

**May 10 (17h05-18h00): Keynote lecture I**

**(ROOM De Méan)**

Thirty years of experimental psychology in Spain

***Pío Tudela***

***Universidad de Granada, Spain***

Experimental Psychology is a young discipline in Spain. The Spanish Society of Experimental Psychology (SEPEX) was founded in 1997, a determinant time point in the development of our discipline. Taking this particular date as a reference I will describe the beginning of experimental psychology in Spanish universities that lead to the founding of our Society, and the exponential growth that experimental research in psychology has undergone since then. I will also review the main areas of research, reflect upon the principal characteristics of our present situation and point to promising future developments.



**May 11 (16h20-17h20): Keynote lecture II**

**(ROOM De Méan)**

Constructive memory and imagining the future: A cognitive neuroscience perspective

***Daniel Schacter***

***Harvard University, USA***

Studies of memory have mainly focused on remembering the past, but an important function of memory is to allow individuals to simulate or imagine future scenarios. A rapidly growing number of studies have shown that simulating future events depends on much of the same neural and cognitive machinery as does remembering past events. To account for these findings, we have suggested the constructive episodic simulation hypothesis, which holds that simulation of future events requires a system that can draw on the past in a manner that flexibly extracts and re-combines elements of previous experiences, sometimes producing memory distortions that reflect the operation of adaptive processes. This talk will consider results from recent cognitive and neuroimaging studies that are related to the constructive episodic simulation hypothesis, and that illuminate the mechanisms and functions of future simulation.



## **ORAL PRESENTATIONS**



**May 10 (9h00-10h50): Oral session 1**

**Symposium (ROOM SM6): “Assessment of maladaptive personality traits across the life-span”** (*Mieke Decuyper<sup>1</sup>, Leen Bastiaansen<sup>2</sup>, Gina Rossi<sup>2</sup>, Filip De Fruyt<sup>1</sup>, Elien De Caluwé<sup>1</sup>, Barbara De Clercq<sup>1</sup> and Lize Verbeke<sup>1</sup>*; <sup>1</sup>*Universiteit Gent* - <sup>2</sup>*Vrije Universiteit Brussel, Belgium*)

The personality disorder diagnosis in DSM-5: incremental validity of traits and dysfunction

*Leen Bastiaansen<sup>1</sup>, Gina Rossi<sup>1</sup> and Filip De Fruyt<sup>2</sup>*  
<sup>1</sup>*Vrije Universiteit Brussel* - <sup>2</sup>*Universiteit Gent, Belgium*

In DSM-5, the personality disorder (PD) diagnosis will be based on two criteria: impaired personality functioning and the presence of maladaptive traits. Because there is still confusion about how these two components interact, and how they both contribute to the PD diagnosis, the current study will address this issue empirically in a sample of 159 psychiatric patients. Hierarchical regression analysis is used to determine the incremental validity of personality traits (as measured by the NEO-PI-R) and personality functioning (as measured by the SIPP-118) in explaining DSM-IV PD variance. Trait and dysfunction dimensions were strongly correlated, but showed significant though limited incremental validity beyond each other. Implications for the conceptualization and assessment of personality pathology are discussed.

Callous-Unemotional traits in adolescence from a DSM-5 trait perspective

*Mieke Decuyper*  
*Universiteit Gent, Belgium*

The psychopathy construct has a well-established value in adulthood and has been successfully extended to youth to describe antisocial behavior. Callous-unemotional (CU) traits are considered as the core characteristics of psychopathy and comprise affective and interpersonal features. CU traits offer a framework for the highly problematic character of early antisocial behavior. In the upcoming edition of DSM-5, it has been proposed to include a CU specifier within the Conduct Disorder (CD) diagnosis to account for the heterogeneity within conduct disordered youth. There is some debate however whether this CU specifier is best described by a measure that describes a single construct or whether it should mainly be understood as a mix of distinct traits that interconnect with the proposed trait system for personality pathology (Krueger et al., 2011). The present study addresses this issue empirically in a non-referred sample of 190 adolescents and discusses how CU traits in adolescence are associated with the facets of the DSM-5 trait system. Both mothers and adolescents provided ratings on the Inventory of Callous-Unemotional Traits (Frick, 2003) and the Personality Inventory for DSM-5 (PID-5; Krueger et al., 2011). The discussion will focus on the implications for assessment of CU traits in adolescence.

Children with regulation problems are at risk for personality pathology four years later

***Elieen De Caluwé and Barbara De Clercq***  
***Universiteit Gent, Belgium***

Emotional Dysregulation problems in childhood have been associated with various forms of later psychopathology, but to date, no studies investigated the adolescent outcomes regarding personality pathology. The present study examines from a typological approach how the CBCL-Dysregulation Profile (DP) predicts DSM-5 (Krueger et al., 2011) pathological personality traits across a time span of four years in a sample of 243 children aged 8-14. The results showed that children assigned to the DP-class are at risk for elevated scores on a wide range of personality pathology features, including higher scores on Hostility, Impulsivity, Emotional Lability, Deceitfulness, Callousness, and Grandiosity. The discussion focuses on the relevance of identifying early manifestations of persisting mood problems, because of their enduring impact on a child's personality development.

Integrating Childhood Oddity Traits In A Dimensional Model For Personality Pathology Precursors

***Lize Verbeke and Barbara De Clercq***  
***Universiteit Gent, Belgium***

Current dimensional measures of childhood personality pathology (e.g., Dimensional Personality Symptom Item Pool, DIPSI; De Clercq, De Fruyt, Van Leeuwen, & Mervielde, 2006) describe personality difficulties within a four-dimensional framework, despite the evidence that the inclusion of a fifth domain, conceptually described as "Oddity", may provide a more comprehensive description of personality pathology at a young age. In the current study 434 adolescents provided self-ratings on a preliminary taxonomy of oddity features, the DIPSI and the Personality Inventory for DSM-5 (PID-5; Krueger et al., 2011). Exploratory factor analysis (EFA), performed at the item level of the oddity taxonomy, revealed 4 internally consistent constructs, that empirically collapse in one higher order "Oddity" domain. The high correlations between these 4 constructs and the PID-5 Psychoticism facets, support the construct validity of this Oddity taxonomy. In addition, the Oddity domain emerges as a clear fifth dimension, beyond the 4 DiPSI dimensions. This research provides evidence that current four-dimensional dimensional models of childhood personality pathology may be expanded with a fifth Oddity dimension, hence representing a more comprehensive description of early personality pathology.

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**Symposium (ROOM SM10): “United we stand, divided we fall? Group dynamics in interactive groups» (*Ellen Delvaux and Loes Meeussen; Katholieke Universiteit Leuven, Belgium*)**

Exploring intra-group relationship conflict: The importance of emotion regulation in groups

***Helen Pluut, Smaranda Boros and Petru L. Curseu  
Tilburg University, Netherlands***

Conflict management is critical to the performance of groups, yet the variety of negative emotions associated with relationship conflict tends to interfere with effective conflict management styles. This longitudinal study therefore explores the role of emotion regulation in student groups. Structural equation modeling is used to test for the effect of emotion-focused coping on emotion regulation, and for the impact of both relationship conflict and emotion regulation on three conflict management styles (collaborating, contending, and avoiding) and a relational emergent state (intra-group trust). The results indicate that the experience of relationship conflict results in more contending and less collaborating conflict management styles and in lower trust. Emotion regulation, however, has the opposite effects, and tends to increase trust by reducing the tendency for groups to be avoiding in their style of managing conflict. In addition, we found that relationship conflict makes it difficult for effective emotion regulation to occur, yet groups whose members score high on engaged emotion-focused coping were more effective in emotion regulation. By showing that emotion-focused coping is an antecedent of group emotion regulation which in turn somewhat neutralizes the destructive nature of relationship conflict, the results have important implications for groups.

Emotional convergence in task groups over time: The moderating role of task group identification

***Ellen Delvaux, Loes Meeussen, Batja Mesquita and Karen Phaet  
Katholieke Universiteit Leuven, Belgium***

Emotions play an important role in task groups. Previous research has shown that high emotional similarity in task groups is associated with higher satisfaction of the group members and better task outcomes. Moreover, research with dyads suggests that emotional convergence is associated with positive relationship outcomes. The current research aimed to get a better insight into the processes leading up to emotional similarity in task groups. In a first study, we measured emotional convergence over time in newly formed task groups and examined the role of identification with the task group. We followed 68 task groups of 4-6 second year psychology students (N = 305) during their collaboration on a project. Participants were asked to fill out an online questionnaire, in which they rated their emotions and level of identification at 4 moments throughout the duration of their collaboration (at week 2, 4, 10 and 13 after the assignment). As predicted, the emotions of task group members converged over time. Moreover, identification with the task group moderated the process of emotional convergence.

