a location previously occupied by self- vs. by stranger-related stimuli, as represented by labels vs. shapes vs. pairings (presentation for 1 s). RTs were significantly faster when the dot occurred following stranger-related stimuli as opposed to self-related stimuli, $p = .039$, likely indicating inhibition of return. This effect was not modulated by the type of representation, $p = .410$. This is original evidence that the self- vs. stranger association of geometric shapes impacts the distribution of attention even after just a short association phase.

OS1.BAR.5 CROSSMODAL NEGATIVE PRIMING BASED ON STIMULUS IDENTITY VS. LOCATION

Wesslein, A.K.¹ & Frings, C.²
 1 Eberhard Karls Universität Tübingen, Germany; 2 University of Trier, Germany
 Presenting author: Ann-Katrin Wesslein

Negative priming (NP) describes the finding that performance is impaired on the second of two displays (i.e., the probe), when the target stimulus is related to a distractor stimulus from the first display (i.e., the prime). In identity-based NP, participants respond to the stimulus identity and the probe target is represented by the prime distractor. In location-based NP, participants respond to the stimulus location and the probe target is presented from the same location as the prime distractor. Both identity- and location-based NP have been demonstrated in different sensory modalities. We will present a series of experiments demonstrating crossmodal identity-based NP, indicating that the mechanisms underpinning NP may function at an amodal level. Further, we will present results from a location-based study, where crossmodal as

compared to unimodal NP effects were reduced. We discuss the limitations of the studies as well as their implications for NP theories.

OS1.BAR.6 EVOLUTIONARY ORIGIN OF ATTENTION

Gabay, S.
 University of Haifa, Israel
 Presenting author: Shai Gabay

Human cognition has an evolutionary origin. Accordingly, older evolutionary structures may play a role in cognitive processes even in humans. Nevertheless, current research in psychology and cognitive science focuses largely on the involvement of cortical regions in cognition – neglecting the potentially rich influence and participation of subcortical structures. This “cortico-centric” bias toward the involvement of cortical regions in cognition may stem from the methodological tools typically applied to study brain functioning and, most importantly, their limitations. Herein, I will present a study examining different attentional abilities of the Archer Fish. I will discuss the similarities and differences between human and fish attentional abilities and the implications of these findings on our understanding of the human attentional system.

OS1.BAR.7 INFLUENCE OF TYPICALITY IN RAPID OBJECT CATEGORIZATION IN INDIVIDUALS WITH AND WITHOUT AUTISM SPECTRUM DISORDER

Beck, A.-K.¹, Carmo, J.C.², Czernochowski, D.¹, & Lachmann, T.¹
 1 University of Kaiserslautern, Germany; 2 Universidade de Lisboa, Portugal
 Presenting author: Ann-Kathrin Beck

Already in 1996, Thorpe showed that healthy individuals are able to categorize items even using ultra-rapid presentations (20 ms). In individuals with autism spectrum disorder (ASD), these categorization processes may be impaired (Plaisted, 2000). This difficulty seems to be caused by abnormal categorization of atypical rather than typical items (Martinovic et al., 2008). To combine these two lines of research, in the current study we compared behavioural as well as EEG data of two different categories (food/animals) with short (33 ms) and long (83 ms) presentation rates. This discrimination task (target/no-target) was most difficult for atypical food items, specifically in high functioning individuals with ASD (N = 14) compared to matched controls (N = 17). This behavioural finding was mirrored in both early and late ERP components, suggesting that not only early categorization but also further perceptual processing

processes might be affected by typicality in individuals with ASD.

OS1.BAR.8 LOW- AND MEDIUM-RATE AUDITORY STEADY-STATE RESPONSES IN DISORDERS OF CONSCIOUSNESS

Górska, U.^{1,2} & Binder, M.¹

1 Jagiellonian University, Poland; 2 Donders Centre for Neuroscience, RU, The Netherlands

Presenting author: Urszula Górska

Diagnosis of consciousness in non-responsive patients with prolonged disorders of consciousness (PDOC) remains challenging. In this study, we investigated the capacity of auditory steady-state responses (ASSRs) for this purpose. We recorded EEG from 9 unresponsive wakefulness syndrome (UWS) and 8 minimally conscious (MCS) patients when stimulated with low- and medium-rate amplitude-modulated periodic tones: 4, 6, 8, 12, 20, 40 Hz. Next, we compared Relative Power (RP) and inter-trial Phase Coherence (PC) measures of brain response with behavioral clinical diagnosis of CRS-R scale. We observed strong positive correlations between individual total CRS-R scores and both mean PC (averaged across all stimulation rates) and 40 Hz RP measure. Additionally, these measures significantly differentiated between UWS and MCS patients' groups. Overall, low- and medium-rate ASSRs might serve as an objective estimate of the level of consciousness in PDOC. This emphasize the role of auditory system integrity in assessing brain capacity for conscious processing.

Palma de Mallorca Room

Spatial Processing

OS1.PAL.1 NAVIGATIONAL ASYMMETRIES IN A SIMULATED 3D ENVIRONMENT

Nicholls, M.E.R.¹, Gwinn, O.S.¹, Bartlett, M.L.¹, & Thomas, N.A.²

1 Flinders University, Australia; 2 Monash University, Australia

Presenting author: Mike Nicholls

The two cerebral hemispheres have different capacities for controlling spatial attention. This asymmetry is thought to cause a shift of attention towards the right side of objects located in far space – and a corresponding lack of attention to objects located on the left. As a result of this imbalance, when passing through an aperture, people veer slightly to the right of true centre. The misplacement of centre is related to pseudoneglect and occurs when walking, controlling a wheelchair and operating a toy vehicle. The current study determined whether the bias also exists in a simulated 3D environment. Right-handed participants (n=98) used a joystick to navigate through a virtual ‘doorway’ or ‘corridor’ separating two rooms. In both cases, a rightward deviation was observed. The results demonstrate that rightward deviations in the real world generalise to a virtual environment, with implications for the representation of peri- and extra-personal space.

OS1.PAL.2 PROCESSING SPATIAL CONFIGURATIONS IN VISUAL WORKING MEMORY

Timm, J.D. & Papenmeier, F.

University of Tuebingen, Germany

Presenting author: J. David Timm

Humans process single objects in relation to other simultaneously maintained objects in visual working memory – a spatial configuration. Are humans able to reorganize a global spatial configuration into a relevant partial configuration? We present three experiments investigating this process. Participants encoded objects’ locations and performed a change detection task for one object probed at retrieval. This object was displaced in half of the trials. We cued the side of the object probed

either during encoding or afterwards (retro-cue), allowing for the reorganization of spatial configurations either during encoding or in working memory. At retrieval, either all objects, cued objects only, non-cued objects only or a single object were shown. Furthermore, we investigated the use of the cue and configurations themselves. We observed a reliable reorganization both when cued during encoding and also under all retro-cue conditions. Our findings provide evidence for a memory-based reorganization of spatial configurations.

OS1.PAL.3 SPATIAL LATENT PROCESSES IN VERBAL WORKING MEMORY

Guida, A., Besson, F., Lavigne, F., & Mathy, F.
University Rennes

Presenting author: Alessandro Guida

Van Dijck and Fias (2011, Cognition) showed that verbal information in working memory is spatialized. This result has been confirmed by several studies. For example, Guida, Leroux, Noël, and Lavielle-Guida (2016, Cognitive Science) presented sequences of 5 consonants in an auditory item probe recognition task. Results revealed a SPoARC (Spatial-Positional Association of Response Codes) effect interpreted as a left to right spatialization: items from the first positions triggered faster responses of the left hand, while items from the last positions triggered faster responses of the right hand. Guillermo Campitelli and I (in press, Psychonomic Bulletin & Review) have proposed a new framework to understand spatialization. Here, I will present experiments that tested left-to-right reading-participants, right-to-left reading-participants, and illiterates. These new data allow precisising the conditions under which spatialization seems to occur (or not), and I will also discuss the consequence for working memory.

OS1.PAL.4 CATCH THE STAR! SPATIAL INFORMATION ACTIVATES THE MOTOR SYSTEM

Miklashevsky, A.¹, Lindemann, O.², Fischer, M.H.¹

1 University of Potsdam, Germany; 2 Erasmus University Rotterdam, Netherlands

Presenting author: Alex Miklashevsky

Previous psycholinguistic studies have shown that grip force spontaneously changes during language processing, but effects of spatial orienting on grip force are unstudied. We induced shifts of spatial attention by presenting lateralized stars and tones or central symbols (arrows and words denoting “left” and “right”). Bimanual grip force was continuously recorded from 24 healthy adults. Star position interacted reliably with hand (at 980 ms after stimulus onset) but tone location only influenced right-hand force (already at 60 ms after stimulus onset). Left- but not right-related symbols induced strong bimanual activation (at 660 ms and 310 ms after stimulus onset for arrows and words respectively). Neuropsychological mechanisms of these asymmetries and implications for grip-force studies of language processing are discussed.

OS1.PAL.5 CROSS-MODAL CORRESPONDENCES BETWEEN TONAL STABILITY AND VISUAL SPACE: ASSOCIATING MUSICAL SYNTAX WITH SPATIAL LOCATION

Maimon, M., Lamy, D., & Eitan, Z.

Tel-Aviv University, Tel-Aviv, Israel

Presenting author: Neta Maimon

Cross-modal correspondences typically associate basic perceptual dimensions in different modalities. Here we present a new type of CMC, involving associations between a high-level, syntactic musical schema – Western music tonality -- and physical space. Using explicit and implicit measures, we investigated the association of tonal stability with vertical and horizontal spatial position. Forty participants (20 musicians) took part in each of 3 experiments. In the explicit test (Exp1), participants assigned each melodic scale degree to a location on a two-dimensional grid. In two implicit association tests, auditory (tonally stable/unstable) and visual (Exp2: high/low circle; Exp3: left/right circle) stimuli were assigned to the same response keys in congruent and incongruent conditions. Stable tones were associated with spatially higher and left-hand positions both explicitly and implicitly (better performance for congruent combinations). Results suggest that musical structure may establish concrete visuospatial connotations, thus proposing a hitherto unexplored path associating syntactical configuration with connotative meaning.

OS1.PAL.6 THE ATTENTIONAL BLINK: BINARY OR GRADUAL?

Karabay, A.¹, Martens, S.¹, Wang, J.², & Akyürek, E.G.¹

1 University of Groningen, NL; 2 Shenzhen University, CHN

Presenting author: Aytaç Karabay

Identification of the second of two targets (T2) is difficult when it follows the first one within 200-500 milliseconds. This so-called attentional blink (AB) may reflect that a missed T2 fails to reach post-perceptual processing. Alternatively, T2 may still reach working memory partially, or in a degraded fashion. To arbitrate between these possibilities, we applied mixture modeling to continuous target features (e.g., orientation). If T2 does not reach post-perceptual processing, responses should be random guesses, that is, uncorrelated with the target. If the T2 representation is only degraded, then errors should cluster around the target with a certain precision. We observed notable differences in AB tasks that are spatially variable and those that are not. In non-spatial tasks, T2 identification was binary; it either did or did not reach post-perceptual processing. In spatial tasks, however, T2 identification was graded, suggesting it was represented in working memory, but with decreased precision.

OS1.PAL.7 ELECTROPHYSIOLOGICAL CORRELATES OF SPATIAL PROCESSING DURING MULTITASKING

Romeo, Z.¹, Bonato, M.², Zorzi, M.^{1,2}, & Spironelli, C.²

1 IRCCS San Camillo Hospital, IT; 2 University of Padova, IT

Presenting author: Zaira Romeo

Multitasking is ubiquitous in everyday life and has a detrimental effect on cognitive performance. In particular, multitasking has been shown to hinder spatial monitoring in both brain-damaged and healthy participants. This study investigated, in healthy adults, the electrophysiological mechanisms associated with correct vs. error responses in the detection of peripheral visual target(s) under multitasking. Results showed increased N1 amplitude under visual (intra-modal) load, whereas auditory (cross-modal) load did not induce significant modulations. Under visual load, error responses were associated to reduced N1 and N2 amplitude for the left and right visual field, respectively. Higher N1 amplitude was instead found for errors to bilateral targets. These results support the hypothesis that a threshold criterion is involved during visual information processing. They provide an electrophysiological correlate for the allocation of capacity-limited cognitive resources involved in the concurrent processing of multiple visual stimuli. Preliminary data on stroke patients is also discussed.

OS1.PAL.8 INVESTIGATING THE SHAPE OF VISUAL FIELD CAPACITY

Del Pin, S.H.^{1,2}, Sandberg, K.¹, Skóra, Z.², & Wierzchoń, M.²*1 Aarhus University, Denmark; 2 Jagiellonian University, Poland*

Presenting author: Simon Hviid Del Pin

The circular array consists of displaying a central fixation surrounded by objects arranged in a circle. It is widely employed for visual experiments but does not account for systematic variance across positions. However, historical and contemporary literature indicates differences in participant accuracy and response times depending on where an object is displayed: the horizontal axis yields higher accuracy and faster responses than the vertical axis. We first replicated these effects and found similar effects on ratings of subjective visibility which has not previously been reported. We then introduced a novel experimental paradigm, aiming to make all objects perceived evenly by adjusting the distance from the centre of 16 positions with a staircase procedure. We mathematically describe the visual space as an ellipse rather than a circle. The resulting equation can be used when designing stimulus displays as well as adding knowledge on the spatial characteristics of the visual field.

Ibiza Room

Problem Solving

OS1.IBI.1 INTENTIONAL FORGETTING IN PROBLEM SOLVING

Tempel, T.

Ludwigsburg University of Education, GERMANY

Presenting author: TobiasTempel

Two experiments on directed forgetting of problem-solving routines are reported. In Experiment 1, participants practiced solving water-jar problems (Luchins, 1942). After working on a series of problems that all could be solved by the same formula, one group was instructed to forget the so-far presented items, whereas another group did not receive a forget instruction. After practicing a different routine in a second series of problems, participants solved test problems that could be solved by the formula from the first or from the second series of problems. The forget instruction significantly reduced the application of the formula from the first series of practice problems. In Experiment 2, participants subsequently practiced two solution formulas in two series of to-be-solved anagrams. Here, a forget instruction regarding the first series of practice anagrams reduced solution speed for test anagrams that had to be solved by the same formula as the to-be-forgotten practice anagrams.

OS1.IBI.2 CHILDREN'S SPATIAL REASONING WITH VISUAL MENTAL MODEL INPUT

Demiddele, K., Heyman, T., & Schaeken, W.

KU Leuven, Belgium

Presenting author: Kevin Demiddele

This pre-registered study (cf. osf.io/c3m9t/) follows up on earlier research on children's spatial reasoning. Preceding findings revealed a strong tendency to systematically represent only one mental model by default, even when correct reasoning requires more. We tested 160 9- and 11-year-olds with 24 reasoning exercises, to find out whether they are only incapable of producing multiple representations or also lack passive understanding. Answers were multiple choice, with the choices being visual representations of mental models by means of

icons, whereas earlier research used textual conclusions. As predicted, all multiple model type problems now had comparable scores, signaling some passive understanding, although not on a par with single model problems. Also as predicted, more errors according to the 'first free fit' strategy were made. Our results, based on a mixed model analysis, specify the details of preferred mental model theory and open up a developmental perspective for it.

OS1.IBI.3 EYE MOVEMENTS INVESTIGATION OF MORAL DECISION MAKING: A FRAMING EFFECT

Indraccolo, A., Brunetti, R., & Del Gatto, C.

Università Europea di Roma, Rome, Italy

Presenting author: Allegra Indraccolo

Studying moral decision-making, psychologists showed that the conflict experienced between emotions and reasoning seems to be deep. Indeed, during a moral decision making, opposite moral principles, namely deontological and utilitarian, seem to fight to find an acceptable answer. In our study, we use moral dilemmas to highlight the conflict between these kinds of moral inclinations. We explore whether external non-moral factors could interfere with our moral beliefs. Our hypothesis is that inducing frustration or gratification by framing negatively/positively the consequences of participants' decisions, we could make them steer towards the other conflicting answer that was refused before. In three experiments, using eye tracker technology, we evaluate decision processes underlying deontological and utilitarian principles. Results are discussed in the context of the "moral flexibility hypothesis": framing the consequences of our action can produce a change in our moral values.

OS1.IBI.4 AHA! UNDER PRESSURE: IS THE AHA! EXPERIENCE CONSTRAINED BY COGNITIVE LOAD?

Van den Bussche, E.¹, Stuyck, H.^{1,2}, & Cleeremans, A.²

1 KU Leuven, Belgium; 2 Université Libre de Bruxelles, Belgium

Presenting author: Eva Van den Bussche

We can solve complex problems by an analytical, step-by-step strategy (non-insight) or by a sudden insight or Aha-experience (insight). The underlying mechanisms of insight are debated. The business-as-usual view argues that there is nothing special about insight and that insight problem solving should similarly depend on available cognitive resources as non-insight problem solving. The special-process view proposes that insight is an implicit process and hence qualitatively different from non-insight. This implies that insight should not rely heavily on available cognitive resources. Participants received 70 word puzzles (CRAT) that could be solved both with insight and non-insight. Concurrently, we manipulated cognitive load by asking participants to remember zero, two or four numbers. Results showed that insight solutions were phenomenologically different from non-insight solutions. Crucially, increasing cognitive load slowed down non-insight, but not insight solutions. As insight was not vulnerable to cognitive load, this provides support for the special-process view.

OS1.IBI.5 WHAT TO DO AND WHAT NOT TO DO: BREAKING POSITIVELY AND NEGATIVELY FORMULATED RULES

Wirth, R., Foerster, A., Kunde, W., & Pfister, R.

Würzburg University

Presenting author: Robert Wirth

Most of our daily life is organized around rules that tell us what to do. By now, numerous studies show that humans have a tendency to abide by the rules, and that breaking them comes with cognitive costs. i.e., a marked behavioral influence of the original rule during rule violations. However, rules also specify what not to do. In the current experiments, we tested how negatively formulated rules affect behavior. Participants conducted finger movements via the touchscreen of an iPad to either follow or break a given rule, and we analyzed temporal and spatial parameters of the ensuing movement trajectories. We found that negatively formulated rules promoted the choice to violate, and violating these rules comes with a benefit rather than behavioral costs. As it turns out, it is not generally more difficult to violate rules, but this difficulty depends on how the to-be broken rule is formulated.

OS1.IBI.6 ON EVALUATING CREATIVE IDEAS: EVIDENCE FROM NEURAL OSCILLATIONS

Rataj, K.

Adam Mickiewicz University, Poznań, Poland

Presenting author: Karolina Rataj

Electrophysiological research on creativity has revealed increases in alpha power when participants generate original responses. However, it remains difficult to dissect creative thinking into specific cognitive processes for several methodological reasons. At the same time, few studies so far have examined the oscillatory activity linked to evaluating creative items. In the study presented here, the electroencephalographic (EEG) signals were recorded while participants read and evaluated novel metaphoric, literal, and anomalous sentences. The time-frequency analysis showed that novel metaphors were associated with more activity in the theta band as compared to literal sentences. Additionally, the event-related brain potential analysis revealed that creative items (novel metaphoric sentences) elicited larger N400 amplitudes than non-creative items (literal sentences). The results will be discussed in reference to other EEG studies investigating the relationship between oscillatory activity and creativity, as well as cognitive processes underlying creative idea evaluation.

OS1.IBI.7 DOES A SCENARIO INTERVENTION AFFECT THE PROCESSING OF SYLLOGISMS?

Van der Lubbe, R.H.J.^{1,2}, Hofman, E.¹, Siebelink, R.¹, & Kammeier, H.¹

1 University of Twente, The Netherlands; 2 Adam Mickiewicz University, Poland

Presenting author: Rob Van der Lubbe

A scenario intervention can be described as a method that induces the generation of creative ideas that may lead to innovative changes. In the current study, we examined whether this intervention affects the strategy and effectiveness of evaluating the validity of conclusions based on four premises (i.e., syllogisms). Twenty-one participants evaluated conclusions in two blocks separated by either a scenario or a control intervention. The electroencephalogram (EEG) was measured to examine online processing changes. Analyses of the EEG revealed a change in processing over parietal areas, specifically for the scenario intervention. Individual differences in the accuracy of evaluating the conclusions were very large and consistent across the two blocks. However, performance measures revealed no support for a major influence of the scenario intervention. The

current EEG findings suggest that a scenario intervention may lead to processing changes, while this may not yet be reflected in behavioral effects.

OS1.IBI.8 INSIGHT IN THE AGE OF DEEP LEARNING: DO SIMULATED CHIMPANZEES DREAM OF ELECTRIC BANANAS?

Colin, T.R.¹ & Belpaeme, T.²

Presenting author: Thomas Colin

We describe a simulation experiment inspired by the animal experiments of Kohler and Epstein, giving special attention to methodological considerations. Simulation studies of psychological experiments must remain close to the original, while compensating for the weaknesses of AI compared to biological intelligence or for aspects of the experiment that are difficult to model with precision (e.g. the life experience of the subjects). These compensations can result in involuntarily hiding the blindspots of contemporary artificial intelligence in comparison with biological intelligence. These blindspots include, in the context of insight, structured actions (decisions in large state spaces), motivated prediction (prediction focusing on relevant features), and the combination of adaptability and stability in the face of radical change. Taking into consideration the methodology and results, we suggest that hierarchical reinforcement learning methods based on the performance gradient do not capture aspects of temporally abstract behavior that are essential for insight in problem-solving.

ORAL SESSION 2

Thursday 26th

17:40-20:00

Auditorio

Working Memory

OS2.AUD.1 OFFLOADING WORKING MEMORY IMPROVES PERFORMANCE BUT IMPAIRS LONG-TERM MEMORY

Grinschgl, S.¹, Papenmeier, F.¹, & Meyerhoff, H.S.²

1 University of Tuebingen, Germany; 2 Knowledge Media Research Center Tuebingen, Germany

Presenting author: Sandra Grinschgl

Modern technology such as tablets allow for temporarily externalizing working memory processes (i.e. cognitive offloading). Whereas such externalizations support immediate performance on different tasks, little is known about the long-term consequences of offloading behavior. In the current set of experiments, we demonstrate a trade-off between immediate task performance and the accuracy of subsequent long-term memory. Our participants solved a pattern copy task while we manipulated the costs of cognitive offloading as well as the awareness of a subsequent memory test. Experiment 1 (n=172) shows that increasing costs for offloading result in less offloading behavior but more accurate performance in an unexpected memory test. Experiment 2 (n=172) shows that offloading behavior remained detrimental for subsequent memory performance when participants are aware of the upcoming memory test. This trade-off urges for care when using offloading devices and emphasizes the importance of metacognitive evaluations for strategy selection in situations of knowledge acquisition.

OS2.AUD.2 IS THERE PROACTIVE INTERFERENCE FROM EPISODIC LONG-TERM MEMORY TO WORKING MEMORY?

Mizrak, E., & Oberauer, K.

University of Zurich

Presenting author: Eda Mizrak

Proactive interference (PI) from earlier learned information to remembering of more recently learned information is a well-documented finding for episodic long-term memory (eLTM), however, it is unclear whether working memory (WM) is also prone to PI eLTM. Across

three experiments, we measured serial recall performance to three types of short lists; a) whose items were repeated in the same order (Hebb), b) whose items were randomized at each trial and shared the same items with the repeated list (Interference) c) whose items were randomized and did not overlap with the other lists (Control). We hypothesized that Hebb list will be learned and stored in eLTM over time ("Hebb Effect"). We tested whether learned Hebb lists interfered with remembering of same items in different positions from Interference lists. For all the experiments we found no difference between Interference and Control list performance suggesting there was no PI from eLTM to WM.

OS2.AUD.3 EFFECTS OF ATTENTIONAL REFRESHING AND ASSOCIATIVE RELATEDNESS ON RECOLLECTIVE AND NON-RECOLLECTIVE RECALL

Rosselet-Jordan, F.L.^{1,2}, Abadie, M.², Mariz Elsig, S.¹, & Camos, V.¹

1 University of Fribourg, Switzerland; 2 Aix-Marseille University, France

Presenting author: Fiona Laura Rosselet-Jordan

This study aimed at investigating the nature of the processes involved in short-term recall as a function of the availability of attentional refreshing, a working memory (WM) maintenance mechanism, and of long-term memory (LTM) knowledge. In a complex span paradigm, the availability of attentional refreshing to maintain memoranda was manipulated by varying the attentional demand of the concurrent task. Lists of 6 associatively related vs. unrelated words were presented to examine the implication of LTM knowledge. Each trial was presented three times in a row to apply a two-stage model (Brainerd, Reyna, & Howe, 2009) that distinguishes recollective (direct-access) and non-recollective (reconstruction) retrieval. Results showed that both recall and recollection were greater when refreshing was available and when related words were used as

memoranda. This suggests that recollection underpinned short-term recall.

OS2.AUD.4 DECODING SENSORY AND ABSTRACT INFORMATION FROM ACTIVITY SILENT BRAIN STATES

Kandemir, G., Karabay, A., & Akyürek, E.G.

University of Groningen (RUG), the Netherlands

Presenting author: Güven Kandemir

Distributed Working Memory (WM) models attribute different levels of WM representations to different regions of the brain. One highly debated factor is whether the information represented in different levels is retained via similar mechanisms. Recently it was shown that sensory information was maintained in activity-silent form and that the state of the network could be revealed following a perturbation by the presentation of a non-informative signal (impulse signal). We applied the same perturbation technique to representations in visual WM, which either corresponded to directly presented orientation gratings, or to stimuli that were recoded following abstract task rules that consisted of rotation instructions. The decoding of EEG recordings revealed that abstract task rules were also retained in activity-silent form and that the impulse signal boosted decoding accuracy during the activity-silent WM maintenance phase. Furthermore, the imagined orientations that were the product of the rotation task were also decodable from impulse-driven activity.

OS2.AUD.5 ROLE OF PHONOLOGICAL WORKING MEMORY IN INITIAL TASK-SET ACQUISITION: A RAPID INSTRUCTED TASK LEARNING STUDY.

Monsell, S. & Graham, B.

University of Exeter, UK

Presenting author: S. Monsell

How quickly are instructions for a task translated into an effective task set? If declarative working memory (DWM) is used to maintain the task S-R rules as initial practice compiles the rules into procedural memory, variables known to affect DWM retention and retrieval should influence task performance while it is still dependent on DWM. Participants were trained on a series of 6-choice RT tasks, with a 1:1 mapping from object pictures to keys. For each task, an instruction phase was followed by test trials. A manipulation of phonological similarity of the objects' names had an effect on performance only over the first few encounters with a stimulus. Even when the instruction phase was changed so that participants had to learn the S-R mappings by trial and error, the effect of

similarity was short-lived. An effective task-set is rapidly "compiled" through instruction and early feedback; verbal DWM plays little role thereafter.

OS2.AUD.6 HOW TO MAKE THE PHONOLOGICAL SIMILARITY EFFECT DISAPPEAR?

Barrouillet, P.¹, Camos, V.², & Gorin, S.¹

Presenting author: Pierre Barrouillet

The TBRS model assumes that there are two distinct stores in verbal WM, a phonological loop based on verbal rehearsal and an executive loop based on attentional refreshing. We recently tested this hypothesis in a letter span task requiring participants to perform a cumulative overt rehearsal of the first letters (from 3 to 5) only, and to keep repeating them until the end of the list to block the access of the following letters to the phonological loop. This procedure, called maxispan, results in a dramatic increase in spans. Here we tested the hypothesis that the maxispan procedure strongly reduces the phonological similarity effect. Results showed that this effect was strong with a standard immediate serial recall procedure, but vanished with the maxispan procedure. We will argue that the phonological similarity effect results from an attempt by participants to articulatorily rehearse too many letters, thus misusing their verbal

OS2.AUD.7 MASKING EFFECTS ON CONSOLIDATING ICONIC REPRESENTATIONS AND ON THE DEPLOYMENT OF ATTENTION RETROSPECTIVELY.

Shimi, A.

University of Cyprus

Presenting author: Andria Shimi

Visual short-term memory (VSTM) improves developmentally but what drives this improvement is not well understood. Recent findings have shown that although differences in the ability to use attention to enhance maintenance are important for understanding improvements, changes in this ability are not the endpoint to understanding developmental differences in VSTM performance (Shimi & Scerif, 2017). I will present data from a new experiment aiming to examine whether masking previously-presented information interferes with the consolidation of iconic representations and if so, differentially over development. Seven-year-olds and adults were asked to report whether a probe had been part of the initial memory array, which could be uncued or followed by a spatial cue directing participants' attention to a location in the array. The presentation of

backward masking stimuli was also manipulated to evaluate whether masking slowed consolidation and modulated cueing benefits. Results extend knowledge on constraining mechanisms influencing attentional deployment and VSTM.

Cibeles Room

Cognitive Control

OS2.CIB.1 EFFECTS OF COMPLEXITY AND PROCESSING CODE OF AN INTERRUPTION TASK ON THE PERFORMANCE IN A PROCEDURAL TASK WITH SEQUENTIAL CONSTRAINTS
Radovic, T. & Manzey, D.

Technische Universität Berlin, Germany

Presenting author: Tara Radovic

The study examines effects of complexity and processing code of an interruption task on the post-interruption performance in a primary task. The primary task (PT) is a procedural task with sequential constraints consisting of eight steps, each requiring a binary decision about a certain property of a complex visual stimulus. While performing the PT, participants are interrupted for 30s at different steps by an interruption task varying in complexity (2-back; 1-back task) and processing code (spatial; verbal). After interruption, participants have to resume the PT at the correct step. Assuming that interruptions demanding more of the same cognitive resources as the PT are more disruptive, we expect the strongest interruption effects for the verbal 2-back interruption, and the weakest for the spatial 1-back task, in terms of resumption times (how fast the PT is resumed) and sequence errors (how often the PT is resumed at the wrong step).