Working through differences: Value convergence and emergent work group identities

***Loes Meeussen, Ellen Delvaux and Karen Phaet***

***Katholieke Universiteit Leuven, Belgium***

This study examines the process of group identity formation over time within real-life interactive work groups, with a focus on achievement values as key content of work group identities. We predicted that work group members would affect each other's achievement values over time and that this convergence in values would provide a shared sense of what is important within the group, underlying emergent work group identities and work group performance. Our findings supported these hypotheses, suggesting that successfully working through differences -rather than group members' initial similarities in values- leads to value convergence and, consequently, a shared identity and group performance.

"Yes, we can!": Collective efficacy and athlete leadership in sports teams

***Katrien Fransen, Norbert Vanbeselaere, Vasileios Exadaktylos, Gert Vande Broek,***

***Bert De Cuyper, Daniel Berckmans, Tanja Ceux, Maarten De Backer and Filip Boen***

***Katholieke Universiteit Leuven, Belgium***

Collective efficacy can be defined as a group's shared confidence that they will successfully achieve their goal. We examined which behaviors and events are perceived as sources of collective efficacy beliefs in a volleyball context. In Study 1, volleyball coaches from the highest volleyball leagues (n=33) in Belgium indicated the most important sources of collective efficacy. This list was then adapted based on literature and on feedback given by an expert focus group, resulting in a 40-item questionnaire. In Study 2, coaches and players from all levels of volleyball in Belgium (n=2,365) rated each of these sources on their predictive value for collective efficacy. The expression of efficacy by the athlete leaders on the field was rated by the coaches as most predictive for players' positive efficacy beliefs. Therefore, in Study 3, we focused on these athlete leaders. More specifically, we explored the different leadership roles occupied by these athlete leaders, and their most important qualities. Furthermore, we examined the impact of these leaders in affecting the efficacy beliefs of their team mates. In addition, we explored the role of team identification. These findings offer a starting point for the design of a continuous measurement of collective efficacy through observation.

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**Symposium (TRIFAC 2) : “On the relations between learning and cognitive control” (Luis Jiménez<sup>1</sup> and Axel Cleeremans<sup>2</sup>; <sup>1</sup>Universidad de Santiago de Compostela, Spain - <sup>2</sup>Université libre de Bruxelles, Belgium)**

Implicit sequence learning does not run out of control  
**Luis Jiménez<sup>1</sup>, María D'Angelo<sup>2</sup>, Juan Lupiáñez<sup>3</sup> and Bruce Milliken<sup>2</sup>**  
**<sup>1</sup>Universidad de Santiago, Spain - <sup>2</sup>McMaster University - <sup>3</sup>Universidad de Granada, Spain**

Jiménez, Lupiáñez, and Vaquero (2009) demonstrated that sequence learning effects decrease after a control trial, as compared to those observed after a trial congruent with the training sequence. This gradual regulation of the expression of learning in terms of the congruency of the preceding trial resembled the Sequential Congruency Effect (SCE), which is generally obtained in standard conflict tasks. We interpreted both effects in analogous terms, as suggesting that conflict monitoring processes can operate implicitly, even when the source of congruency remains unknown. Beesley, Jones, and Shanks (2011) questioned this conclusion, and argued that these effects could be explained as the result of learning longer-chains of contingencies, which would be necessarily broken after a control trial. We challenge this conclusion by showing that both implicit sequence learning and the SCE can be obtained in conditions in which there is no higher-order information to rely upon. We report on simulations showing that the SRN model proposed by Beesley et al. cannot predict these effects, and also show that, contrary to an alternative account based on the development of explicit expectancies, the reported effects were maintained over a transfer phase in which the training sequence was removed.

Learning cognitive control  
**Tom Verguts**

**Universiteit Gent, Belgium**

Control and automaticity are typically considered functional opposites. Here, I propose that controlled and automatic processing are two manifestations of the same cognitive system having either little (controlled) or extensive (automatic) experience with the task at hand. Within this framework, I discuss the adaptation by binding model (Verguts & Notebaert, 2008), according to which cognitive control effects emerge from a cognitive system learning a (very) novel task. I also discuss recent behavioral evidence for the model. In reinforcement learning terminology, this model concerns an actor (Sutton & Barto, 1998); I also discuss a recent critic model of anterior cingulate cortex (ACC), according to which ACC performs value computation to provide learning signals for actor systems located elsewhere in the brain (Silvetti et al., 2011). EEG data testing critical predictions of this model are discussed.

Explicit knowledge is necessary but insufficient for overcoming automatic sequential effects

**Elisabet Tubau, Hèctor Gimeno and Joan López-Moliner**  
**Universitat de Barcelona, Spain**

Responses to series of stimuli presented at fast rates are affected by automatic sequential effects. For example, in two-choice serial reaction time tasks, response repetitions are performed faster than response alternations in conditions of short

response stimulus temporal interval (RSI). With RSI longer than 300 ms, a cost-benefit pattern is usually observed: repetitions are performed faster than alternations when included in repetition runs but alternations are performed faster than repetitions in alternation runs. Would, nevertheless, the anticipation of the forthcoming event modulate such sequential effects? Using a fixed order instead of a random presentation, we found that some of the participants who developed explicit knowledge of the order showed different sequential effects as the ones who did not show such knowledge, suggesting a shift in the response control mode. Differences in control modes were also supported by different patterns of costs and benefits on run continuations which violated the fixed sequence. However, for some explicit learners, a dissociation between explicit knowledge and sequential effects was also observed, suggesting that the power of the explicit knowledge for response control is modulated by certain individual differences.

Linking consciousness and control through metarepresentation

*Axel Cleeremans*

*Université libre de Bruxelles, Belgium*

While numerous theories of consciousness have now been proposed, two big ideas dominate and subsume most other proposals. The first is that consciousness amounts to “fame in the brain” (e.g., Baars, Dehaene, Dennett, Lamme): We are conscious of whatever representations have, at some point in time, come to dominate information processing through processes of global competition and constraint satisfaction. The other idea is that consciousness specifically depends on the involvement of meta-representations (e.g., Rosenthal, Perner & Dienes): We are conscious of something in virtue of the fact that our first-order representations are the target of higher-order representations. In other words, it is because of the fact that one is conscious that one is conscious, that one is conscious! In this talk I explore the idea that consciousness is something that one learns rather than an intrinsic property of certain neural states, and suggest that this perspective offers a way of reconciling Global Workspace Theory with Higher-Order Thought Theory. Starting from the idea that neural activity is inherently unconscious, the question becomes: How does the brain learn to be conscious? I suggest that consciousness arises as a result of the brain's continuous attempts at predicting not only the consequences of its actions on the world and on other agents, but also the consequences of activity in one cerebral region on activity in other regions. By this account, the brain continuously and unconsciously redescribes its own activity to itself, so developing systems of meta-representations that characterize and qualify their target representations. Such re-representations form the basis of conscious experience, and also subtend successful control of action. In a sense thus, this is the enactive perspective, but turned both inwards and (further) outwards. Consciousness is “signal detection on the mind”; the mind is the brain's (non-conceptual, implicit) theory about itself. I subtend these ideas by exploring computational modelling and empirical evidence that learned metarepresentational systems underpin a system's ability to control itself, which in turn entails that it is sensitive to its own representations — a minimal requirement for conscious experience.

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**Symposium (TRIFAC 3) : “Word recognition research: The latest developments in Belgium and Spain” (*Marc Brysbaert; Universiteit Gent*)**

Do voice details survive lexical consolidation?

**Nicolas Dumay<sup>1</sup> and Jeff S. Bowers<sup>2</sup>**

**<sup>1</sup>Basque Center on Cognition, Brain and Language, Spain - <sup>2</sup>University of Bristol, UK**

This study assessed whether lexical consolidation strips voice-specific details off newly learnt words, thereby producing more abstract representations. English participants acquired one set of fictitious competitor words (such as 'shadowks' for 'shadow') seven days before the test, and another set of such competitors immediately before the test. Each word was learnt in a male or a female voice, and was tested in either the same or the other voice. Cued recall and phoneme monitoring showed stronger memory for the seven-day old items and an enhanced voice effect —better performance in the same voice condition— after seven days. Critically, performance in a pause detection task showed that only the seven-day old items contributed to lexical activity, and this only when the input preserved the voice in which they were encoded. Such findings indicate that voice-specific details neither are stripped off during nor just survive lexical consolidation: they are enhanced by it.