OS2.CIB.2 THE DEVELOPMENT OF THE PROCESSING COST ENTAILED BY CONFLICTING AFFORDANCES DURING OBJECT PERCEPTION

Godard, M.¹, Wamain, Y.¹, Delepouille, S.², & Kalénine, S.¹
1 University of Lille, France; 2 University of Littoral Côte d'Opale, France.

Presenting author: Marc Godard

The perception of manipulable objects involves the activation of motor information in the absence of real action (i.e. affordance perception). Recent findings indicate that perceiving an object evoking distinct grasp-to-move and grasp-to-use gestures induces a processing cost. The present study aims to assess the development of this conflict cost. As it is assumed to result from the combination of general affordance sensitivity and conflict

monitoring abilities, the conflict cost should follow a non-linear development. Eighty-four participants (from 8 to adulthood) performed 3D object perception tasks, an action priming task and a Simon task to assess the conflict cost induced by the evocation of distinct affordances, affordance sensitivity and conflict monitoring, respectively. Results showed that the conflict cost follows a non-linear development and evolves jointly with general affordance sensitivity. The contribution of conflict monitoring abilities requires further investigations. Findings highlight novel refinements in the development of perception-action interactions.

OS2.CIB.3 DISSOCIATION BETWEEN REACTION TIME AND PUPIL DILATION IN THE COLOR-WORD STROOP TASK.

Hershman, R. & Henik, A.

Ben-Gurion University of the Negev, Israel

Presenting author: Ronen Hershman

It has been suggested that the Stroop task gives rise to two conflicts: the information conflict (color vs. word meaning) and the task conflict (name the color vs. read the word). However, behavioral indications for task conflict (RT congruent condition longer than RT neutral condition) appear under very restricted conditions. We conducted Stroop experiments and measured RT and pupil dilation. The results show a clear dissociation between RT and pupil dilation. We found the regular RT pattern—large interference and small, non-significant facilitation. In contrast, pupil dilation showed information conflict—larger pupil dilation to incongruent than to congruent and neutral conditions—and task conflict—larger pupil dilation to the congruent than to the neutral condition. Moreover, pupil indications for task conflict appeared earlier than indications for the information conflict. These results suggest that pupil changes could indicate conflict even in the absence of behavioral indications for the conflict.

OS2.CIB.4 COGNITIVE CONTROL DEFICITS RELATED TO ANOSOGNOSIA AFTER ACQUIRED BRAIN INJURY IN EXPERIMENTAL AND DAILY LIFE TASKS

Ricchetti, G.^{1,2}, Navarro-Egido, A.^{1,2}, Merchán-Baeza, J.A.³, Salazar Frías, D.^{1,2}, Rodríguez Bailón, M.⁴, & Funes, M.J.^{1,2}
 1 *University of Granada, Spain*; 2 *Mind, Brain and Behavior Research Center (CIMCYC), Spain*; 3 *University of Vic-Central University of Catalonia, Spain*; 4 *University of Málaga, Spain*.

Presenting author: Giorgia Ricchetti

Acquired brain injury (ABI) patients are often unaware of their own cognitive deficits, a phenomenon called anosognosia. Inhibitory control (i.e. conflict resolution), monitoring (i.e. error detection) and self-regulation (i.e. error correction) have been associated to this syndrome, however they have been typically measured using experimental tasks unrelated to everyday life. In this study we compared inhibitory control, monitoring and self-regulation abilities of a group of ABI patients with anosognosia and a control healthy group through an experimental conflict based task (ET) and an activity of daily living (ADL) task including conflicting situations. Results revealed that patients showed more difficulty to inhibit action towards conflicting stimuli on the ET and the ADL task compared to controls, and detected fewer errors during ADL performance. No differences were found in self-regulation between groups in neither of the two tasks. We conclude that inhibitory control and monitoring impairments could be major mechanisms underlying anosognosia.

OS2.CIB.5 WHEN CONFLICT BRINGS PLEASURE: EXAMINING THE NECESSARY CONDITIONS UNDER WHICH INCONGRUENT STIMULI ARE EVALUATED AS POSITIVE

Ivanchei, I.I.¹, Braem, S.², Vermeylen, L.¹, & Notebaert, W.¹

1 *Ghent University, Belgium*; 2 *Vrije Universiteit Brussel (VUB), Belgium*

Presenting author: Ivan Ivanchei

Recent studies have demonstrated that cognitive conflicts, as experienced during incongruent Stroop-stimuli ("GREEN" printed in red), are automatically evaluated as negative, in line with theories emphasizing the aversive nature of conflict. However, correct responding to such stimuli has been shown to trigger a positive evaluation, presumably reflecting the positive surprise people feel when overcoming conflict. Using an affective priming paradigm, the present study investigated whether stimulus frequency (i.e., number of unique stimulus presentations) and task experience (i.e., number of trials) play an important role in this positive

evaluation. Importantly, we observed that responding to incongruent stimuli was evaluated as negative on the first trials, but as positive later in the experiment (in an experiment that controlled for stimulus frequency). These results fit with the idea that we first need to create outcome expectancies (lower expectancies for being correct on incongruent trials) before we experience the resolution of conflict as positive.

OS2.CIB.6 THE ROLE OF THETA OSCILLATIONS IN COGNITIVE CONTROL: STIMULUS-RESPONSE BINDING IN BEHAVIOR AND ELECTROENCEPHALOGRAPHY

Senoussi, M., Verbeke, P., De Loof, E., Talsma, D., & Verguts, T.

Ghent University, Belgium

Presenting author: Mehdi Senoussi

Cognitive control is the ability to guide thoughts and actions towards goals. It allows us to flexibly implement complex behavior depending on context. One of its features is the implementation of stimulus-response mappings (SRM) by binding goal-relevant perceptual representations and actions. A recent computational model of cognitive control implements a mechanism to bind arbitrary task-relevant (neural) representations, through synchronization, by bursts sent at theta frequency (4-8Hz). In a series of behavioral and electroencephalography experiments we tested predictions from this model in SRM tasks. By interrogating the temporal dynamics of cognitive control through varying delays between SRM instructions and stimuli we show that performance is modulated periodically in the theta frequency band (5Hz). Furthermore, neural representations of instructed SRM followed these theta oscillations, validating the neural predictions from the model. Together, these results provide support to this model and new insights on the mechanisms underlying cognitive control.

OS2.CIB.7 THE CAUSAL ROLE OF THE LEFT DORSOLATERAL PREFRONTAL CORTEX IN THE INHIBITORY TAGGING EFFECT: EVIDENCE FROM HIGH DEFINITION TRANSCRANIAL DIRECT CURRENT STIMULATION

Martínez-Pérez, V.¹, Castillo, A.¹, Sánchez-Pérez, N.², Vivas, A.B.³, Campoy, G.¹, & Fuentes, L.J.¹

Presenting author: Luis J. Fuentes

When an inhibition of return procedure is combined with conflict tasks (e.g., Stroop task), both inhibition of return (IOR) and inhibitory tagging (IT) effects are usually

observed. At the cortical level, IOR involves the dorsal frontoparietal network, whereas IT involves the executive prefrontal cortex, mainly the DLPFC. Behaviorally, IOR is observed with rather long cue-target intervals in discriminative tasks, whereas IT has been observed when the prime-target interval is just 250 ms. Here, we asked whether IT is also applied to ongoing emotional processing, and whether the left DLPFC plays a causal role in IT. By using transcranial direct current stimulation (tDCS), we observed reduced conflict effect, the signature of IT, when the prime word was presented at the cued location and the prime-target interval was 250 ms, neither earlier nor later. In a second experiment, the IT effect was eliminated when cathodal stimulation was applied to the left DLPFC.

Estambul Room

Neural Plasticity

OS2.EST.1 CATEGORICAL REPRESENTATION FROM SOUND AND SIGHT IN THE OCCIPITO-TEMPORAL CORTEX OF SIGHTED AND BLIND

Mattioni, S.¹, Rezk, M.¹, Cuculiza Mendoza, K.E.², Battal, C.1, Bottini, R.², van Ackeren, M.J.², Oosterhof, N.N.², & Collignon, O.^{1,2}

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2 *University of Trento, Italy*

Presenting author: Stefania Mattioni

The Ventral Occipito-Temporal Cortex (VOTC) shows robust category selective response to visual information. How is this functional organization tributary of visual input or even visual experience? To address these questions, we used fMRI to characterize the brain responses to eight categories (4 living, 4 non-living) presented acoustically in sighted and early blind individuals, and visually in a separate sighted group. Using a combination of decoding and representational similarity analyses, we observed that VOTC reliably encodes sounds categories in the sighted and blind groups using a structure strikingly similar to the one found in vision. Blind people however showed higher decoding of auditory categories in VOTC. In addition, the correlation between the representational structure of visual and auditory categories was almost double in the blind ($r=.66$) when compared to the sighted ($r=.35$) group. Crucially, we also show that VOTC represents the semantic but not the acoustic relations between auditory categories in both groups. Our results suggest that early visual deprivation triggers an extension of the intrinsic categorical organization of VOTC that is partially independent from vision.

OS2.EST.2 THE VISUAL PERCEPTION OF SOUNDS: INVESTIGATING FUNCTIONAL PLASTICITY WITH VISUO-AUDITORY SENSORY SUBSTITUTION

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1 *CNRS, Paris, France* 2 *University of Marseille, France*

Presenting author: Malika Auvray

How plastic is the brain when it comes to the distinction between our sensory modalities? The aim of our study was to investigate behaviourally this question via a non-invasive technique named “sensory substitution”. People were trained to use a visual-to-auditory conversion device, which translates visual images into sounds. Taking advantage of a Stroop-like paradigm, our study revealed that, after training, when asked to identify sounds, participants would spontaneously have visual images, as their performance in sound identification was influenced by the simultaneous presentation of visual distractors. This visual interference effect shows that visual imagery became associated to auditory stimuli. In addition, participants’ performance during training for localisation and recognition tasks, as well as their associated phenomenology, depended on their auditory abilities, revealing that processing finds its roots in the input sensory modality. Altogether, our results show that brain plasticity allows people to see sounds while still hearing it.

OS2.EST.3 METAPLASTICITY PROTOCOL IN COGNITIVE TRAINING WITH TDCS

Vranić, A., & Martinčević, M.

University of Zagreb, Croatia

Presenting author: Andrea Vranić

Transcranial direct current stimulation (tDCS) is a relatively new addition to cognitive enhancement procedures, yielding various outcomes. Recently, metaplasticity protocol has been proposed to heighten the training effects. Metaplasticity refers to activity-dependent changes in neural functions that modulate subsequent synaptic plasticity. The aim of this study was to verify the effectiveness of a combination of tDCS and cognitive training within metaplasticity research design.

Thirty one healthy young adults were randomly assigned to either treatment or active control (sham) group. The design included an 8-session training in which equal protocol, differing only in tDCS/sham stimulation, was used for both group (n-back + 5min pause + (n-back+tDCS/sham)), with pretest, posttest and follow-up at 5 months. Repeated measures ANOVA did not find statistically significant interactions between groups and measurement points for the n-back tasks, forward and backward span, symmetry span, oddball and the bivalent shape task.

OS2.EST.4 THE TIME COURSE OF BRAIN REORGANIZATION IN HEARING LATE LEARNERS OF SIGN LANGUAGE

Banaszkiewicz, A.¹, Matuszewski, J.¹, Bola, Ł.^{1,2,3}, Szczepanik, M.¹, Rutkowski, P.⁴, Szwed, M.², Emmorey, K.⁵, Jednoróg, K.¹, & Marchewka, A.¹

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Presenting author: Anna Banaszkiwicz

The neural plasticity underlying learning is a process rather than a single event, however the dynamics of training-induced functional reorganization are rarely examined. Here, we focus on sign language acquisition in hearing adults who underwent an 8-month long training with five neuroimaging sessions. At each session, we tested whether growing proficiency leads to increased brain activity to sign language and a brain-wide reconfiguration of activity patterns due to the transition from sensory to linguistic processing. Language network reorganization occurred after 3 months of learning (second fMRI session), as reflected by increased activation in modality-independent perisylvian language-related network, together with modality-dependent parieto-occipital, visuospatial and motion-sensitive regions. Despite further progress, no significant alterations in fMRI response were detected during the following months. This indicates that large-scale brain reorganization occurs during the first months of sign language acquisition, and further consolidation and learning proceeds in a stable, local manner.

OS2.EST.5 FUNCTIONAL AND STRUCTURAL BRAIN PLASTICITY DURING TACTILE READING ACQUISITION IN SIGHTED ADULTS: MULTIMODAL MRI APPROACH

Matuszewski, J.¹, Bola, Ł.^{1,2,3}, Kossowski, B.¹, Banaszkiwicz, A.¹, Paplińska, M.⁴, Szwed, M.², Jednoróg, K.¹, Draganski, B.⁵, & Marchewka, A.¹

1 Polish Academy of Sciences, Poland; 2 Jagiellonian University, Poland; 3 Harvard University, USA; 4 Academy of Special Education, Poland; 5 University of Lausanne, Switzerland

Presenting author: Jacek Matuszewski

Neuroimaging studies showed that adult brain can undergo functional and structural plasticity. However, detailed temporal dynamics of that reorganization are still poorly understood. Tactile Braille reading acquisition is an interesting model, as it induces cross-modal plasticity – reorganization in visual cortex followed by somatosensory training. Here, we studied interactions between brain activity, grey matter volume (GMV) and myelination in 26 sighted students participating in 8-months tactile reading course with 4 multimodal MRI sessions during training and follow-up study after 2.5-months break. We observed functional plasticity in the first stage of learning both in sensory and language processing areas. These changes were followed by linear increases in GMV of somatosensory and visual cortex observed also in follow-up study. Additionally, myelination increase was observed in visual word form area and right frontal lobe. These results show that tracing various aspects of plasticity simultaneously during training offers a unique insight into experience-driven neural changes.

OS2.EST.6 PROBING PSYCHOPHYSICALLY THE CORTICAL PLASTICITY HYPOTHESIS IN MACULAR DEGENERATION

Casco, C. & Contemori, G.

University of Padova, Padova, Italy

Presenting author: Clara Casco

Macular degeneration patients (MD) develop a preferred retinal locus for fixation (PRL). The use of PRL might produce cortical plasticity with respect to a symmetrical position (non-PRL) and to an iso-eccentric region in controls: we asked whether high contrast flankers modulate contrast gain for the target more when flankers are collinear rather than orthogonal. Results revealed in both PRL and non-PRL, at the shortest target-to-flankers distance (2λ), facilitation rather than inhibition as it happens in controls and that this effect depends on the individual contrast sensitivity at the baseline. When the target-to-flankers contrast ratio increases the inhibition decreases, then switching to facilitation. However, when ratio surpasses 1 the facilitatory effect progressively

reduces and then disappears. This relationship is expressed by a 'dipper' function (Zenger and Sagi, 1996) for normal vision, indicating neither a phenomenon of spontaneous nor use-dependent cortical plasticity, but rather perceptual grouping within high-level receptive field.