On the advantages of the go/no-go task in experiments with young readers

**Pablo Gomez<sup>1</sup> and Manuel Perea<sup>2</sup>**

**<sup>1</sup>DePaul University, Chicago, USA - <sup>2</sup>Universitat de València, Spain**

In a recent paper with developing readers (2nd and 4th grade children), Moret-Tatay and Perea (2011, J.Exp.Child.Psych) reported that the go/no-go lexical decision task led to faster responding (more than 100 ms), fewer errors (both omission errors and false alarms), and (to some degree) less noisy data than the two-choice lexical decision task. Thus, in experiments with young readers, the go/no-go lexical decision task should be preferred choice over the (standard) yes/no lexical decision task –note that in adult readers, the go/no-go advantage is less substantial (see Gomez, Ratcliff, & Perea, 2007; J.Exp.Psych:General, for a model of the go/no-go task). Here we examined whether the advantages of the go/no-go procedure with children are task-specific or whether they also generalize to other tasks. To that end, we conducted an experiment using a numerosity task (“is the number of asterisks high or low?”) with a go/no-go or a two-choice procedure. The participants were 4th grade children. Results showed a somewhat similar pattern of data across the two procedures (i.e., a pattern of data clearly different from that in lexical decision). We will present fits from Ratcliff’s diffusion model to examine which of the processes may be common and which processes may be different in the two procedures (two-choice vs. go/no-go).

When multilinguals meet orthography... Love at first sight

**Jon Andoni Duñabeitia, Aina Casaponsa and Manuel Carreiras**

**Basque Center on Cognition, Brain and Language, San Sebastian, Spain**

Recent years have witnessed an increasing number of studies exploring how bilinguals recognize printed words in their two languages, and to which extent reading one word in a given language spontaneously activates competing lexical representations in the same and in the other language (e.g., masked priming effects

with translation equivalents). However, recent electrophysiological studies have also highlighted an astonishing effect with a tremendously curious time course: The language switch cost effect. When masked prime words and targets correspond to different languages and when they do not have any overlap in terms of orthography or semantics (i.e., unrelated between-language manipulations), participants show a very consistent switch cost effect as compared to an unrelated within-language condition. This switch cost effect starts very early, at around 150ms post-target presentation. This finding raises a number of interesting questions that need further investigation: First, how can readers know that the masked unconsciously perceived words match or mismatch the target words' language? And second, how can the visual word recognition system do so in less than 200 ms? In the present electrophysiological studies we demonstrate that bilingual readers are sensitive to the masked words' orthographic structure and regularities in order to "detect" a language switch. We conducted two masked priming semantic categorization ERP experiments in which the primes were made of unrelated words either in the target language, or in another language known by the participants. We manipulated the mean bigram frequency (high vs. low) and the bigram legality (legal vs. illegal) of the words that were in the other language, by measuring their bigram information according to the counts of the target language. Results clearly showed that the latency and amplitude of early and late ERP components were sensitive to these manipulations. We conclude that these data unambiguously show that readers are highly sensitive to orthographic regularities of the words, and that they use this information in order to infer the language of these words (even when this information is masked and difficult to capture by the visual word processing system).

Word recognition: A signal detection approach

**Marc Brysbaert and Kevin Diependaele**

***Universiteit Gent, Belgium***

Lexical decision is one of the most frequently used tasks in word recognition research. Data-analysis typically focuses on reaction times (RTs) for correct word-trials only. Although random error is incorporated in the analysis, researchers typically assume that word responses are fully reliable: Words receiving a yes-response have been recognized, and words receiving a no-response are not known. This implies that when participants are presented with the same stimuli on two separate occasions, they are expected to give the same response. We demonstrate that this is not true and that responses in a lexical decision task suffer from internal noise, in line with all psychophysical studies. We obtained estimates of the internal noise following a signal-detection modeling framework (Burgess & Colborne, 1988). The results show similar noise values as in typical psychophysical signal-detection experiments when sensitivity is taken into account (Neri, 2010). These estimates imply that with an optimal data model, only 83-91% of the responses can be predicted. For word responses, word frequencies below 10 per million yield alarmingly low percentages of consistent responses (near 50%). At the level of RTs, noise estimates were about three times higher. Correspondingly, the estimated amount of consistent trial-level variance is only 8%. These figures are especially relevant given the recent popularity of trial-level lexical decision models using the linear mixed-effects approach (e.g., Baayen et al., 2008).

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**Symposium (TRIFAC 4) : “Language and space in numerical cognition” (Wim Gevers<sup>1</sup> and Ineke Imbo<sup>2</sup>; <sup>1</sup>Université libre de Bruxelles, Belgium - <sup>2</sup>Universiteit Gent, Belgium)**

Testing quantity activation in the perceptual comparison of numbers: Evidence from two Indian notations

**Javier García-Orza<sup>1</sup>, Manuel Perea<sup>2</sup>, Reem Abu Mallouh<sup>2</sup> and Manuel Carreiras<sup>3</sup>**  
**<sup>1</sup>Universidad de Málaga, Málaga, Spain - <sup>2</sup>Universitat de València, Spain - <sup>3</sup>Basque Center for Cognition, Brain and Language, Spain**

One common assumption in the literature on numerical cognition is that when presented with Arabic integers, their corresponding quantity representations are automatically activated, even in tasks that do not demand access to quantity. Evidence in favour of this view comes from the finding of distance effect in perceptual tasks. However recent studies have questioned this (Cohen, 2009). The present study explored the Persian and Arabic version of Indian numbers (Experiment 1 and 2, respectively). Naïve participants (speakers from Spanish) and users of these notations (Pakistanis and Jordanians) participated in a physical same/different matching task. The RTs of users of the Indian notations were regressed on perceptual similarity (estimated from the Spanish participants' RTs) and numerical distance. Results showed that the critical predictor for RTs was perceptual similarity. In a third experiment we used the same task with degraded stimuli with the aim of testing whether the lack of a distance effect in perceptual tasks was due to the absence of automatic access to the number's semantic representations (as argued by Cohen, 2009) or whether it was due to the slow rate of semantic activation from the integers. The results argue against claims of a strong automaticity in number processing.

To make decades important they have to be the first you read

**Amparo Herrera and Pedro Macizo**  
**Universidad de Granada, Spain**

Macizo and Herrera (2009) observed a reverse unit-decade compatibility effect when Spanish readers compared the magnitude of two-digit written number words, which suggested that they processed separately the decade and unit words but mainly focused on the decade. This effect was observed with canonical (thirty two) and reverse (two thirty) numbers indicating that the effect did not depend on what was processed first. However, in that study the reading pattern was not controlled so Spanish participants could process reverse numbers from right-to-left as canonical numbers from left-to-right and, thus, the decade word always processed first in that study. To evaluate the effect of the reading patterns on the processing of written numbers, an eye-tracking study was conducted with compatible and incompatible trials presented in canonical and reversed order. We replicated Macizo and Herrera's findings in that reverse compatibility effects were found for canonical and reversed numbers. However, when reading patterns were considered, the effect was only observed when the decade was processed first (with canonical numbers in left-to-

right reading and with reverse numbers in right-to-left reading). These results suggest that in Spanish, decades have to be the first word processed to obtain the reverse unit-decade compatibility effect with written numbers.

Magnitude and spatial processing: investigating the conceptual account

***Katia Carbè, Veronique Ginsburg and Wim Gevers***  
***Université libre de Bruxelles, Belgium***

A strong correlation is observed between the processing of numbers and space. The hypothesis of the “mental number line” illustrates the nature of this interaction. It assumes a representation of numbers oriented from left to right (Restle, 1970). Evidence for this orientation is provided by the SNARC effect (Spatial Numerical Association of Response Codes). This effect reflects the observation that participants are faster to respond with the left hand side to relatively small numbers and with the right hand side to relatively large numbers (Dehaene, Bossini, & Giraux, 1993). Recent research alternatively suggests a conceptual overlap between abstract magnitude related concepts (small/large) and abstract spatial concepts (left/right) (Gevers et al., 2006, 2010). Here we present a number of studies that directly investigate the conceptual account. We more specifically compare the spatial codes underlying the processing of abstract (e.g. concepts such as small and tiny) and object related (e.g. compare size of ‘elephant’ with ‘chair’) magnitude processing.