OS2.EST.7 PLASTICITY IN THE AUDITORY CORTEX OF THE DEAF: RETAINING TASK-SPECIFIC PURPOSES OR PLURIPOTENTIAL ACQUISITION OF A NEW ATTENTIONAL AREA?

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Presenting author: Maria Zimmermann

Previous studies (e.g. Bola et al., PNAS 2017) suggest that the deafs' auditory cortex preserves its task-specific function (i.e. rhythm processing) despite switching to a different sensory modality (visual). An alternative possibility is, however, that visual activations in auditory cortex indicate that it acquires, in fact, a new cognitive function - attention. To distinguish between these two hypotheses, we performed a pilot fMRI study on three congenitally deaf participants, with four different visual tasks: a luminance discrimination task with or without temporal content, faces/houses recognition task, spatial pattern (checkerboard) image discrimination task, and temporal/spatial sequences comparison. We found that only spatial pattern recognition, which had a very low attentional load, did not activate the auditory cortex. All three remaining tasks activated very similar auditory areas (right posterior STG). Our pilot suggests that the auditory cortex in the deaf may not retain its task-specific function but become a secondary attentional area.

Atenas Room

Bilingualism

OS2.ATE.1 COGNITIVE PROCESSING OF UNADAPTED ENGLISH WORDS IN CROATIAN: EVIDENCE FROM CROATIAN SPEAKERS OF ENGLISH WITH DIFFERENT LEVELS OF L2 PROFICIENCY

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1 University of Rijeka, Croatia; 2 University of Rijeka, Croatia

Presenting author: Irena Bogunović

This study aims to investigate priming effect in L2 speakers with different levels of language proficiency. The study consisted of a questionnaire on language use, a proficiency test, and three priming experiments. Experiment 1 explored priming effect in both language directions and two conditions (associative and semantic relatedness; translation equivalence). The other two experiments focused on different language directions with unadapted English words. The results showed that reaction times were shorter when primes and targets were related. In Experiment 1, the participants responded faster in L1-L2 direction. The effect of proficiency was observed in Experiments 2 and 3. These findings imply that L2 speakers have direct access to conceptual representations of L2 words, regardless of their proficiency level. The speed with which L2 words are accessed is related to vocabulary knowledge and subjective word frequencies, suggesting that frequency of use, rather than language membership, affects bilingual lexical access, even in low-proficiency L2 speakers.

OS2.ATE.2 VOCABULARY ACQUISITION IN A FOREIGN LANGUAGE: ELECTROPHYSIOLOGICAL EVIDENCE OF THE ADVANTAGE ASSOCIATED WITH SEMANTIC VS. LEXICAL LEARNING

García-Gómez, A.B. & Macizo, P.

University of Granada

Presenting author: Pedro Macizo

In our study, we obtained electrophysiological markers associated with the acquisition of vocabulary in a second language (L2) by comparing a semantic and a lexical training method. The semantic training involved a picture-

word paradigm and a semantic categorization task while the lexical training included a word-word method and a grapheme monitoring task. After learning, brain electrical activity was recorded in a forward and backward translation task and a naming task in L1 and L2. The electrophysiological measures obtained in the semantic vs. lexical training revealed: (a) early semantic and lexical access in the L2 naming task and (b) early semantic access in the forward translation task. The pattern of results suggests that a single session of semantic vs. lexical learning favors the establishment of connections between semantics and the words learned in L2.

OS2.ATE.3 ERP STUDY ON THE BILINGUAL ADVANTAGE IN WITHIN-LANGUAGE CONFLICT RESOLUTION

Ramos, M.A.¹ & Macizo, P.²

1 University of Barcelona (UB), Spain; 2 University of Granada (UGR), Spain

Presenting author: María Ángeles Ramos Moreno

The bilingual advantage in cognitive control is one of the most questionable topics in the current scientific research. In this study, we compared Spanish (L1) - English (L2) bilinguals and Spanish monolinguals in a semantic judgement relationship task in L1 that produced within-language conflict due to the coactivation of the two meanings of a homophone (e.g., “callado” and “cayado”, meaning “silent” and “crook” in English). In this task, participants indicated if pairs of words were related or not (“ruidoso-cayado” i.e., “noisy-crook”). Conflict arose because a word (“ruidoso”) not related to the orthographic form of a homophone (“cayado”) was related to the alternative orthographic form (“callado”). Compared to a control condition with unrelated word pairs (“película-cayado”; “movie-crook”), the results found greater behavioral interference and N400 modulations in monolinguals compared to bilinguals which suggest better conflict resolution in bilinguals.

OS2.ATE.4 CROSS-LINGUISTIC GENDER INTERFERENCE IN L2 LEARNERS: THE EFFECT OF COGNATE STATUS AND GENDER CONGRUENCY

von Grebmer zu Wolfsthurn, S., Pablos-Robles, L., & Schiller, N.O.

Leiden University

Presenting author: Sarah von Grebmer zu Wolfsthurn

This study systematically explores cross-linguistic interference effects on L2 processing of gender in German-Spanish L2 learners and the role of cognate status and gender congruency. To this date, no study has directly examined whether both cognate status and gender congruency regulate gender interference effects, and what the implications are for L2 gender attainment. We combined EEG techniques to trace the temporal unfolding of interference, with a syntactic violation paradigm and a picture-naming task to track the effects of interference. We modelled ERP amplitudes (P600 indexing syntactic violations and N200 indexing L1 inhibition) and processing latencies while manipulating the cognate status of nouns and gender-congruency across L1 and L2. We hypothesised stronger interference effects as a result of interaction between cognate status and gender-congruency, reflected in shorter processing times for cognates as well as gender-congruent nouns. These results are highly relevant for characterising L2 gender processing and acquisition mechanisms.

OS2.ATE.5 CROSS LINGUISTIC INFLUENCES IN L3 SYNTACTIC PROCESSING

Prior, A., Abbas, N., & Degani, T.

University of Haifa, Israel

Presenting author: Anat Prior

Learners acquiring the syntax of a third language (L3) might be influenced by existing knowledge from their first (L1) and/or second (L2) languages. Indeed, models of L3 acquisition differ in identifying the source of cross-linguistic influence, and various transfer patterns have been reported. The current study investigates Arabic-Hebrew-English university student trilinguals, who are not self-selected and for whom both L1 and L2 are typologically distant from the target L3, English, allowing us to overcome confounds of previous research. Participants read English sentences that overlapped syntactically with one, both or neither of their previous languages, while their eye movements were recorded and then performed grammaticality judgments on each sentence. Online reading times and off-line performance are analyzed in order to address the central question of whether L1 or L2 can be identified as a dominant source

of cross-linguistic influence, or whether the entire linguistic repertoire is activated when processing L3.

OS2.ATE.6 PROFICIENCY SHAPES THE REPRESENTATION AND ACCESS OF SYLLABIC MOTOR PROGRAMS IN BILINGUAL SPEAKERS: SYLLABLE-FREQUENCY EFFECTS IN EARLY HIGH-PROFICIENT SPANISH-BASQUE BILINGUALS AND LATE LOW-PROFICIENT SPANISH-GERMAN BILINGUALS

Cholin, J.¹, Abad Bruzzo, K.F.¹, Jorschick, A.B.¹, & Carreiras, M.²

1 Bielefeld University, Germany; 2 Basque Center for Cognition, Brain and Language (BCBL), Spain

Presenting author: Joana Cholin

Speakers' ability to speak fluently might rely on stored motor-programs for high-frequency syllables. A slower segment-by-segment assembly may be used to construct novel or low-frequency syllables. Previous studies show that monolingual speakers produce high-frequency syllables faster than low-frequency syllables. For bilingual speakers, results are scarce but point towards independent language-specific syllabic representations for early high-proficient bilinguals, while late low-proficient bilinguals seem to rely on language-shared representations. Testing the hypothesis that syllabic motor representations change with proficiency, we first replicated syllable-frequency effects in German and Spanish monolingual speakers using highly controlled materials. We then tested early high-proficient Spanish-Basque bilinguals and late low-proficient Spanish-German bilinguals with the Spanish and German materials respectively. RTs depended on whether the target syllable had one, no or several possible correspondences in the complementary language. Results show qualitative differences between proficiency groups supporting our hypothesis and further elucidating underlying motor-learning processes in bilingual speakers.

OS2.ATE.7 LANGUAGES NEVER REST! IN THE BILINGUAL BRAIN ALL LANGUAGES ARE AUTOMATICALLY ACTIVATED WHEN NONE IS USED

Aristei, S.¹, Lochy, A.¹, Rossion, B.², & Schiltz, C.¹

1 University of Luxembourg, Luxembourg; 2 Universit? de Lorraine, France

Presenting author: Sabrina Aristei

The established automaticity of word recognition has recently been challenged. To test automaticity in bilinguals, we analyzed the amplitude of brain responses synchronized with the repeated presentation of German

and French words appearing in streams of non- and pseudowords at 10Hz. Participants were unaware of stimulus lexicality. A typical left posterior brain response to words emerged and was modulated by the wordlikeness of non-lexical strings (i.e. smallest within pseudowords). Furthermore, responses to words from the weaker language L2 were maximally reduced within pseudowords of the dominant language L1, both in late learners and balanced bilinguals. In a group of monolinguals, there was no brain response to words or modulation from pseudowords in the unknown language. Hence, when no language is explicitly activated, lexical access occurs automatically for all languages, with the degree of activation reflecting the language strength. Our data support a unique lexicon for all languages in the brain.

St Tropez Room

Language Development

OS2.StT.1 THE ROLE OF ATTENTION AND INHIBITION IN LINGUAL PERFORMANCE IN THE CONTEXT OF A LOGOGRAPHIC AND ALPHABETIC WRITING SYSTEM

Guo, C., Tseaye, A, & Logemann, A.

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Presenting author: Cuiling Guo

Visual attention facilitates the processing of visual stimuli, while inhibition suppresses the processing of irrelevant visual information. They often work together in a synergy sense to better interpret incoming visual objects, e.g. an English word. Deficits of attention and inhibition have been implicated in reading performance, supported from the evidence that ADHD has been associated with poor reading performance across different languages. However, to the best of our knowledge, it is not clear what the relative contribution of the aforementioned executive systems to lingual performance is, and whether this relation differs across writing systems. The primary aim of the current study is to address this ambiguity. Previous studies have suggested that there may be a complex relation between weight and executive performance. Hence, a secondary explorative aim of the current project, is to explore the role of Body Mass (BMI) in executive performance.

OS2.StT.2 CONTRIBUTIONS OF FPVS APPROACH TO UNDERSTANDING OF READING ACQUISITION MECHANISMS.

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Presenting author: Alice van de Walle de Ghelcke

Adults' expert reading is a highly automated process supported by the left hemisphere. This left specialization is thought to emerge during children's reading acquisition through progressive connections between posterior visual regions and anterior language regions. However, the exact onset and the development of this specialization

remain unclear. To investigate these questions, we adopted a longitudinal and transversal design to assess neural discrimination responses in children of different ages and reading profiles. Children were tested behaviorally and with electroencephalography using Fast Periodic Visual Stimulation (FPVS-EEG) to measure selective neural responses to letter strings. Our findings highlighted an early emergence of the left neural specialization for reading and a specific modulation of the neural responses to letter strings according to age and reading profile. Taken together, these findings open promising applications of the FPVS-EEG approach in early detection of reading acquisition disorders.

OS2.StT.3 INVESTIGATING THE EFFECTS OF MATURATION AND SES ON EARLY SPEECH PERCEPTION

Gonzalez-Gomez, N.¹, O'Brien F.², & Harris, M.¹

1 Oxford Brookes University; 2 Oxford University Hospitals, NHS.

Presenting author: Nayeli Gonzalez-Gomez

Three longitudinal studies explored infants' phonetic (i.e., discrimination of a non-native consonantal contrast), prosodic (i.e., discrimination of non-native lexical tones) and phonotactic (i.e., preference for CVC sequences having higher- or lower-frequency of occurrence) development in infants born preterm or full-term and from lower- or higher socio-economic status families. 76 Infants were tested longitudinally at 7.5, 9, 10.5 and 12 months. Results showed no significant differences between the phonetic or the phonotactic development of preterm and full-term infants. However, a time-lag between preterm and full-term developmental timing for prosody was found. Socioeconomic status didn't have a significant effect on prosodic development. Nevertheless, phonetic and phonotactic development were both affected by SES. Infants from lower SES backgrounds showed perceptual phonetic narrowing later, and had a delayed preference for high-frequency sequences later than their more advantaged peers. Overall these results suggest that different constraints apply to the acquisition of different phonological subcomponents.

OS2.StT.4 THE IMPACT OF VISUAL MAGNOCELLULAR FUNCTIONING ON READING SKILLS IN FRENCH PRIMARY SCHOOL CHILDREN

Leclercq, V.¹ & Bellocchi, S.²

University Paul Valéry Montpellier 3

Presenting author: Virginie Leclercq

Many studies have investigated the visual magnocellular system in dyslexia. However, few researches have explored the magnocellular functioning during normal reading (e.g., Kevan & Pammer, 2009; Talcott et al., 2000). Consequently, very little is known on the link between the visual magnocellular system and reading development. Here we aimed to explore whether the link between visual abilities and reading might be affected by reading proficiency. We tested 103 French typical developing readers [51 beginning readers (Grade 1), 52 proficient readers (Grade 5)] with reading tests and a coherent dot motion task measuring the visual magnocellular functioning. Results indicate a positive correlation between visual magnocellular functioning and reading for beginning readers but not for proficient readers. These results suggest that the link between magnocellular functioning and reading abilities depends on the number of years of reading exposure.

OS2.StT.5 THE LINGUISTIC AND SOCIAL SIDES OF PACIFIER USE IN INFANCY

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Presenting author: Laura Barca

Evidence suggests that the Age of Pacifier Withdrawal (APW) affects linguistic processing later in life. Children who used the pacifier for a longer period used more concrete strategies (e.g., functional relations), and less abstract strategies (e.g., free associations) while describe different concepts. Moreover, 8 years old children with APW of 72 months were slower in the semantic categorization of abstract words, with respect to concrete and emotional ones. Here, we will explore the effect of pacifier use on linguistic development of 47 Italian children, aged 18-36 months. Their parents compiled the MacArthur-Bates CDI, a parent report assessing early language acquisition; the Parenting Style Questionnaire, evaluating their own behavior according to three parenting domains (social, didactic, disciplinary); and the Parental Sense of Confidence questionnaire, to assess their sense of satisfaction and parental efficacy. Results

will be discussed taking into account social aspects related to pacifier use and linguistic development.

OS2.StT.6 WHAT EYE MOVEMENTS REVEAL ABOUT THE WORD ENCODING PROCESSES OF YOUNGER AND OLDER ADULTS

Taconnat, L., Morel, S., Guerrero-Sastoque, L., Frasca, M., & Vibert, N.

CNRS - Université de Poitiers - Université de Tours, France

Presenting author: Nicolas Vibert

This eye-tracking study compared the way 39 younger and 50 older adults encoded words in anticipation for a memory task. Participants had to learn successively a set of 20 "organizable" words, which belonged to five different semantic categories, and a set of 20 "non-organizable" words, each presented for 100 seconds on a single display. Participants were then asked to recall as many as possible words of each set. The results confirmed the detrimental impact of aging on memory and showed that when they encoded the words, older adults did not look at them as much as younger adults, because of slower eye movements. Younger adults, but not older ones, adapted their scanning strategy to the words they were learning: They made more fixations per word when the words were organizable, which may help group the words by category, but they made longer fixations on non-organizable than on organizable words.

OS2.StT.7 IQ VERSUS EXECUTIVE FUNCTIONS: INVESTIGATING THE PREDICTIVE ROLES OF IQ, WORKING MEMORY AND SUSTAINED ATTENTION IN CHILDREN'S READING ACHIEVEMENT

Slattery, É.J., Ryan, P., Fortune, D.G., & McAvinue, L.P.

University of Limerick, Ireland.

Presenting author: Éadaoin Slattery

It is well established that cognitive abilities are important predictors of achievement and learning in children. The purpose of the present study was to examine the relative contributions of IQ and selected executive functions (working memory and sustained attention) to the prediction of reading achievement (word decoding and reading comprehension). Irish primary school children (N = 104) aged 8-10 years completed measures of each cognitive and reading-related ability. Hierarchical multiple regressions revealed that IQ and executive functions are differentially related to reading achievement. IQ is a better predictor of reading comprehension than of word decoding. Conversely, executive functions matter more for the prediction of word decoding than of reading

comprehension. In relation to each executive function, working memory predicts both reading achievement scores, over and above IQ; however, the variance in reading achievement attributable to sustained attention over IQ, is explained by working memory. Theoretical and applied implications are discussed.

Tarraco Room

Sociality

OS2.TAR.1 MICRODOSING PSYCHEDELICS ENHANCES EMOTION RECOGNITION

Colzato, L.S., Maraver, M.J., Prochazkova, L., Rifkin, B.D., & Hommel, B.

Ruhr University Bochum

Presenting author: Lorenza Colzato

Taking small doses (“microdosing”) of psychedelic substances such as truffles allegedly has multiple beneficial effects, including emotion recognition, via its primary effects by directly binding to 5-HT_{2A} receptors. The goal of this study was to examine, for the first time, the quantitative longitudinal effects of microdosing psychedelic truffles on the ability to recognize emotions of others, controlling for expectation effects. We carried out the first longitudinal (with participants taking 6 microdoses over the course of 18 days) triple-blind, between-group, placebo-controlled field study employing the Reading the Mind in the Eyes Test (RMET) in 59 young healthy participants. Taking microdoses of psychedelic substances, compared to placebo, improved performance on the RMET. This effect was restricted to the difficult items and was independent from expectation effects. Our data suggest that microdosing psychedelics improves the ability to infer the mental state of others from social cues of the eye region.

OS2.TAR.2 MAPPING THE “SHARED BRAIN”

Hinvest, N.S., Ashwin, C.A., Hook, J., Scarampi, C., Smith, L.G.E., & Stothart, G.

University of Bath, U.K.

Presenting author: Neal Hinvest

The ability to detect the neural processes underlying the formation of a shared identity between interacting individuals would reveal the unconscious psychological framework that underpins social behaviour. In the first phase of our project we used EEG as a tool of classifying individual emotional status, based on the theory that social identity is based on shared emotion. We used a rigorously-defined experimental approach and obtained strikingly different classification rates compared to other

researchers. This speaks to the methods and approaches currently used within the field. We provide a critique of methods with the aim of building new, more rigorous, approaches to EEG-based classifiers of emotion. In the second phase we used a peer-reviewed method of classifying stages in the development of a shared identity via observed behaviour to identify events within EEG of freely interacting dyads to map the unconscious emergence of a shared identity and will present these findings.

OS2.TAR.3 OBSERVATION OF COMMUNICATIVE CUES ASSIGNS MEANING TO HUMAN INTERACTION: AN EEG STUDY

Kourtis, D.¹, Pierre Jacob, P.², Sebanz, N.³, Sperber, D.^{3,2}, & Knoblich, G.³

1 University of Stirling, Stirling, UK; 2 Institute Jean Nicod (CNRS, EHESS, ENS), France; 3 Central European University, Hungary

Presenting author: Dimitrios Kourtis

We investigated whether the observation of communicative cues makes subsequent interaction more meaningful. EEG was recorded while participants observed photo sequences depicting two actors seated next to a table with two nearly identical objects on it. The actors occasionally engaged in mutual eye contact and/or one of them pointed towards an object. Subsequently, the other actor looked either at that object or at the other object. EEG analyses showed that the N300 was smaller when the actors looked at the same object, suggesting that identification of actor-object relationships is a relative fast process. The N400 was smaller when the final scene was preceded by mutual eye contact or by perception of the pointing gesture, regardless of whether the two actors looked at the same object. This suggests that observation of communicative cues “opens up” the mind to different action possibilities, enabling him/her to assign meaning to typically unexpected interaction outcomes.

OS2.TAR.4 YOUR FACE SCARES ME: EFFECTS OF PERCEPTUAL LOAD AND SOCIAL ANXIETY ON PROCESSING OF THREATENING AND NEUTRAL FACES

Theodorou, M.¹, Konstantinou, N.², & Panayiotou, G.¹

1 *University of Cyprus*; 2 *Cyprus University of Technology*

Presenting author: Georgia Panayiotou

Faces are biologically significant, believed to be given preferential attention. However, processing of competing stimuli is modulated by perceptual load (Lavie, 1995): A demanding task (high load) absorbs all processing capacity, leaving no resources for secondary tasks or distractors. It has been suggested that faces are preferentially processed, regardless of load, but other studies show they are subject to load effects just like any other stimuli. This study uses a letter search task to examine attention to face or object pictures (neutral/threatening) presented as to-be-ignored distractors. Participants (N=46) were high or low in social anxiety, which is associated with preferential processing of faces, especially threatening ones. Results showed that faces were subject to load effects. Socially anxious participants had slower RTs to the task when distractors were threatening than neutral, irrespective of their types (faces or objects). Results are discussed in light of load theories and social anxiety theories.

OS2.TAR.5 DEVELOPMENTAL DIFFERENCES IN GAZE PROCESSING: A 'JOINT DISTRACTION' EFFECT

Aranda-Martín, B., Lupiáñez, J., & Ballesteros, M.A.

University of Granada, Spain

Presenting author: Belén Aranda-Martín

A gaze, besides orienting attention, provides valuable social information. Lately, the effects produced by arrows and gazes have been qualitatively dissociated using a stroop paradigm showing that the classical congruency effect presented by arrows is reversed when the stimulus is a gaze. Socio-cognitive mechanisms could be at the base of such dissociation. Through this study, we intend to explore the differences in the processing of both stimuli in three age groups (4, 5 and 6 years). If there is a social explanation behind the effect, it should emerge during infancy, becoming more pronounced as social development improves. Results show that, whilst the congruency effect produced by arrows is present in all three groups, the reversed effect of the gaze emerges gradually, becoming more evident at the age of 6. This study sheds light on gaze processing, leading to a further investigation of socio-cognitive processes in childhood.

OS2.TAR.6 INDIVIDUAL DISPOSITIONS PREDICT GOAL PRIORITY DURING THE RECOGNITION OF OTHERS' ACTIONS

Decroix, J.¹, Morgado, N.², & Kalénine, S.¹

1 *Univ. Lille, CNRS, CHU, Lille, France*; 2 *University of Paris Nanterre, Nanterre, France*

Presenting author: Jérémy Decroix

According to predictive models of action understanding, observers would decode goal-related information before processing the visual kinematics when recognizing others' actions. Such models have been supported by recent action priming results showing earlier priming for object-directed actions sharing similar goals than similar grips (Decroix & Kalénine, 2018). Yet goal priority in action recognition could be modulated by situational (e.g., visual context) and individual factors. In the present study involving 64 young adults, we evaluated whether several social and cognitive individual dispositions of the observer (e.g., Perspective Taking, Sense of Social Power) could influence goal priority in a similar action priming paradigm. Results showed that the way we relate to others (e.g. perspective taking abilities) predict goal priority during the recognition of basic hand-object interactions (e.g., writing with pen). Findings suggest to incorporate the social characteristics of the observer in cognitive models of action understanding.

OS2.TAR.7 BRAIN ACTIVITY DURING TRANSITIVE AND SOCIAL ACTION OBSERVATION IN ADULTS AND ADOLESCENTS

Lesourd, M.¹, Afyouni, A.¹, Gerinswald, F.¹, Raoul, L.¹, Cignetti, F.², Sein, J.¹, Nazarian, B.¹, Anton, J.-L.¹, & Grosbras, M.-H.¹

1 *Aix-Marseille Université*; 2 *Université Grenoble Alpes*

Presenting author: Mathieu Lesourd

The Action Observation Network (AON) is a set of brain areas consistently engaged during the observation of other's actions. While the core nodes of the AON are present since early adolescence, it is not known to what extent they are sensitive to different features of the observed action. Twenty-seven typically developing adolescents and twenty-two adults were enrolled in a fMRI study and were asked to passively observe videos of hand actions varied along two factors: sociality (social/non-social) and transitivity (transitive/intransitive). Univariate analyses showed that observing actions recruits similar fronto-parietal and occipito-temporal networks to the same extent in both adults and adolescents. However, multivariate analyses revealed an interaction in the right posterior superior temporal sulcus,

indicating that social actions are less-well represented in adolescents compared to adults. These results suggest that the adolescent brain is specifically less sensitive than the adult brain to the social information conveyed by the action.

Barcelona Room

Arithmetics I

OS2.BAR.1 MODAL-INDEPENDENT PATTERN RECOGNITION DEFICIT IN DEVELOPMENTAL DYSCALCULIA ADULTS: EVIDENCE FROM TACTILE AND VISUAL ENUMERATION

Cohen, Z.Z., Gliksman, Y., & Henik, A.

Ben-Gurion University of the Negev, Israel

Presenting author: Zahira Ziva Cohen

Developmental dyscalculia (DD) is characterized by lower numerical and finger-related skills. Studies of enumeration among those DD that suggested core deficiency in pattern recognition, working memory or/and attention, were mostly carried out in the visual modality. In our study, we examined tactile (vibration to the fingertips) and visual (dots) enumeration of 1-10 stimuli among DD and matched-control adults. We used 800 ms stimuli exposure time of either random/non-neighborly fingers or canonical/neighborly fingers arrangements. The visual exposure time enabled us to explore pattern recognition effects when working memory and attention loads were low. Compared to controls, DD participants showed smaller visual subitizing range and less accurate performance in pattern recognition condition (canonical/neighborly presentation) in both visual and tactile enumeration. We discuss possible modal-independent deficits in pattern recognition and working memory on enumeration performance among those with DD and the unique role of fingers in ordinal and cardinal representation of numbers.

OS2.BAR.2 THE LARGEST-ADDEND EFFECT IN ALPHABET-ARITHMETIC VERIFICATION TASK

Dewi, J. & Thevenot, C.

University of Lausanne, Switzerland

Presenting author: Jasinta Dewi

Studies on alphabet-arithmetic verification (e.g. $A + 3 = E$; true or false?) have shown a recurrent phenomenon that after a period of training, the increase in solution times as a function of addends is systematically followed by a decrease in solution times for problems with the highest addend, irrespective of its size. Our results in two alphabet-arithmetic verification trainings revealed that

this decrease in solution times is due to the particularities of largest-addend problems, which make them particularly salient for memorisation, and that the sensitivity to this salience depends on participants' short-term memory capacities. By analysing the false equations, we unveiled that the disappearance of the so-called opportunity stopping (i.e. the fact that letters preceding the answer are rejected faster than those following it) at the end of training found in an earlier study, taken as another proof of retrieval-based performance, was merely due to this largest-addend effect.

OS2.BAR.3 UNRAVELLING THE MECHANISMS OF SYMBOLIC AND NON-SYMBOLIC MAGNITUDE DISCRIMINATION WITH FREQUENCY-TAGGING EEG

Van Rinsveld, A.¹, Guillaume, M.¹, Poncin, A.², Schiltz, C.², Gevers, W.¹, & Content, A.¹

1 Université Libre de Bruxelles, Belgium; 2 University of Luxembourg, Luxembourg

Presenting author: Amandine Van Rinsveld

We assessed the human ability to discriminate magnitude information from both symbolic (i.e. digits) and non-symbolic material (i.e. dot patterns) with a frequency-tagging EEG approach. We used a specific fast periodic visual stimulation (FPVS) paradigm entailing a periodic change of magnitude at 1.25 Hz. We observed a neural response at that frequency for both symbolic and non-symbolic periodic changes, suggesting a magnitude discrimination in both cases. In the non-symbolic experiments, we observed a specific neural discrimination of numerosity and total area of the dot patterns in medial occipital electrodes, showing that numerosity but also continuous magnitude can be early extracted along the visual stream. In the symbolic experiments, neural synchronization on magnitude and parity digit changes occurred in lateralized occipito-parietal regions. Taken together, the FPVS paradigms allowed us to track the neural correlates of symbolic and non-symbolic magnitude processing with a method requiring no instructions and only short testing sessions.

OS2.BAR.4 TYPICAL BASIC NUMERICAL ABILITIES DESPITE CONGENITAL ABSENCE OF SENSORIMOTOR FINGER EXPERIENCE

Andres, M., Pesenti, M., & Vannuscorps, G.

Université catholique de Louvain, Belgium

Presenting author: Michael Andres

Fingers help children learning to count but whether this sensorimotor experience is necessary to develop efficient basic numerical abilities is unclear. We tested DC, an adult with a congenital absence of seven fingers, in tasks that required processing numbers (comparison, calculation) or words (rhyme judgement). We compared numerical tasks involving fingers during normal development (addition, subtraction) to tasks less related to fingers (multiplication), and measured classical effects related to shared properties of numbers and fingers (order, base). Response speed and accuracy were within the range of ten control participants matched for age and education, and we found no difference between tasks related and unrelated to finger counting. DC showed typical performance and evidenced classical order and sub-base-five effects. To keep the count of invisible elements, DC relied on his toes while controls used their fingers. Thus, finger sensorimotor experience is not necessary for the development of efficient basic numerical abilities.

OS2.BAR.5 COMPARING DIFFERENT TASKS FOR MAGNITUDE ESTIMATION IN MENTAL ARITHMETIC

Felisatti, A.¹, Shaki, S.², & Fischer, M.H.¹

1 University of Potsdam, Germany; 2 Ariel University, Israel

Presenting author: Arianna Felisatti

Estimating number positions on a horizontal line assesses cognitive magnitude representations. We studied effects of heuristics on such estimations, comparing zero- and non-zero arithmetic problems (e.g., 4+0 vs 3+1). Adult left-to-right-readers estimated positions of single digits and of arithmetic addition and subtraction results in 3 tasks: shifting marker (SM: larger=right movement), shifting line (SL: larger=left movement), or bi-directional line length-production (LP: bi-directional movement). All tasks yielded larger estimates for subtraction than addition with non-zero problems, with a stronger effect in SM than SL. LP yielded larger overall estimates and smaller constant errors than SL or SM, which did not differ. The results show that magnitude estimates are relatively robust across methods. They can inform the Arithmetic-Heuristics-And-Biases model of mental arithmetic (Shaki et al., 2018).