Mechanisms of number-space interactions

***Jean-Philippe van Dijck<sup>1</sup>, Véronique Ginsburg<sup>2</sup>, Luisa Girelli<sup>3</sup> and Wim Gevers<sup>2</sup>***  
***<sup>1</sup>Universiteit Gent - <sup>2</sup>Université libre de Bruxelles - <sup>3</sup>Università degli studi di Milano-Bicocca, Italy***

Several psychophysical and neuropsychological investigations suggest that the processing of number and spatial information is strongly associated. A popular account for this bulk of evidence argues that this association has its origin in the underlying mental representation of numbers taking the form of a horizontally oriented mental number line, which is isomorphic to the representation of physical lines. Recently however, several alternative explanations have been put forward, leading to a debate regarding the crucial mechanisms involved. We will describe that this debate is reminiscent to previous discussions in cognitive psychology and resembles a structure- process trade off, which cannot be solved given the available evidence. Here we propose some pointers for further research which can help us to get out of this theoretical vacuum.

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**Thematic session (ROOM SM6): Psychopathology**

A trait-based analysis of decision-making in neuropsychological tasks and daily life:  
implications for addiction vulnerability

**Ana Torres, Juan F. Navas, Agostina Romano, Antonio Cándido and José C. Perales**  
**Universidad de Granada, Spain**

The present study was aimed at unveiling the effect of reward/punishment sensitivity and impulsivity on a series of neuropsychological and daily-life decision making measures. In a series of three quasi-experiments we compared (1) individuals with high scores ( $>1SD$ ) in a reward sensitivity (RS) scale against those with low scores ( $<-1SD$ ), (2) individuals with high scores in punishment sensitivity (PS) against those with low scores, and (3) highly impulsive individuals against less impulsive ones. SPSRQ (RS/PS), and UPPSp (impulsivity) questionnaires were used to identify the participants who fulfilled the criteria for inclusion, and thus for further assessment in decision-making tests (maximization/regret, neuropsychological feedback-based gambling tasks, and a structured interview on the severity of several potentially addictive behaviors). The three experiments yielded different effect patterns of the personality traits on the three types of decision-making measures. These patterns are compatible with the idea that specific combinations of reward hypersensitivity, punishment hyposensitivity, and high impulsivity are indicative of maladaptive decision making. Performance on neuropsychological tasks cast light on the elemental neurocognitive processes that mediate the relationship between personality traits and daily-life decision making.

Altered mesocorticolimbic brain pattern activation during monetary reward  
processing in cocaine addiction

**Juan Carlos Bustamante, Alfonso Barrós-Loscertales, Víctor Costumero, Noelia Ventura-Campos, Paola Fuentes, Patricia Rosell, Juan José Llopis and César Ávila**  
**Universitat Jaume I, Spain**

Cocaine addiction alters the brain functionality in the mesocorticolimbic dopaminergic system implicating alterations in cognition, motivational and motor processes. The aim of this study is to show if a cocaine patients group could present altered mesocorticolimbic brain pattern activation during monetary reward processing. Seventeen cocaine patients and eighteen controls took part in the fMRI study based in an event-related experimental design. We applied an adaptation of the monetary incentive delay task described by Knutson et al. (2001) to elicit neural responses to monetary incentive anticipation and outcome reactivity. Image processing and statistical analyses were carried out using SPM8. The patients showed, in comparison with controls, hypoactivation in the right caudate during the anticipation condition and hyperactivation in the right dorsolateral prefrontal cortex during reactivity condition. Also we found that activation during anticipation in the caudate correlated positively with months in treatment, and activation during

reactivity in accumbens correlated inversely with months in abstinence. Our results show a change in reward mesocorticolimbic brain mechanisms that could be related with altered neurocognitive components of motivation in cocaine dependence. Moreover, we show that better treatment retention implicates neurofunctional striatal normalization that determines the patients' ability to suppress drug seeking when are exposed to drug-stimuli.

*The association between attention biases, recurrent negative thought and affective disorders*

**Mieke Beckwé and Natacha Deroost**  
**Vrije Universiteit Brussel, Belgium**

Given the high prevalence and relapse rate of major depressive disorder (MDD) and generalized anxiety disorder (GAD), it is important to devote research to the prevention of affective disorders. An important common risk factor in the development of both is recurrent negative thought, but very little is known about its underlying mechanisms. An attention bias for threatening and negative material could possibly be one of the underlying mechanisms. However, too little is known about the specificity of this bias in affective disorders and even less is known about its role in recurrent negative thought. In the present study, we investigated the relationship between attention biases, recurrent negative thought and affective disorders, using several versions of the exogenous cueing task (ECT) in persons who suffer from MDD, GAD, or with a tendency to perseverate in negative thoughts (worrying and rumination). Preliminary results indicate that only depressed persons and persons with a tendency to ruminate have difficulties to divert attention away from negative personality traits.

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## **Thematic session (ROOM SM10): Social Cognition**

Effects of one's own emotional state on perspective taking and prosocial behaviour

**Henryk B. Bukowski and Dana S. Samson**  
**Université catholique de Louvain, Belgium**

Little is known about the influence of our emotional state on our ability to take another's perspective. We designed a pseudo-interactive virtual card game in order to induce guilt, anger or joy through the interaction with the game partner. After performing the card game, each participant completed a visual perspective-taking task in which they were asked to judge from their own or the perspective of their game partner. Participants also completed a tombola tickets sharing task to measure prosocial behaviour. Physiological recordings and retrospective self-reports confirmed that the guilt and anger induction were successful and resulted in emotional responses. As expected from previous studies, participants in the guilt condition shared more tombola tickets with their game partner than participants in the anger condition. Interestingly, the emotional state had not only effects on prosocial behaviour but also on participants' performance in the visual perspective taking task: participants in the anger condition gave more weight to their own

perspective than their partner's perspective whereas the opposite was found for the participants in the guilt condition. In conclusion, this study demonstrates that emotions can influence perspective taking even its most cognitive aspects and in very different ways depending on the emotion.

Social psychoendocrinology of oxytocin: A critical review

**Anthony Lane**

***Université catholique de Louvain, Belgium***

Oxytocin (OT), a polypeptide hormone well known for its implication during the labour, has aroused a growing interest in the scientific community for more than two decades. Past research has shown OT's crucial role in many psychosocial processes. Several researchers even consider OT as the "pro social" hormone par excellence. But is this reputation scientifically based? Does OT really deserve the nickname of « love hormone » as it has been reported in the media? Our talk aims to answer those questions. Firstly, we will propose a comprehensive overview of OT research. Secondly, we will provide an interpretative framework to qualify the representation that has been made about OT. Finally, we will point out the gaps in this literature and will suggest some relevant lines of research for the future.

Is mentalizing restricted to mental events?

**Kris Baetens, Ning Ma, Johan Steen and Frank Van Overwalle**

***Vrije Universiteit Brussel, Belgium***

The medial prefrontal cortex (mPFC) has been shown to be systematically involved in mental processes that involve mental states of the self and others. However, there is research demonstrating involvement of this brain region in tasks that do not concern such "mentalizing content". We hypothesize that the mPFC might be subserving a more general process of abstraction, defined as the formation of concepts or ideas by omitting non-essential features of stimuli, regardless of their social or non-social nature. We conducted an fMRI study demonstrating the involvement of the mPFC in generating personality traits of visually presented persons as well as in generating objective semantic categories of objects, tools and natural phenomena in comparison to a matched visual control task. These results support the notion that the mentalizing system has a broader role than processing mental states.

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## **Thematic session (ROOM SDC): Perception & Performance**

The relationship between vocal abilities and singing accuracy

***Pauline Larrouy-Maestri<sup>1</sup> and Sean Hutchins<sup>2</sup>***

***<sup>1</sup>Université de Liège, Belgium - <sup>2</sup>University of Montréal, Canada***

Poor-pitch singing could be caused by poor pitch perception or poor vocal-motor control abilities. This study aims to contrast these two possible causes in order to determine the role of vocal control on the accuracy of sung performances among nonmusicians. Participants matched recordings of their own voices either by singing, or by manipulating those recordings on a physical instrument which could control the pitch of the vocal recording playback by sliding the finger along a position sensor. In addition, participants sang a full song from memory. Overall, participants were more accurate at matching the pitch of the original recording with the instrument than with their voice. In addition, singers who were more accurate at vocal pitch matching tended to have better vocal quality (as assessed through standard measurements, e.g. jitter, stability), and were better at singing whole songs. This pattern of results confirms that vocal-motor control, rather than pitch perception ability, is the primary driver of singing ability, and provides insight into the relationship between pitch accuracy and vocal quality.

The role of attention in perceptual learning : an exploratory study

***Sarah Brohé, Myriam Piccaluga, Véronique Delvaux, Kathy Huet and Bernard***

***Harmegnies***

***Université de Mons, Belgium***

The present experiment is part of a project studying the control of perception and production of nonnative speech sounds. The issue we address is whether the categorization of unfamiliar speech sounds can be influenced by orienting the subjects' attention. We created a continuum of [ta]-like syllables that we subdivided in three categories. The subjects, who are French-speaking people, were unfamiliar with two categories out of three. They were administered a categorization task in which they had to classify each sound in the appropriate category. Attention was directed by first providing instructions that highlighted the relevant phonetic cue(s) to determine the appropriate category and secondly by providing feedback after each response. Results showed a strong positive effect of the feedback. At the end of the experiment subjects provided with feedback performed better than subjects without feedback. Furthermore, when feedback was given, performance improved during the course of the experiment. Regarding the effect of the instructions, the more informative they were, the more beneficial they seemed. These exploratory data confirm the role of

feedback in perceptual learning and suggest the possibility of influencing categorization by focusing attention on specific acoustic cues, therefore making a step towards a better understanding of language processing.

Predictable variations in pitch modulate the spatial processing of visual stimuli

***Fátima Vera-Constán, Irune Fernández and Jordi Navarra***

***Fundació Sant Joan de Déu, Parc Sanitari Sant Joan de Déu, Hospital Sant Joan de Déu, Spain***

We investigated whether perceiving predictable “ups and downs” in acoustic pitch (as can be heard in musical melodies) can influence the spatial aspects of visual processing as a consequence of a ‘spatial recoding’ of sound (see Foster & Zatorre, 2010, Rusconi et al., 2006). Event-related potentials (ERPs) were recorded while participants performed a color discrimination task of a visual target that could appear either above or below a centrally-presented fixation point. Each experimental trial started with an auditory isochronous stream of 11 tones including a high- and a low-pitched tone. The visual target appeared isochronously after the last tone. In the ‘non-predictive’ condition, the tones were presented in an erratic fashion (e.g., “high-low-low-high-high-low-high...”). In the ‘predictive condition’, the melodic combination of high- and low-pitched tones was highly predictable (e.g., “low-high-low-high-low ...”). Within the predictive condition, the visual stimuli appeared congruently or incongruently with respect to the melody (“...low-high-low-high-low-UP” or “...low-high-low-high-low-DOWN”, respectively). Participants showed faster responses when the visual target appeared after a predictive melody. Electrophysiologically, an amplitude modulation of the N2 and P3 components was observed in frontal-central and anterior-parietal regions. Auditory-to-visual congruency effects were also observed, frontally, in early negativities (50-100 ms.) and in the parieto-occipital P3 component. Our findings reveal the existence of crossmodal effects between perceiving auditory rhythms and visual temporal orienting. In line with previous studies, our results suggest that pitch information can be transformed into a spatial code that shapes the spatial processing in other modalities such as vision.

Emotional intelligence, creativity, and school performance in children

***Michel Hansenne***

***Université de Liège, Belgium***

Previous studies have shown that both creativity and emotional intelligence (EI) were related to children school performance. In this study we investigated the incremental validity of EI over creativity in an elementary school setting. Seventy-three children aged from 9 to 12 years old were recruited to participate in the study. Verbal and figurative creativity were assessed using Torrance’s test and EI with the Trait Emotional Intelligence Questionnaire – Children form (TEIQue-CF). Results showed that children school performance was predicted by creativity. However EI had no influence on performance. These findings question the recent spread of EI training programs within elementary schools.

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## Thematic session (Trifac 2): Memory I

The concreteness effect from the perspective of false memories

**Alejandro Marín-Gutiérrez<sup>1</sup>, Emiliano Díez<sup>1</sup>, Sarah Hunekamp<sup>2</sup> and Ángel  
Fernández Ramos<sup>1</sup>**

**<sup>1</sup>University of Salamanca, Spain - <sup>2</sup>University of Münster, Germany**

The concreteness effect refers to the fact that concrete nouns are processed faster and more accurately than abstract nouns in a variety of cognitive tasks. This has led to the assumption that differences exist between the representations of concrete and abstract concepts. The nature of these differences remains controversial. Recently, some researchers have proposed that concrete and abstract concepts are organized according to qualitatively different organizational principles. They assume that the organization of concrete concepts is based on their semantic similarity, whereas the organization of abstract words is the association with other concepts. In this study we tested this premise from a false memory's perspective, using the DRM paradigm. In Experiment 1, participants studied lists of words associated, either strongly or weakly, to a critical word that was abstract or concrete. After that, the participants performed a recognition test. Results showed that false recognition rates differed significantly between concrete and abstract critical words only in the case of strong associates, with abstract words being falsely recognized more often. In Experiments 2 and 3 we studied this phenomenon under conditions of limited response time. Results are discussed in terms of information-activation theories.

The temporal retrieval hypothesis: Learning when (rather than what) to respond  
explains list-level proportion congruent effects

**James R. Schmidt**

**Universiteit Gent, Belgium**

The current report assesses the ability of participants to learn when to respond, rather than merely what to respond in the context of speeded response time tasks. The temporal coding hypothesis (Matzel, Held, & Miller, 1988) argues that participants not only encode information about the stimuli and responses into memory, but also information about time. My new temporal retrieval hypothesis suggests that retrieval of information about the time between stimulus onset and the response on previous trials influences a participant's preparedness to respond at a similar time on following trials. More specifically, it is argued that these temporal biases can explain the list-level proportion congruent effect in the Stroop paradigm. The reported experiment varied the speed of responses with a non-conflict contrast manipulation rather than a conflict congruency manipulation. By simply varying the proportion of fast to slow responses, a pseudo proportion congruent effect (what I call a proportion fast effect) is observed. These data provide yet another problem for the highly popular conflict monitoring and adaptation account of this supposed cognitive control effect.

Forgetting and lowered confidence? Retrieval-induced forgetting of emotional autobiographical memories

**Charles B. Stone**

***Université catholique de Louvain, Belgium***

People build their sense of self, in part, through their memories of their personal past. What is striking about these personal memories is that, in many instances, they are inaccurate, yet confidently held. Most researchers assume that confidence ratings are based in large part on these mnemonic features (i.e., their vividness and/or the number of details). However, we explore a heretofore unappreciated source on which confidence ratings may be based: the accessibility of memories as a result of selective retrieval. To examine this possibility, we use Anderson et al.'s (1994) retrieval-induced forgetting (RIF) paradigm with emotional (positive and negative) autobiographical memories. For memory recall, we found the standard RIF effect across emotional valences. That is, the selective retrieval of positive (negative) memories (Rp+) induced individuals to forget related positive (negative) memories (Rp-), compared to individuals who did not receive selective practice (Nrp). More interestingly, we found that the confidence ratings for positive memories mirrored the RIF results: decreased confidence for Rp- memories relative to Nrp memories. However, for negative memories, we found the opposite pattern: increased confidence for both Rp+ and Rp- memories. We discuss these results in terms of autobiographical and flashbulb memory research.

Unbiased judgments do not entail cognitive priority: An associative explanation of episodic-like memories in causal learning

**Miguel A. Vadillo<sup>1</sup> and David Luque<sup>2</sup>**

***<sup>1</sup>Universidad de Deusto, Bilbao, Spain - <sup>2</sup>Universidad de Málaga, Spain***

During the last decades, many researchers have attempted to contrast the predictions of two important types of causal learning theories: Associative models and rule-based models. Some studies have focused on dissociations between causal judgments and other types of subjective judgments to discover the hierarchical structure of the processes involved in those judgments. According to many researchers, the cognitive architecture most likely to produce those dissociations is incompatible with the assumptions of associative models. Contrary to this view, in the present series of simulations we show that the selective retrieval of the information contained in associations can also give rise to the kind of dissociations observed in the literature. We conclude that this evidence should always be interpreted with caution and contrasted with the results of other experiments using different methodological approaches.

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## **Thematic session (Trifac 3): Language I**

Naming and recognising acronyms: what's the difference between an EEG and an EGG?

***Cristina Izura and David Playfoot***  
***Swansea University, UK***

Acronyms are a growing and an idiosyncratic part of our everyday vocabulary. In this study acronym naming and recognition times were examined with reference to the variables known to affect the processing of common words. The factors under consideration were age of acquisition, acronym frequency, imageability, acronym length, number of orthographic neighbours, bigram and trigram frequencies, voicing and print-to-sound characteristics. The factors were entered into a multilevel regression analysis. Results indicate firstly, that acronym naming is affected by lexical and sublexical variables. The overwhelming influence of orthographic measures in acronym naming as opposed to standard word naming (i.e. effects of bigram and trigram frequencies are difficult to detect in standard word naming studies) indicates that a crucial difference between acronyms and mainstream words might reside at a pure orthographic level. Secondly, that the influence that variables such as age of acquisition and imageability exert in acronym naming is similar to that observed in regular word naming suggesting that acronyms might not be as irregular as previously considered. The challenges that acronym naming imposes in current models of word reading will be discussed.