Reference:

Shaki S et al., *Think Reasoning* (2018), 24(2), 138-156.

Funding: DFG FI_1915/8-1 "Competing heuristics and biases in mental arithmetic".

OS2.BAR.6 ACCESSING NUMERICAL REPRESENTATIONS THROUGH FINGER-CONFIGURATIONS

Vanstavel, S., Coello, Y., & Mejias, S.

Université de Lille

Presenting author: Sandrine Mejias

In everyday life, finger-configurations are commonly used to communicate about quantities, for example, when asking the bartender to bring "three more beers". But how do we access numerical representations from fingers-configurations? It has been suggested that finger-configurations are automatically processed as symbols, similarly to Arabic digits. Here we used EEG recording coupled with a Fast Periodic Visual Stimulation approach to study high-level semantic visual processing (i.e., accessing numerical representations). Participants were passively exposed to small numerosities (2-to-4) presented either through finger-configurations, Arabic digits or dots set. This technique provides a direct comparison of neural response patterns of each category of stimuli and clarify the finger-configurations status. Results indicate that fingers-configurations and Arabic digits are automatically discriminated within the occipito-parietal cortex (as symbols), while dots were processed within the occipital cortex (as analog magnitude). Given its high sensitivity, the present method could provide an implicit neural marker suitable for clinical applications.

OS2.BAR.7 SPACE AND NUMBERS IN THE JUNGLE: DIRECTIONAL SPATIAL-NUMERICAL ASSOCIATIONS IN INDIGENOUS AMAZON PEOPLE TSIMANE'

Cipora, K.¹, Soltanlou, M.¹, Gibson, E.A.², & Nuerk, H.-C.¹

1 University of Tuebingen, Germany; 2 Massachusetts Institute of Technology, USA

Presenting author: Krzysztof Cipora

Majority of studies aiming to provide general account on human cognition have been conducted in Educated and Industrialized societies. The same holds true for studies in numerical cognition investigating directional Spatial-Numerical Associations. In this study, we tested a group (N = 123) of Tsimane' people – a non-industrialized society living in Bolivian rainforest. They were presented with six cards with different numerosities (1-6 elements), and asked to arrange them inside a horizontal and a vertical grid. Interestingly, in both conditions the

proportions of individuals, who used left-right vs. right-left / bottom-top vs. top bottom arrangements were relatively close. Additionally, in both conditions about 20% of individuals did not use space-related arrangement. There was no relation between horizontal and vertical arrangements. Results will be discussed in the context of current theories of Spatial-Numerical Associations.

Palma de Mallorca Room

Time Processing

OS2.PAL.1 COMBINING SPATIAL AND TEMPORAL EXPECTANCIES TO IMPROVE VISUAL PROCESSING

Charras, P.

University Paul Valéry Montpellier 3; University of Montpellier, Montpellier, France

Presenting author: Pom Charras

Attention can be voluntarily oriented towards a spatial location to improve sensory information processing. Additionally, sensory processing can be enhanced if knowing when an event is about to occur. In the present talk, I will present a series of behavioral studies conducted to investigate to what extent both the spatial and temporal information was efficiently used to improve performance. In these studies spatial and temporal expectancies were combined, such that participants could predict where in space but also when in time an event was more likely to appear. Given the discrepancy in the literature, we manipulated task demands by asking participants to simply detect target appearance or to discriminate target stimulus. Our results reveal that, in both the detection and discrimination tasks, participants did use spatial and temporal information to respond faster and more accurately, therefore suggesting independent processes that give rise to additive effects.

OS2.PAL.2 THE REPRESENTATION OF TIME AND SPACE IN THE BRAIN: A META-ANALYSIS OF NEUROIMAGING STUDIES ON TEMPORAL AND SPATIAL PROCESSING

Cona, G.¹, Wiener, M.², & Scarpazza, C.¹

1 University of Padova, Padova, Italy; 2 George Mason University, Fairfax, VA, US

Presenting author: Giorgia Cona

Time and space are fundamental dimensions for our cognition. Despite they are intrinsically different, they share several features and show some overlapping brain activations. Supplementary Motor Area (SMA) stands among these, representing a core region for both temporal and spatial processing. Which regions are co-activated with SMA to support temporal and spatial tasks, respectively? We conducted a meta-analysis using the

activation likelihood estimation algorithm (GingerAle software). We included 847 activation foci across 62 studies of time and 884 foci across 61 studies of space. We observed overlapping activations between time and space in SMA and in bilateral insular regions. In temporal tasks, other brain regions co-activated with SMA are located in the cerebellum, basal ganglia, inferior frontal and left parietal regions. In spatial tasks, brain regions co-activated with SMA are located in dorsal fronto-parietal regions and fusiform gyri. These distributed networks play a key role in time and space representation.

OS2.PAL.3 BEEP ME UP: NON-SPATIAL TONES INCREASE PERCEIVED SPEED OF VISUAL OBJECTS

Meyerhoff, H.S.¹, & Gehler, N.A.²

1 Leibniz-Institut für Wissensmedien, Tübingen, Germany; 2 University of Tübingen, Germany

Presenting author: Hauke S. Meyerhoff

Coinciding auditory information alters early processing of visual scenes. Here, we investigate a new audio-visual illusion: Coinciding tones increase the perceived speed of moving visual objects. Our participants judged which of two objects moved faster. Each object changed its direction of motion, however, the direction changes of one of the objects were accompanied by spatially uninformative tones. Whereas the audio-visual object moved at a constant speed of 4.5 deg, the speed of the visual object varied from 2.75 to 6.25 deg. We measured the point of subjective equality, which indicated that the audio-visual object was perceived to move 6-9% faster than the visual object. The effect persisted with prevented eye-movements and across different volumes. Guiding visual attention to one object revealed a similar effect; but mere coincidence of visual cues did not. Thus, the increase in perceived speed stems from guidance of spatial visual attention by temporally coincident non-spatial sounds.

OS2.PAL.4 SPATIOTEMPORALLY MODULATED STIMULI LEADS TO A SYMMETRICAL INTERACTION BETWEEN TIME AND NUMEROSITY

Togoli, I. & Bueti, D.

International School for Advanced Studies (SISSA), Italy

Presenting author: Irene Togoli

Time and numerosity are stimulus dimensions influencing our perception – e.g., the greater the number of people queuing at a counter, the longer the time we expect to wait. Whereas the presence of these perceptual biases is known, their directionality (i.e., whether it is symmetrical) is controversial. Here we assess the time-numerosity interaction using visual stimuli in which the two dimensions were varied together. In different experiments, we used either static or dynamically changing stimuli, whereby temporal and numerical cues are more likely integrated throughout the stimulus presentation. Participants judged either stimulus duration, total, or average numerosity over time. With static stimuli, we observed an interaction between the two dimensions with a stronger bias provided by numerosity. Using dynamic stimuli, we showed a perfectly symmetrical interaction, with total duration and average numerosity over time as factors biasing perception. These results provide novel evidence for a symmetrical interaction between these two magnitudes.

OS2.PAL.5 PLEASE DON'T STOP THE MUSIC: A META-ANALYSIS OF THE BENEFITS OF EARLY MUSICAL PRACTICE ON ACADEMIC ACHIEVEMENT AND COGNITION

Román-Caballero, R.¹, Vadillo, M.A.², & Lupiáñez, J.¹

1 University of Granada, Granada, Spain; 2 Autonomous University of Madrid, Madrid, Spain

Presenting author: Rafael Román-Caballero

The interest in the effects of musical practice on cognitive and academic outcomes has increased. However, recent meta-analyses have shown inconsistent results, perhaps due to the vague definition of musical training. The current meta-analysis investigates the impact of early programs that actually involve learning to play musical instruments. Following a systematic review search, 35 independent samples of children and adolescent were included. All used experimental designs with control groups. We found small-to-medium improvements in several functions (intelligence, memory, visuospatial abilities and phonological processing) and literacy. Heterogeneity was low for most of them and there was little evidence of publication bias (which was mainly restricted to studies with lower design quality). Importantly, studies with randomized samples and active control groups showed a similar effect. These results are

consistent with a far-transfer approach of musical practice, thus supporting the conclusion that learning to play an instrument could benefit cognition and academic skills.

OS2.PAL.6 A MOMENTUM EFFECT IN TEMPORAL ARITHMETIC

Bonato, M.^{1,2}, D'Ovidio, U.^{1,2}, Fias, W.², & Zorzi, M.^{1,3}

1 University of Padova, Italy; 2 Ghent University, Belgium; 3 IRCCS San Camillo Hospital, Lido Venice, Italy

Presenting author: Mario Bonato

The mental representation of brief temporal durations, when assessed in standard laboratory conditions, is reliable and surprisingly accurate. Here we show for the first time that adding or subtracting temporal durations systematically induces strong and opposite distortions, with underestimation for subtraction and overestimation for addition, as opposed to comparatively accurate temporal reproduction of the same durations. The sizeable difference found between operations was stable across durations and was still reliably present when correcting for the effect due to operation sign alone, indexing a reliable signature of arithmetic processing on time representation. This novel behavioral marker conceptually mirrors in the time domain the representational momentum, whereby the estimated spatial position of a moving target is displaced in the direction of target motion itself. This momentum effect in temporal arithmetic suggests a new and surprising analogy between time processing and visuospatial processing, which might index the presence of common computational principles.

OS2.PAL.7 AN ILLUSORY MOTION IN STATIONARY STIMULI ALTERS THEIR PERCEIVED DURATION

Contemori, G.^{1,2} & Battaglini, L.¹

1 University of Padova, IT; 2 Centre de Recherche Cerveau & Cognition (CerCo), Toulouse, FR

Presenting author: Giulio Contemori

Moving objects are perceived to last longer than static ones of equal duration. Here, we compare the perceived duration of two sets of static stimuli, one that elicits and one that does not elicit a perception of illusory motion. We used peripheral drift images composed of repeating asymmetric patterns (RAP) in which the illusory motion is controlled through a change in the physical orientation of the local elements. Both illusory and non-illusory images are created by the same local elements reorganized differently so that to balance out the total amount of

visual stimulation in the two patterns. We estimated the point of subjective equality (PSE) and the slope of the psychophysical functions in a temporal discrimination task. The illusion shifted the PSE towards a shorter duration but caused no change in the slope. To conclude, like real motion, even the illusory motion alters the perceived duration by expanding it.

ORAL SESSION 3

Saturday 28th

13:10-14:30

Auditorio

Robots

OS3.AUD.1 PSYCHOPHYSIOLOGICAL RESPONSES TO EYE CONTACT IN VIRTUAL REALITY AND IN LIVE INTERACTION

Syrjämäki, A.H., Isokoski, P., Surakka, V., Pasanen, T.P., Helminen, T.M., Peltola, M.J., & Hietanen, J.K.

Tampere University, Finland

Presenting author: Aleksi Syrjämäki

We investigated whether eye contact would evoke similar psychophysiological responses in virtual reality (VR) as in a face-to-face interaction. Participants (N = 40) viewed a confederate in a live interaction (Live condition) and a confederate's avatar in VR (VR condition). In both conditions, the confederate/avatar was portraying direct and laterally averted gaze. In the Live condition, skin conductance reflecting affective arousal was greater in response to direct than averted gaze. In the VR condition, however, there were no differences in skin conductance responses to direct and averted gaze. Instead, heart rate deceleration responses reflecting attention orienting were greater to direct gaze compared to averted gaze in both Live and VR conditions. These results suggest that while eye contact engages visual attention similarly when interacting with a live confederate and a confederate's avatar in VR, only eye contact with a live person increases affective arousal.

OS3.AUD.2 HUMAN-LIKE ERRORS IMPAIR SYNCHRONIZATION IN A JOINT TASK WITH A ROBOT

Ciaro, F., De Tommaso, D., & Wykowska, A.

Istituto Italiano di Tecnologia (IIT), Italy

Presenting author: Francesca Ciaro

In the present study, we examined whether human-like behavior of a robot affects the way humans perform a joint task with the robot. Participants performed a synchronized tapping task with the humanoid robot iCub. iCub's was programmed to make a mistake in 60% of the trials. For half of the participants, in the erroneous trials, iCub pressed the wrong key (Human-like error), whereas for the other half of participants iCub interrupted the task

and moved back and forth between two keys (Mechanical error). Results showed that overall participants were less accurate (higher error rate and lower period performance) for the Human-like than the Mechanical condition. When iCub performed the task correctly, however, the variability in the asynchrony between the robot's and participants' mean periods was higher for the Human-like than for the Machine-like error context. Our results show that human-likeness of a robot behavior affects synchronization in a joint task.

OS3.AUD.3 HUMAN MACHINE INTERACTION: A PROBLEM OF AGENCY

Sahaï, A.^{1,2}, Pacherie, E.², Grynszpan, O.³, & Berberian, B.¹
 1 *The French Aerospace Lab, France*; 2 *ENS, France*; 3 *Université Paris-Sud, France*

Presenting author: Bruno Berberian

The sense of agency experienced in joint action is thus a central subjective dimension of human sociality. In a series of 3 experiments, we explore the development of we-agency when interacting with robot. Combining a Social Simon task with the intentional binding effect, we explore (1) the emergence of self and we-agency in joint action and (2) the impact of the nature of the partner (human Vs Social robot Vs Computer) on the development of we-agency. Our two first experiments show that a vicarious sense of agency developed when co-acting with another human agent but not with a computer. Moreover, EEG data indicated a decrease in task involvement when engaged in human-computer interaction. A third experiment shows that the social nature of the artificial agent can modulate the development of we-agency, but also that the emergence of a we-unit can alter the development of the self-agency.

OS3.AUD.4 USING HUMANOID ROBOTS TO TEST FLEXIBILITY OF HUMAN SOCIAL COGNITION

Wykowska, A.¹, Kompatsiri, K.^{1,2}, Schellen, E.¹, Bossi, F.¹, & Ciardo, F.¹

1 Istituto Italiano di Tecnologia (IIT), IT; 2 Ludwig-Maximilians-Universität (LMU), DE

Presenting author: Agnieszka Wykowska

In this presentation, I will argue that using embodied humanoid robots in interactive experimental protocols allows not only for high ecological validity together with excellent experimental control, but it also provides the opportunity to test if mechanisms of human social cognition are flexible enough to be elicited not only by natural but also by artificial agents. I will present results of several studies in which we examined mechanisms of human cognition during interaction with humanoid robots. Our results show that mutual gaze with a robot is interpreted in a social way, increasing participants' engagement in joint attention (Experiment 1) and honesty (Experiment 2). Furthermore, embodied presence of a robot has an impact on participants' sense of agency (Experiment 3). These results support the idea that humanoid robots can be represented by the human cognitive system as social entities, thereby indicating flexibility of social cognition.