Two routes to reading? Evidence from a shallow orthography – Spanish

***Ian C. Simpson, Eduardo Onochie-Quintanilla and Sylvia Defior***  
***Universidad de Granada, Spain***

The observation that skilled readers of English can correctly read aloud both irregular words and nonwords has in part led to the development of the dual-route model of reading. The few cases of acquired dyslexia reported for Spanish speakers has led some authors to suggest that two separate processes for reading are not required for Spanish (Ardila et al; 1989; Ardila 2006, 2011). Given the scarcity of published cases of acquired dyslexia for Spanish speakers we suggest that studying children may be more suitable for determining the applicability of dual-route models of reading to Spanish. 168 children from Spain (age range at commencement of study 6;5-7;5) took part in a series of word and nonword reading aloud tasks over an 18 month period. Despite controlling for syllable, bigram and trigram frequencies, a clear advantage for words over nonwords was observed. This result was replicated even when these frequencies were manipulated to favour the nonwords. The results clearly refute the claims of Ardila and colleagues that a single reading mechanism exists in Spanish speaking individuals. We will discuss follow-up experiments designed to determine which of two reading models, the classic dual-route model or connectionist based model, best explain the Spanish data.



On the importance of the upper part of words during normal silent reading

**Manuel Perea**

***Universitat de València, Spain***

Recent research has shown that there is a bias for the upper part of words in the identification of isolated words. The goal of the present experiment was to examine how this bias influences eye movement control during silent normal reading. To that end, we monitored the participants' eye movements when reading intact sentences and when reading sentences in which the upper/lower portion of the text was removed. Results showed a greater reading cost (longer fixations) when the upper part of the text was removed than when the lower part of the text was removed (i.e., it influenced when to move the eyes). However, there were no signs of any effect in the initial landing position on a target word (i.e., it did not influence where to move the eyes). We discuss the implications of these findings for models of eye movement control in reading.

On the coding of repeated-letter digraphs in visual-word recognition

**Joana Acha<sup>1</sup> and Manuel Perea<sup>2</sup>**

***<sup>1</sup>University of the Basque Country - <sup>2</sup>Universitat de València***

Most models of word recognition assume that letters are the basic input coding units. In the present study, we examined how the cognitive system encodes repeated-letter digraphs (rr, ll) –note that these letters are more prone to be miscoded by spatial and temporal gradient mechanisms proposed by most recent visual word recognition models. We conducted two masked priming lexical decision experiments in which we examined whether or not repeated-letter digraphs are coded as two different units by the cognitive system. In Experiment 1, a word containing a repeated-letter digraph (e.g., ERRATA) was preceded by a prime in which one repeated letter from the digraph was transposed (erarta-ERRATA) or by a control prime in which these letters were replaced (esanta-ERRATA). We found a significant transposed-letter effect. In Experiment 2, the target word was preceded by a subset prime in which the critical letter was removed (erata-ERRATA), replaced (esata-ERRATA) or repeated (errrata-ERRATA). The three conditions produced the same amount of facilitation on the target words. Taken together, the present data suggest that repeated letters are coded as separate units, supporting the view that letter identification and letter position coding are two independent mechanisms.

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## Thematic session (Trifac 4): Numerical Cognition

Acuity of the approximate number system, exact number processing or symbol-meaning mapping: what underlies mathematical ability?

**Delphine Sasanguie<sup>1</sup>, Silke Göbel<sup>2</sup>, Kristina Moll<sup>2</sup>, Karolien Smets<sup>1</sup> and Bert Reynvoet<sup>1</sup>**

<sup>1</sup>*Katholieke Universiteit Leuven* - <sup>2</sup>*University of York*

To date, the origin of mathematical variability in humans remains unclear. To examine which of the commonly used assumptions to explain this origin is the most appropriate one, we presented 6-, 7-, and 8-year-old children with three comparison tasks: a non-symbolic task on large numerosities (in order to measure the ANS acuity), a non-symbolic task on small numerosities (as a measure of the ENS) and a symbolic task (as a measure of the connection between symbols and their numerical meaning). We correlated their performance on these tasks with mathematics achievement scores on a curriculum-based standardized test. We observed no relation between math achievement and ANS acuity as measured by the Weber fraction. However, math achievement was associated with the speed with which children could compare magnitudes, especially in the symbolic comparison task. It therefore can be concluded that mathematical variability in children is related more to the ease with which a symbol can be connected to its corresponding magnitude, than to the precision of the magnitude representation.

The relation between the acuity of the ANS and general arithmetic performance

**Mathieu Guillaume, Christophe Mussolin, Julie Nys, Wim Gevers and Alain Content**  
*Université libre de Bruxelles, Belgium*

In the field of numerical cognition, it has been suggested that the acuity of the number sense is related to general mathematic achievement. Nevertheless, some recent studies failed to find a robust correlation between basic numerical skills and arithmetic performance in adults. In the present study, we attempt to clarify this research question by assessing basic numerical skills through several symbolic and non-symbolic tasks, in which visuo-spatial cues were controlled. We evaluate the number sense with two magnitude comparison tasks (using dot patterns presented simultaneously or successively) and a numerical estimation task in which participants had to evaluate the number of dots displayed on screen. We calculated the Weber Fraction (W) for the comparison tasks and the Coefficient of Variation (COV) for the estimation task. General arithmetic performance was also assessed. The results reveal that general arithmetic performance correlated with symbolic performance as well as with estimation COV, but not with non-symbolic processing. Interestingly however, W and the COV did not correlate. The data suggest that arithmetic performance is related to symbolic mediation rather than to magnitude and question the validity of W as a measure of non-symbolic number acuity.

The impact of language on magnitude judgments from unbalanced bilingual 7-to-11 graders to balanced bilingual adults in German and in French

**Amandine Van Rinsveld, Sonja Ugen, Christine Schiltz, Karin Landerl and Martin Brunner**

**University of Luxembourg - University of Graz**

The effect of language on numerical processing has been shown through cross-lingual comparisons. A verbally presented magnitude judgment task of two digit numbers results in different processing patterns if the task language uses a number syntax following the unit-decade order (e.g., in German 21 = “one twenty”) compared to a decade-unit order (e.g., in English 21 = “twenty one”). Generally, magnitude judgements of two-digit number pairs are processed faster when the larger number contains the larger decade and the larger unit (e.g., 57\_34) than when the larger number contains the smaller digit (e.g., 54\_37). Previous studies with monolinguals suggest that this effect is strongly related to the syntax of the task language. We looked at the effect of language on magnitude judgments in pupils (grades 7, 8, 10, 11) who gradually become German-French bilinguals through education and balanced bilingual adults. The results show an effect of language on magnitude judgments: bilingual pupils and adults show a regular compatibility effect in German, but a progressively developing reversed compatibility effect in French with increasing French exposure. Thus, bilinguals process the same task differently if presented in German or in French, applying similar processes as monolinguals of comparable languages. Further, the impact of language is related to language exposure.

The role of short-term memory for order in numerical cognition in 3rd grade kindergarten children.

**Lucie Attout and Steve Majerus**

**Université de Liège, Belgium**

Several studies explored the relationship between verbal short-term memory (STM) and numerical cognition, but with inconclusive findings. The present study re-explored this relationship, by adopting the critical distinction between STM for item information (the items to be retained) and STM for order information (the order of the items within a list). We hypothesized that especially STM for order should be related to the development of numerical abilities, given that recent studies suggest the intervention of common processes during the representation of order information in STM and numerical tasks. We investigated item and order STM abilities and numerical processing abilities in 68 children during their third year in kindergarten. We observed that order STM abilities, but not item STM abilities, correlated significantly with performance on numerical order judgment and calculation tasks. These associations remained after control of interindividual differences in verbal and non-verbal cognitive efficiency. Our results suggest a specific relationship between order STM processes and numerical cognition, opening new perspectives for our understanding of the STM determinants of numerical cognition development.