Cibeles Room

Face Processign

OS3.CIB.1 DOES FACE FAMILIARITY INFLUENCE ATTENTIONAL REFRESHING IN VISUAL WORKING MEMORY?

Schneider, P.¹, Vergauwe, E.², & Camos, V.¹

1 University of Fribourg, Switzerland; 2 University of Geneva, Switzerland

Presenting author: Philippe Schneider

Attentional refreshing has been defined as the main maintenance system in working memory (WM), using domain-general attentional resources to keep visual as well as verbal information active for a short period of time. However, its functioning is not well understood. One assumption is that it would rely, at least in part, on retrieval from long-term memory (LTM). The familiarity effect, a LTM effect, is known for influencing performance in WM tasks, with more familiar items yielding better performance. In a series of experiments, we investigated the hypothesis that more familiar items would be refreshed more efficiently than the less familiar ones. To that aim, we systematically manipulated refreshing opportunities and familiarity in two visual WM tasks. We manipulated face familiarity by using the well-established Own-Race Effect, where faces from our own ethnicity are better recalled than faces from other ethnicities. Results and their implications for WM theories will be discussed.

OS3.CIB.2 TYPICAL FACIAL EXPRESSION RECOGNITION WITHOUT MOTOR SIMULATION

Vannuscorps, G.^{1,2}, Andres, M.², & Caramazza, A.¹

1 Harvard University, U.S.A; 2 Université catholique de Louvain, Belgium

Presenting author: Gilles Vannuscorps

Perceiving others' movements activates imitative motor plans in the observer. This led to the idea that efficient interpretation of others' movements, such as their facial expressions, requires covert imitation of these movements, a "motor simulation". If so, then, individuals born with congenital bilateral facial paralysis and thus never developed motor representations that could be mobilized to covertly imitate facial movements, should

interpret facial movements less efficiently than typically developed participants. We report the results of five experiments assessing different aspects of facial expression recognition in eleven individuals born with bilateral congenital facial paralysis. Their patterns of performance were indistinguishable from that of typically developed individuals. Thus, efficient action interpretation does not require motor simulation.

OS3.CIB.3 QUANTITATIVELY ANALYZING THE TIME COURSE OF FACE LEARNING: AN ERP STUDY

Kotowski, K.¹, Stapor, K.¹, & Sommer, W.²

1 Silesian University of Technology, Poland; 2 Humboldt-University at Berlin, Germany

Presenting author: Krzysztof Kotowski

The development of the stable face representation in the brain is a long-term cognitive process that is not thoroughly examined in the literature. Previous ERP studies have identified the N250 component as the main correlate of face familiarity. The amplitude of this component is known to decrease during demanding tasks of face learning or recognition, like the Joe/No Joe task. However, previous articles analyse only the average amplitude differences between two, three or four consecutive parts of the experiment. Our work refines these analyses by quantitative assessment of the N250-based time course of face learning based on the replicated Joe/No Joe experiment. After the process of selection of a proper trend model and a proper number of parts on which to divide the experiment, our initial results support the hypothesis of a linear characteristic of this face learning curve.

OS3.CIB.4 DISSOCIATED EFFECT OF FACIAL EXPRESSION
PRESENTED AT THE PERCEPTUAL THRESHOLD ON
COMFORT SOCIAL DISTANCE AND ELECTRODERMAL
ACTIVITY

Cartaud, A., Ott, L., Honoré, J., & Coello, Y.

University of Lille, France

Presenting author: Alice Cartaud

We aimed to test whether facial expressions could modulate comfort social distances and the electrodermal response (EDA) when presented at the perceptual threshold. For this, we first established the individual perceptual threshold of the participants while they had to discriminate the facial expression (angry, neutral or happy) displayed on a 4x2m stereoscopic screen. In the second task, a new set of faces were displayed at their individual threshold before presenting a Point-Light Walker (PLW) moving towards them and crossing them at inter-shoulder distances. EDA was recorded while they had to judge whether the PLW was crossing at a comfortable distance or not. Finally, participants estimated the valence and arousal of the faces. Results revealed an effect of facial expressions on the comfort distances but no effect on the EDA suggesting that implicit induction of an emotional state affects social judgment but not automatic physiological response.

Estambul Room

Language Processign II

OS3.EST.1 SEMANTIC PREVIEW BENEFIT AND COST: EVIDENCE FROM PARAFOVEAL FAST-PRIMING

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Presenting author: Jochen Laubrock

Recent studies have demonstrated that semantically related parafoveal previews can either facilitate or interfere with lexical processing of a target word. The exposure time to parafoveal previews (i.e., preview duration) has been shown to influence the size and direction of parafoveal semantic effects. However, evidence to date is only correlational. In two experiments, we experimentally manipulated preview duration. Using a combination of the gaze-contingent fast-priming and boundary paradigms, we systematically examined the time course of parafoveal semantic activation during the oral reading of Chinese sentences. Semantic previews led to facilitation in lexical access of target words only when the previews were presented briefly (80 ms). Longer exposure time (100 ms or 150 ms) eliminated semantic effects, and full preview without duration limit resulted in preview cost, i.e., a reversal of preview benefit. Results suggest that the size and direction of parafoveal semantic effect depends on the level of lexical activation.

OS3.EST.2 ON THE INTERPLAY BETWEEN MOTOR SEQUENCING AND LINGUISTIC SYNTAX: ELECTROPHYSIOLOGICAL EVIDENCE

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Presenting author: Pilar Casado

In this study, we combined two different sequential motor tasks, linear vs. non-linear self-administration of sentences, with correctness judgment of the latter, which

could include a morphosyntactic violation, while recording brain electrical activity. The sentences could be of three types: subject-relative sentences, embedded PP sentences or coordinate subject sentences. Overall, results revealed significant modulations in the ERP components, connected to the number of different actions involved in both the motor task and the sentence. The motor task seemed always to hamper the occurrence of early syntactic processes, as no frontal negativities could be observed. The latter were replaced by lexico-semantic processing when motor and sentential structures matched, as reflected in the appearance of an N400 effect. In turn, a mismatch in this regard seemed to completely impede the appearance of any type of early processing. The present findings extend support that syntax and motor task computations draw upon interdependent resources.

OS3.EST.3 THE REPRESENTATION OF SYNTACTIC FEATURES: CROSS-LINGUISTIC EVIDENCE

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Presenting author: Niels Schiller

To produce a word, speakers need to retrieve the lexico-syntactic representation of the word and encode the phonological form for articulation. It is not precisely known yet if a word's syntactic features (e.g., number, gender, etc.) are automatically activated and selected in bare noun production. Cubelli, Lotto, Paolieri, Girelli, and Job (2005) proposed that only in languages that have a complex morphological structure (e.g., Italian), the selection of grammatical gender is required. In languages with a relatively simpler morphological structure, the selection of grammatical gender is by-passed. Here, we investigated this issue further by employing a language with an extremely simple morphological structure, i.e., Mandarin Chinese. Using the picture-word interference paradigm, we manipulated the congruency of the lexico-syntactic classifier feature (comparable to grammatical

gender) between the target picture and the superimposed distractor word. We measured participants' naming latencies and their electroencephalogram (EEG). As a result, relative to the classifier-congruent condition, classifier incongruency elicited a stronger N400 effect in the ERP analyses, suggesting the automatic activation of lexico-syntactic features in bare noun production. However, classifier congruency did not affect naming latencies, suggesting that the lexico-syntactic feature is not selected in bare noun naming when it is irrelevant for production.

OS3.EST.4 ASSESSING INDIVIDUAL DIFFERENCES IN LANGUAGE PROCESSING: A NOVEL RESEARCH TOOL

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Presenting author: Florian Hintz

Individual differences in language processing are prevalent in our daily lives. However, for decades, psycholinguistic research has largely ignored variation in the normal range of abilities. Recently, scientists have begun to acknowledge the importance of inter-individual variability for a comprehensive characterization of the language system. In spite of this change of attitude, empirical research on individual differences is still sparse, which is in part due to the lack of a suitable research tool. Here, we present a novel battery of behavioral tests for assessing individual differences in language skills in younger adults. The Dutch prototype comprises 29 subtests and assesses many aspects of language knowledge (grammar and vocabulary), linguistic processing skills (word and sentence level) and general cognitive abilities involved in using language (e.g., WM, IQ). Using the battery, researchers can determine performance profiles for individuals and link them to neurobiological or genetic data.

Atenas Room

Emotion and Attention

OS3.ATE.1 PROACTIVE CONTROL OF AFFECTIVE DISTRACTION: EXPERIENCE-BASED BUT NOT EXPECTANCY-BASED

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 Presenting author: Constantin Schmidts

Unpleasant stimuli disrupt ongoing information processing, even when they are entirely task-irrelevant. We examined whether such affective disturbances can be controlled proactively. We examined experience-based control by manipulating the frequency of affective distractors, and expectancy-based control by presenting predictive valence cues. We predicted that both mechanisms would shield the attentional system from affective disturbance. Participants solved a letter classification task while being exposed to neutral or negative distractor pictures. We varied whether the proportion of negative distractors was low or high and whether cues were informative or uninformative. In two experiments (N = 75), we found support for the notion that experience-based control shields information processing from affective disturbances, whereas distractor valence expectations were neither helpful nor harmful. There appears to be no explicit top-down influence on attentional control settings of affective distraction, just adjustments to the context.

OS3.ATE.2 ALERT: ATTENTION IS ENHANCED PRIOR TO ANY UPCOMING STIMULUS, REGARDLESS OF ITS EMOTIONALITY

Makovski, T. & Chajut, E.
The Open University of Israel
 Presenting author: Tal Makovski

A recent study has found that people do not inhibit distractors in advance. Instead, attention is more alerted when observers are expecting the presentation of an upcoming stimulus, even if it is surely distracting. Here we asked whether threat, which is an evolutionary important signal that known to modulate attention after its appearance, would elicit a different preparation effect

prior to its appearance. Thus, participants performed a change-detection task while expecting that at a fixed moment in time a neutral, a threatening, or no stimulus would appear. Replicating previous findings, responses to an infrequent dot-probe were faster when it appeared when participants were expecting a distracting stimulus. Importantly, however, whereas only threatening stimuli impaired performance in the change-detection task, the expectation effect for threatening and neutral stimuli was the same. These results suggest that the visual system is not more alerted in the face of a threat.

OS3.ATE.3 CONTRASTING DIS-/ENGAGEMENT OF SPATIAL ATTENTION IN DISGUST AND FEAR IN PREDICTIVE VERSUS COUNTER-PREDICTIVE CUEING

Zimmer, U., Wendt, M., Pacharra, M., Heinrichs, F.G., Krone, K., & Bremer, P.
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 Presenting author: Ulrike Zimmer

Using a predictability of 50% valid/invalid cues, our recent studies indicated that disgust in contrast to other negative emotions directs our attention away as mirrored in slower responses and enhanced P3-activity to same-sided versus opposite targets. Here we asked if top-down (expectancy-based) shifts of attention mediate emotional avoidance/attraction. In an ERP-study, a lateralized facial emotion cue (disgust/fear/neutral) preceded a lateralized white triangle target with a SOA of 200ms or 800ms. In the predictive condition, 75% of the cues were valid, in the counter-predictive 75% were invalid. Participants signaled the direction of the triangle (up/down). Behavioral results indicated an interaction of predictability with emotion, specifically driven by disgust in the counter-predictive condition. ERP-results showed an interaction of emotion by SOA at P3, again pronounced in the counter-predictive condition. Our results suggest stronger disengagement from the location of a disgust-related cue, mediated by top-down (expectancy-based) shifts of attention or Inhibition of Return.

OS3.ATE.4 ATTENTIONAL BIAS DUE TO EMOTIONS AND WORD PROCESSING IN BINGE-DRINKING: AN ERPS STUDY

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Presenting author: Pamela Gobin

We investigated whether the automatic emotional processing, impacting early attentional and later lexico-semantic processes, would be affected by binge-drinking, according to the word-association with alcohol. Recent studies have shown an emotional recognition impairment. Other studies have highlighted an attentional focus towards items linked to alcohol, but without taking into account word emotionality. Thus, 20 binge-drinkers and 20 control participants (10 males/10 females) performed a lexical decision task, with emotional (negative/positive) and neutral words, related or not to “alcohol”, while EEG was recorded. Results showed a significant effect of emotionality, of association, and of interaction between group, sex and emotionality or association, both on early (N1/N2/P2/P3) and on later components (N400/P600), depending on considered valence. Therefore, emotional valence and association with “alcohol” would influence attention allocation, which leads to a specific cognitive resource distribution for lexical activation and for semantic integration, modulated by alcohol consumption but differentially for men and women.

St Tropez Room

Memory

OS3.StT.1 POSITIVE AND NEGATIVE EFFECTS OF OVERT VERSUS COVERT MEMORY RETRIEVAL

Pansky, A., Sagi, J., & Morad, L.

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Presenting author: Ainat Pansky

Interpolated memory testing has been shown to yield positive effects on later retention (i.e., the testing effect) but some negative effects as well (e.g., forced confabulation effects). In this study, we examined the extent to which each of these effects is due entirely to retrieval practice, or whether overt reporting of the retrieved information makes an additional contribution. Participants were asked both answerable and unanswerable questions about a viewed event, either once (Experiment 1) or repeatedly (Experiment 2), retrieving the answers either covertly or overtly. Our procedure was especially designed to encourage actual retrieval whether or not an overt response was solicited. We found comparable effects of overt and covert retrieval, for both answerable and unanswerable questions, resulting in comparable improvements in delayed memory performance (in terms of both completeness and reliability). Our findings support the role of retrieval per se in underlying both positive and negative effects of testing.

OS3.StT.2 USING THE MEMORY MEASUREMENT MODEL IN WM TASKS WITH VISUAL MATERIAL AND n-AFC RECOGNITION RETRIEVALS

Frischkorn, G.T. & Oberauer, K.

University of Zurich, Switzerland

Presenting author: Gidon T. Frischkorn

The memory measurement model (M3; Oberauer & Lewandowsky, 2018) distinguishes three working-memory processes that activate representations for retrieval: baseline activation, unspecific activation of all representations currently stored in WM, and re-activation of representations when cued by a specific context it is bound to (e.g. serial or spatial position). These parameters specify activation for three representation

categories: items in position, other list items, and not-presented lures. Additional parameters enable M3 to model how strongly distractors in complex span tasks are filtered out at encoding, and how efficiently items are removed from memory in updating tasks. So far, the M3 has only been used with verbal material in complex span and updating tasks. We will present a generalization of the M3 to WM tasks with visual materials. In addition, we will explore the suitability of M3 for n-alternative forced choice (n-AFC) recognition retrievals with varying numbers of choice options.

OS3.StT.3 THE EFFECT OF ELABORATION ON MEMORY ACROSS AGE

Bartsch, L.M. & Oberauer, K.