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**Symposium (ROOM SM6): “Implicit cognition in addiction” (*Etienne Quertemont<sup>1</sup> and José C. Perales<sup>2</sup>; <sup>1</sup>Université de Liège, Belgium - <sup>2</sup>Universidad de Granada, Spain*)**

Assessing and changing alcohol approach associations: clinical effects and underlying mechanisms

***R.W. Wiers and T.E. Gladwin***

***University of Amsterdam, Netherlands***

We developed the alcohol-Approach Avoidance Task (a-AAT), and found that heavy drinkers demonstrate an approach-bias for alcohol-stimuli, which was not found in light drinkers, and which was moderated by the OPRM1 gene (Wiers et al., 2009). In recent studies we also found that a cannabis-variant of the measure is predictive of prospective escalation of cannabis use (Cousijn et al., 2011) and that the alcohol-version predicts escalation of alcohol use in young adolescents with relatively poor executive control. We developed re-training versions of the alcohol-AAT, which demonstrated that alcohol-approach tendencies could be successfully changed in heavy drinking students with subsequent effects on drinking behavior (Wiers et al., 2010) and which helped alcoholic patients to remain abstinent (Wiers et al., 2011). Regarding the latter study, we performed mathematical modelling of the IAT scores using the QUAD model (Gladwin et al 2012). Results demonstrate that the training changes both the dominant alcohol-approach associations to alcohol-avoid associations and increased control over the bias. The latter component did mediate the treatment outcome result, suggesting that the active ingredient of the training consists of increased control over an automatically initiated tendency to approach alcohol-related stimuli.

Executive control and core dysfunctional beliefs in cocaine addiction

***A. Verdejo-García<sup>1</sup>, N. Albein-Urios<sup>1</sup>, J.-M. Martínez<sup>2</sup>, O. Lozano<sup>3</sup> and J. C. Perales<sup>1</sup>***

***<sup>1</sup>Universidad de Granada, Spain - <sup>2</sup>Centro Provincial de Drogodependencias, Diputación de Granada, Spain - <sup>3</sup>Universidad de Huelva, Spain***

In this presentation we will approach implicit cognition in addiction by studying the link between the degree of impairment in core executive functions and the intensity of dysfunctional beliefs inherent to addiction and comorbid personality psychopathologies. For that, we will first describe executive performance differences between cocaine addicts with comorbid Cluster B and Cluster C personality disorders, cocaine addicts without comorbidities, and non-drug using controls. These differences largely pertain to the executive components of working memory, inhibition and switching. Next, we will describe self-report data showing elevation of dysfunctional beliefs specific to each diagnostic entity: cocaine addiction vs. cocaine addiction+Cluster B disorders vs. cocaine addiction+Cluster C disorders. Finally, we will present evidence of a significant association between poorer executive functioning (non-accessible and typically egodystonic) and greater intensity of

dysfunctional beliefs (accessible, intrusive and egosyntonic). Results will be discussed in the context of current neurobiological models of addiction in relation to insight and self-awareness.

Attitude measurement in the absence of an evaluative processing goal: Implications for the prediction of relapse in nicotine and alcohol addiction

**A. Spruyt**

**Universiteit Gent, Belgium**

Automatic attitude activation depends heavily on the extent to which attention is assigned to the affective stimulus dimension. It could therefore be hypothesized that it is more informative to measure automatic attitude activation in the absence of an (extrinsically induced) evaluative processing goal than the activation of positive vs. negative information under conditions that maximize selective attention for the affective stimulus dimension. Consistent with this reasoning, I will first report the results of a large-scale meta-analysis (32 articles, 43 studies, total N = 2766) showing that affective priming measures of automatic attitude activation are behaviorally predictive only if they are obtained in the absence of an evaluative processing goal. Second, I will present a series of consumer choice studies in which selective attention for the affective stimulus dimension was either present or absent during the attitude measurement phase. Results confirmed that participants' choice behavior and implicit attitude scores were related only if participants were not encouraged to assign attention to valence. Finally, I will demonstrate that relapse in alcohol and nicotine addiction can be predicted on the basis of an adapted version of the affective priming task that does not require participants to assign attention to the affective stimulus dimension.

Loss of willpower in addictive behaviors from a neurocognitive perspective

**X. Noël**

**Université libre de Bruxelles, Belgium**

Deregulated behaviors associated with a state of addiction raise fascinating and inseparable questions: how does it happen that the common (relative) free exercise of will could be compromised to this extent? What can be done for the purpose of its restoration? Recent cognitive theories consider mental operations operating below the level of consciousness as key determinants (in interaction with other non-automatic processes) of the way we think, we feel and we act. Applied to the field of addiction, an addictive behavior may be the product of an imbalance between two separate, but interacting, cognitive registers that contribute to decision making: a reactive/automatic attentional and memory system for signaling the presence of drug-related cues in the environment and for attributing to such cues pleasure and/or excitement; and a reflective/nonautomatic system for regulating the dominant reactive/automatic response. I believe that this theoretical framework could now be advantageously updated in taking into account recent findings pointing out subtle complex interactions between these registers and their respective functions related to response inhibition, approach/avoidance tendencies, attentional biases, decision making under uncertainty and metacognition. My talk will focus on five cases of the interaction between automatic and non-automatic cognitive processing that may be good targets for clinical interventions in alcoholics and in pathological gamblers; (1)

the dominant response dis-inhibition (2) the approach-avoidance tendencies and (3) the attentional biases for addiction-related cues; (4) the taste of uncertainty; (4) the lack of introspective accuracy. Main ideas of this presentation is that (1) poor top-down supervision prevents updating of intrinsic bottom-up properties of addiction-related information; (2) improving this supervision results in changing these properties. Together, the presented data give weight to the idea that experimental research could be useful in the treatment of individuals with addiction-related sufferings, and may result in the improvement of their willpower.

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**Symposium (ROOM SM10): “Contact and conflict in intergroup relations”  
(*Kristof Dhont; Universiteit Gent, Belgium* )**

Changing some ideological roots of prejudice: Longitudinal effects of ethnic intergroup contact on social dominance orientation

***Kristof Dhont<sup>1</sup>, Alain Van Hiel<sup>1</sup> and Miles Hewstone<sup>2</sup>***

***<sup>1</sup>Universiteit Gent, Belgium - <sup>2</sup>University of Oxford, UK***

Social Dominance Orientation (SDO) has been well established as a powerful predictor of a variety of intergroup phenomena but little is known about situational experiences that may influence SDO. Drawing from research on the intergroup contact theory, we argue that positive intergroup contact is able to reduce the levels of SDO. Corroborating this hypothesis, the results of an intergroup contact intervention study among high school students (Study 1,  $N = 71$ ) demonstrated that students' SDO-levels were indeed attenuated after the contact intervention. Furthermore, this intervention effect on SDO was significantly stronger among students reporting a higher quality of contact during the intervention. A cross-lagged longitudinal study among adults (Study 2,  $N = 363$ ) further extended these findings by demonstrating that contact is able to decrease SDO over time. Moreover, we did not obtain evidence for the idea that people high in SDO would engage less in intergroup contact. Overall, these findings indicate that intergroup contact erodes one of the important socio-ideological roots of generalized prejudice and discrimination.

The relationship between models of diversity and experiences of daily intercultural contacts

***Kaat Van Acker, Batja Mesquita and Norbert Vanbeselaere***

***Katholieke Universiteit Leuven, Belgium***

In contemporary Western-European societies, interactions between majority members and minority members, particularly of Muslim origin, are marked by hostility. The current study investigates how shared understandings of what majority and minority groups mean to each other, i.e. models of intergroup relations, shape majority members' interactions with minorities. Two common models of intergroup relations in Flanders represent immigrants as a) a threat to majority culture (i.e. culture-threat model) or b) as “victims” of discrimination and prejudice (i.e. unfair-treatment model). We propose that these different models of intergroup relations prepare majority members to approach interactions with minority members in

different ways. In a sample of 100 Flemish majority students of culturally diverse high schools, we measured students' endorsement of a culture-threat and an unfair-treatment model of intergroup relations. Two weeks later, they kept a daily diary of their contacts with minority members for seven consecutive days. The results showed that participants' endorsement of an unfair-treatment model predicted a greater focus on perspective-taking and learning about their minority interaction partner as well as more feelings of admiration and respect; whereas endorsement of a culture-threat model predicted a greater focus on differences and misunderstandings as well as higher levels of irritation during intergroup interactions.

Ethnic minorities' legal fight against discrimination: The role of institutional support and egalitarianism

**Alejandra Alarcón Henríquez, Assaad Azzi and Laurent Licata**  
*Université libre de Bruxelles, Belgium*

We investigate ethnic minority members' willingness to take legal actions to fight against discrimination as a function of institutional support and salience of egalitarian ideology (EG), while controlling for belief in meritocracy (BM). Study 1 ( $N = 136$ ) shows that perceiving institutional support to fight against discrimination for collective reasons (to prevent others from being discriminated against) rather than for individual reasons (to compensate the victim only) increases participants' willingness to engage in legal actions, but only among participants with high EG. We observe the opposite for participants with low EG. Moreover, the more participants endorse EG (and the less BM), the more they perceive racial or ethnic discrimination. We replicate the interaction effect on the willingness to take legal action and the main effect of EG on discrimination perceptions in Study 2 ( $N = 97$ ) by manipulating experimentally the type of institutional support (individual vs. collective) and using either an EG or neutral prime. A third qualitative study based on interviews with individuals that filed a discrimination complaint to an Equality Body ( $N = 24$ ) sheds light on the possible mediators involved in the willingness to take legal actions induced by EG and type of institutional support.