University of Zurich

Presenting author: Lea Bartsch

Previous research has shown that free time to attend to and further process information in working memory is key in promoting WM and long-term memory (LTM, Souza & Oberauer 2017,2018). To investigate whether free time is used for elaboration we conducted two experiments comparing memory performance of young and older adults. Participants remembered lists of nouns, interleaved with short or long free-time intervals, or with filler words connecting all the nouns into a meaningful sentence to assist elaboration. Assisted elaboration benefited WM equivalently to longer free time only when memory load was high and only in young adults. In contrast, LTM benefits of sentence elaboration were larger than of longer free time. Furthermore, older adults benefited from assisted elaborations but never to the degree of younger adults, providing further evidence that the LTM deficit of older adults might arise at least in part from a deficit in elaboration.

OS3.StT.4 AUTOMATIC PROCESSES ON FALSE
RECOGNITION: THE ROLE OF BACKWARD ASSOCIATIVE
STRENGTH AND PRESENTATION RATE

Suarez, M. & Beato, M.S.

University of Salamanca, Spain

Presenting author: Mar Suarez

Are only automatic processes capable of producing false recognition? We manipulated the presentation rate of study items and the backward associative strength (BAS) in the Deese/Roediger-McDermott paradigm. Participants studied 5 high-BAS and 5 low-BAS lists of associatively related words for a subsequent recognition test. Associates were studied at two presentation rates: fast condition (50ms, visually masked) and slow condition (2000ms, unmasked). Results showed that true recognition dramatically dropped in the fast condition (.79 vs. .31), while false recognition did not differ between conditions (.42 vs. .34). More interestingly, false recognition in low-BAS lists was similar in the slow and fast conditions (.35 vs. .36), whereas high-BAS lists produced higher false recognition in the slow than fast condition (.49 vs. .32). Therefore, very fast automatic processes seem to be responsible for false recognition, but also a little more time was required to observe the full effect of the high associative strength.

Tarraco Room

Visual Attention

OS3.TAR.1 BEHAVIOURAL EVIDENCE FOR MULTIPLE ATTENTIONAL TEMPLATE

Zhou, X., Lorist, M.M., & Mathöt, S.

University of Groningen

Presenting author: Xiaoyi Zhou

During visual search, representations maintained in visual working memory (VWM), which are known as templates, are assumed to be activated to bias attention towards matching visual items. A main debate over this VWM-based capture concerns whether only one (Single-Item-Hypothesis, SIT) or multiple (Multiple-Item-Hypothesis, MIT) templates actively interacts with perceptual processing at a given time to bias attention. The current study was designed to test the two accounts. Participants memorized 2 colors, prior to a visual search task where the target and the distractor matched or did not match the memory. A robust attentional capture was observed when the memory color was presented as the target or the distractor. Consistent with the MIT model, we found that a similar pattern of the RT distribution for both-match trials and no-match trials, showed that both the target-matched and distractor-matched colors draw attention. Critically, simulations of RTs based on the two models in a drift-diffusion model revealed a better match of MIT model to the observed data. Taken together, our findings provided behavioural evidence for the concurrent guidance of multiple items in VWM.

OS3.TAR.2 PARIETAL tACS AT BETA FREQUENCY IMPROVES VISUAL CROWDING

Battaglini, L., Ghiani, A., Casco, C. & Ronconi, L.

University of Padova

Presenting author: Luca Battaglini

Visual crowding is the inability to discriminate objects that are presented with nearby flankers. Beta cortical oscillation in the right parietal cortex seems to be associated with better crowding resilience. The effect of tACS within the beta and alpha range, namely at 18 and 10hz, on a letter crowding task, was tested. An increment in the participants' performance with 18hz-tACS

compared to 10hz-tACS and sham stimulation, was measured. This improvement was found specifically in the hemifield contralateral to the stimulation site and was accompanied by increased amplitude of EEG beta oscillations (resting electroencephalography). Moreover, analysis on a single trial levels reveals that correct discrimination was associated with a specific phase of beta tACS. These results support a causal relationship between beta oscillations and visual crowding and, importantly, provide evidence that tACS at relevant frequencies can improve crowding-related performance.

OS3.TAR.3 APPLYING A SIMILARITY BASED MODEL OF VISUAL SEARCH TO FIXATION DATA AND DUAL TARGET SEARCH

Guest, D.

Nottingham Trent University, UK

Presenting author: Duncan Guest

It is well known that similarity effects visual search efficiency. Guest and Lamberts (2011) proposed a model to account for the time course of visual search that assumes (unlike many models) that similarity between objects and internal representations of objects is not static but changes as perceptual information is processed about objects and their features. This assumption underpins models of other perceptual tasks (e.g., categorization, Guest & Lamberts, 2011). Here we extend the model and show it can account for the time course of eye fixation data in simple feature search and conjunction search (Experiment 1). We also extend the model to account for performance in dual target search. The model accounts well for the impact of searching for two targets (Experiment 2a and 2b) and also captures set size effects (Experiment 3). Importantly, the model suggests that, at least some of the time, two targets can be searched for simultaneously.

OS3.TAR.4 PUPIL SIZE REFLECTS EXPLORATION AND EXPLOITATION IN VISUAL SEARCH (AND IT'S LIKE OBJECT-BASED ATTENTION)

Mathôt, S. & Regnath, F.

University of Groningen, Netherlands

Presenting author: Sebastiaan Mathôt

The adaptive-gain theory (AGT) distinguishes two modes of behavior: exploitation and exploration. During exploitation, you are focused on a single task; during exploration, you rapidly switch between tasks. The AGT further posits that exploration is associated with larger pupils than exploitation, and that large pupils reflect increased activity in the Locus Coeruleus (LC). Here we test these predictions in a visual-search task. Participants searched for a target in a display that was divided into regions of different colors. These regions were unrelated to the search task. Nevertheless, we found that participants tended to search one region at a time, reminiscent of object-based attention. Furthermore, we found that switches to another region were accompanied by pupil dilation. This suggests that shifting attention (or gaze) from one region towards another region is a form of “micro-exploration” that is accompanied by pupil dilation and, presumably, increased tonic activity of the LC.

Barcelona Room

Dyslexia

OS3.BAR.1 THE LINK BETWEEN COGNITIVE DISORDERS AND EMOTIONAL PROBLEMS: INSIGHTS FROM DEVELOPMENTAL DYSLEXIA

McArthur, G., Francis, D., Robidoux, S., Badcock, N., & Hudson, J.

Macquarie University

Presenting author: Genevieve McArthur

There is growing concern amongst educators, clinicians, and scientists that children with cognitive disorders are at increased risk for emotional problems. This concern is backed by scientific studies showing associations between childhood cognitive disorders and emotional problems. Unfortunately, our understanding of why these associations exist is limited. By combining the statistical power of large-scale longitudinal studies with the causal testing power of intervention case studies, we are working towards the first comprehensive evidence-based theory of the mechanisms linking one childhood cognitive disorder - developmental dyslexia - to emotional problems. In this presentation, I will present the outcomes of our most recent studies which are providing glimpses into these mechanisms. I will also consider how these mechanisms might explain associations between other cognitive disorders and emotional problems.

OS3.BAR.2 WEAKER NEURAL RESPONSES TO LEXICALITY AND WORD FREQUENCY IN DYSLEXIC ADULTS: AN EEG STUDY WITH FAST PERIODIC VISUAL STIMULATION

Lochy, A.¹, Collette, E.², Rossion, B.^{2,3}, Schelstraete, M.-A.², & Schiltz, C.¹

1 Université du Luxembourg, Luxembourg; 2 Université Catholique de Louvain, Belgium; 3 Université de Lorraine, France

Presenting author: Alette Lochy

Dyslexia, a persistent reading disorder, is characterized by different brain activation patterns when reading. Here, we used a Fast Periodic Visual Stimulation paradigm during EEG recordings to assess the sensitivity of dyslexics to fine-grained psycholinguistic variations of letter strings: lexicality, lexical frequency, and orthographic regularity.

Dyslexic and non-dyslexic students watched 60-second streams of stimuli presented at 10Hz, in which deviant items are inserted periodically (1/8, at 1.25Hz). Results show discrimination responses at 1.25Hz over left posterior occipito-temporal regions, reduced in dyslexics. Group differences were significant for discrimination of word lexicality and frequency, but not for word regularity. These results show that FPVS response amplitude distinguishes normal from pathological population. Since explicit reading is prohibited by the fast rate, results suggest differences of automatic and implicit word processing in dyslexics. The lack of group difference for regular/irregular words is interpreted post-hoc as reflecting the life-long drill of dyslexics to irregular words.

OS3.BAR.3 DEVELOPMENTAL DYSLEXIA: A DEFICIT IN MAGNOCELLULAR-PARVOCELLULAR CO-ACTIVATION, NOT SIMPLY IN PURE MAGNOCELLULAR ACTIVATION

Ciavarelli A. & Casco C.

University of Padova, Padova, Italy

Presenting author: Ambra Ciavarelli

High contrast sensitivity (CS) with Gabor stimuli of very low spatial frequency (SF) and very high temporal frequency (TF) indicates pure magnocellular sensitivity. Any advantage in CS, by either decreasing TF or using static high-SF Gabors, would be ascribed to the coexisting responses of both systems. Differently from the prediction of the magnocellular deficit, in our study dyslexic individuals showed no deficit in the unmixed magnocellular response. Also, differently from controls, they showed no advantage when the relative weight between magnocellular and parvocellular inputs was thrown off balance in favor of the latter. Our results point out that in dyslexia, the relative contribution of these two systems to visual processing is perturbed and this may have a detrimental consequence in word processing, both within the parafovea and the fovea, during fixation. Collectively, these data may give a contribution to the advancement of diagnostic and training protocols for developmental dyslexia.

OS3.BAR.4 DOES A SOCIO-EVALUATIVE CONTEXT
MODULATE THE AMPLITUDE OF THE PHONOLOGICAL
DEFICIT IN DEVELOPMENTAL DYSLEXIA?

Maïonchi-Pino, N.¹, Magnien, A.², Chabanal, D.¹, Lucas,
O.¹, Ferrand, L.¹, & Huguet, P.¹

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Franche-Comté, FR*

Presenting author: Norbert Maïonchi-Pino

Cross-linguistic studies suggest that phonological deficit tends to be a universal marker of reading difficulties in developmental dyslexia (DD). However, there is a debate between the degraded phonological representation hypothesis and the hypothesis that the phonological deficit stems from difficulties in memorizing, accessing and retrieving the phonological representations. Our aim was to determine to what extent a socio-evaluative context modulates the amplitude and the expression of this phonological deficit. We designed tasks that involved the use of phonological syllables in silent reading by jointly manipulating the evaluative pressure of the instructions to saturate the phonological loop of the working memory (known to be impaired in DD). Our results showed that stressful instructions given on the importance to succeed in a reading task impact negatively both the performance and the phonological response patterns of children with DD, more than typically-developing children, suggesting failure to access phonological syllable-based representations under socio-evaluative contexts.

Palma de Mallorca Room

Arithmetics II

OS3.PAL.1 SPATIAL BIASES IN MENTAL ARITHMETIC ARE INDEPENDENT OF READING HABITS: EVIDENCE FROM FRENCH AND ARABIC SPEAKERS

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Presenting author: Nicolas Masson

The representation of number magnitude appears linked to space, with small- vs. large-magnitude numbers being respectively related to the left vs. right side of space in Western cultures. These Spatial-Numerical Associations (SNAs) in number processing is commonly attributed to the reading/writing direction. SNAs have also been reported in Western participants solving arithmetic problems, with subtraction/addition inducing leftward/rightward biases. Here, we tested whether SNAs in arithmetic stem from reading direction by using a temporal order judgement task in participants with opposing reading directions. French/Arabic speakers solved subtraction and addition problems while determining which of a left or right target appeared first on screen. Both groups favoured the right target more often when solving addition than when solving subtraction problems. These results indicate that SNAs in arithmetic are not related to reading direction. We call for a reconsideration of current models and suggest a pervasive role of biological factors in human adults.

OS3.PAL.2 THE MALLEABILITY OF NUMBER

Reynvoet, B. & Ariens, S.

KU Leuven, Belgium

Presenting author: Bert Reynvoet

Numerosity comparison, i.e. deciding which dot-array contains the most dots, has attracted a lot of interest in the numerical cognition field. However, the interplay between number and non-numerical cues of the dot-arrays (total area, convex hull,...) in numerosity decisions remain unclear. The contribution of number and non-numerical cues in numerosity decisions has been demonstrated with congruency effects: congruent trials

(where number and non-numerical cues correlate) are easier than incongruent trials (where number and non-numerical cues anti-correlate). In the present study, we manipulated the list of to be presented trials and observed a reduced congruency effect when the list also contained filler trials with some of the non-numerical cues correlating positively and others negatively with number (partial congruent trials). This pattern shows that changing the relation amongst the different non-numerical cues, results in different numerosity decisions. Implications for theories on numerosity processing will be discussed.

OS3.PAL.3 INITIAL COMPETENCE AND EXPERIENCE-DRIVEN REFINEMENT OF NUMERICAL ACUITY IN DEEP NEURAL NETWORKS

Testolin, A.¹, Zou, Y.², & McClelland, J.³

1 University of Padova, IT; 2 Stanford University, USA

Presenting author: Alberto Testolin

Newborns are sensitive to the approximate number of items in a visual display, however numerical acuity improves during development and is higher in adults with more extensive formal education. Our computational model shows that a deep neural network can exhibit initial sensitivity to numerosity after random initialization, and experience-driven unsupervised learning leads to a progressive refinement of numerical representations, following a developmental trajectory similar in form to that seen in human subjects. Sensitivity to numerosity emerges both with controlled training stimuli, where number orthogonally varies with total area and number frequencies are uniformly distributed, but also using a more ecological set of training stimuli mirroring the statistical distribution of visual features in natural environments. Overall, our work combines with other recent behavioral and computational findings to support the emerging focus on the role of experience rather than evolutionary specialization as a major determinant of human numerosity judgement abilities.

OS3.PAL.4 EMOTION AFFECTS ARITHMETIC

Kulkova, E.S. & Fischer, M.H.

University of Potsdam, Germany

Presenting author: Elena Kulkova

Both mental arithmetic and emotions demonstrate spatial associations. However, it is unclear whether these associations are interconnected. Our study investigates whether emotional priming affects calculation performance. 30 adults saw blocks of happy, neutral or sad pictures followed after 1000 ms by multi-digit arithmetic facts until a verbal true-false response was recorded. Pictures represented either human emotional faces or landscapes, animals and objects. Calculation was faster for additions than subtractions and for non-carry over carry- problems. Both happy and sad pictures facilitated additions compared with neutral pictures. Happy pictures also facilitated subtractions. Happy non-face pictures facilitated processing carry problems more than happy faces. The findings suggest that the spatial association of emotions is mediated by magnitude (less/more emotion) not valence, and that there is a general “positive bias”. Decoding human emotion may require more time and cognitive resources and, therefore, conflict with effortful carry problem solving, resulting in its inhibition.