Immigrant ethnic minorities of the Near-East in Belgium: Process of acculturation in situation of double minority

**Bachar Malki and Assaad Azzi**  
*Université libre de Bruxelles, Belgium*

In principal, migrants may think about themselves in terms of their nationality, their religion of origin or their ethnic background. The selection of one of these referents can depend on the minority or majority status of the group in the country of origin, and the relative contrast with the native population of the host society. Such a selection raised our interest in contrasting Near-Eastern Christian Migrants (NECM) and Muslim Migrants (MM). However, NECM can be considered a 'double minority'. This creates a more complex situation where we need to consider that people can define themselves by different collective identities and adapt themselves to the two majority groups (Arab /Turkish and Belgian). Study 1 ( $N = 12$ ) allowed us to highlight the specific interest of NECM in the construction of their ethnical-religious identity that distinguishes itself from the national identity of their country of origin. Study 2 ( $N = 163$ ) showed that religion intervenes strongly in the process of participation in the



host society, but only weakly in the process of identification (or strategies of acculturation) with the host society. As expected, participation in host society is better predicted by ethnic identification for NECM, and by religious orientation for MM.

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### **Thematic session (ROOM SDC): Organizational Psychology, Ergonomics**

Why competency is not enough in an economic depression context: understanding job performance from a positive individual perspective

***Andreea Tutu and Alexandru Ioan Cuza***

***University of Iasi, Romania***

Job performance has received an increased attention in the last decades. Aiming to better understand its determinants from a positive individual-orientated view, this paper's first objective is to investigate the interacting effect of the employee's job competency and organizational citizenship behaviors on job performance levels of a sample of 200 Romanian employees (participation rate: 86.2%). Secondly, this research aims to analyze the interacting effect of employees' organizational citizenship behaviors and of Employer's organizational economic behaviors in a context of global economic depression. We used correlation analysis, prediction models, and, as tools, competency assessment checklists developed by means of the Competency Elicitation Interview (Faix et al., 1991), Robertson's performance scales for job performance (1996, 1997), Smith's scale for organizational citizenship behaviors (1983). Results support the idea that job performance can be approached from a multidimensional point of view. The significance of organizational citizenship behaviors as translations of personal involvement acts into the organization was successfully established, highlighting the important role they have in relationship with job performance. As valid predictors of supervisory ratings of employees' performance, organizational citizenship behaviors seems to have the most important predictive power with a percent of 55% of the performance's variance explained. Furthermore, job competencies alone seem to be necessary but not sufficient to predict high levels of job performance (with a predictive power of 10%). Surprisingly, the interaction effect of employees' organizational behaviors and organizational economic behaviors of the Employer reveals an unexpected paradox in relationship with individual job performance. The main limitations (e.g., people who refused to participate didn't had comparable demographics with those who agreed to participate) along with the main findings will be discussed.

A gender-based analysis of the association between worker's mental health and lack of recognition in the workplace

***Annalisa Casini<sup>1</sup>, Els Clays<sup>2</sup>, Bart De Clercq<sup>2</sup>, Isabelle Godin<sup>1</sup> and France Kittel<sup>1</sup>***

***<sup>1</sup>Université libre de Bruxelles, Belgium - <sup>2</sup>Universiteit Gent, Belgium***

Previous research showed that lack of recognition in the workplace is harmful for workers' mental health (Casini et al. 2011). This study investigates the association between lack of recognition – defined following Honeth's theory of recognition (Honneth, 1995) – and workers' anxiety and chronic fatigue within a gender

perspective. Two large cross-sectional Belgian databases – Belstress III and Somstress – were merged resulting in 4013 participants (2304 women), aged 21-66, and working in 9 organizations. Selected items from Siegrist's ERI scale, Karasek's JDC-S scale, and Quine's mobbing scale were used for measuring 4 types of recognition: (1) recognition of worker's professional value; (2) respect of worker's rights; (3) the emotional support from colleagues and (4) from supervisors. Results show that, in general, the association between lack of recognition and poor mental health is weaker for women (ORs: 2.13 to 2.61) than for men (ORs: 2.29 to 3.39). However, stratified analysis shows that this tendency varies sharply as a function of the gendered nature of the sector. Findings suggest that while studying worker's health, scholars should take into account the gendered representations of the workplace.

Overcoming judgment biases in medical decision making: Moderating factors  
***Yasmina Okan<sup>1</sup>, Rocío García-Retamero<sup>1</sup>, Edward T. Cokely<sup>2</sup> and Antonio Maldonado<sup>1</sup>***

***<sup>1</sup>Universidad de Granada - <sup>2</sup>Michigan Technological University, USA***

Recent research has shown that individuals frequently experience difficulties understanding health-relevant numerical concepts. A prominent example is denominator neglect, or the tendency to pay too much attention to numerators (e.g., number of treated patients who died) with insufficient attention to denominators (e.g., overall number of treated patients). This judgment bias can lead to inaccurate assessments of treatment risk reduction and thus has important consequences for medical decision making. Here, we report three experiments investigating the impact of numerical abilities and language-related abilities in the susceptibility to denominator neglect. Additionally we investigated the extent to which this judgment bias can be attenuated by using graphical displays (i.e., icon arrays), as well as the moderating role of graph literacy in the effectiveness of such displays. Results indicated that individuals with low numeracy and limited non-native language proficiency were more susceptible to show denominator neglect. Providing icon arrays in addition to numerical information helped people make more accurate assessments of risk reduction. However, individuals with low graph literacy benefited to a lesser extent from icon arrays, and also showed lower confidence in their estimates of risk reduction. Theoretical and prescriptive implications are discussed (e.g., the effective communication of medical risks).

Differentiation between urgent and evaluative behaviours in driving through the task  
 features

***Alberto Megías, Antonio Maldonado, Andrés Catena, Leandro Luigi Di Stasi and Antonio Cándido***  
***Universidad de Granada, Spain***

The aim of the current research was to dissociate evaluative and urgent behaviour in risky driving situations. Urgent behaviours are triggered by stimuli, performed under time pressure, and they will help to avoid negative outcomes, for example, braking when a vehicle ahead has stopped suddenly. In contrast, in evaluative behaviours, a value is assigned to a situation, for example to categorize a road scene as risky, which is typically done by driving school students. Forty participants performed a task that demanded evaluative judgments and urgent behaviours in 100 different risky road

situations, all captured from HRT motorcycle simulator. Our results show that urgent and evaluative behaviours lead to different responses in the same situations. Urgent behaviours are faster, with detriment of the ability to discriminate risk, and increasing the trend toward safer behaviours; being the combination of the time pressure and possible negative consequences the cause of the differences between the two behaviours. These results provide evidence supporting the importance of the task features in the study of driving behaviours. Working on urgent behaviours from the beginning of learning to drive is necessary, because the evaluative behaviours learned in driving schools are not adapted to urgent situations presented on real driving.

Visual memory of central and marginal items in real complexity: influence of subjects' expertise in road traffic

***Adélaïde Blavier, Cédric Montagnino and Anne-Sophie Nyssen***  
***Université de Liège, Belgium***

Our purpose is to study the visual memory (VM) of natural complex scenes in function of subjects' expertise. 15 subjects were divided into 3 groups according to their level of driving expertise (novices, <5 years and >5 years of experience) and were asked to memorize road images (divided into 3 levels of complexity). After each image presentation (5 second presentation), subjects were asked to answer 6 questions, 3 about central information for driving and 3 about marginal items (not relevant for driving) and to estimate their self-confidence. Our results showed an effect of detail type, subjects' expertise and stimulus complexity: performance was significantly better for central items than for marginal information, for less complex images than for more complex images and with experts (level 2 and 3) than novices (level 1). We observed no interaction between these 3 variables (detail type, image complexity and subjects' expertise). This finding suggests the difference between central and marginal information in VM performance is stable independently of image complexity and subjects' expertise. It generalizes results from our previous study with experts in art history and from Melcher's study (2006) that showed that the difference between central and marginal information was stable independently of stimulus presentation duration.

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## **Thematic session (TRIFAC2): Memory II**

The role of the salience of fluency in recognition memory in Alzheimer's disease

***Christine Bastin, Eric Salmon and Sylvie Willems***  
***Université de Liège, Belgium***

Recognition memory can rely on two processes: recollection (recall of the details from the encoding episode) and familiarity (feeling that some information is old without any recollection, induced by fluency of processing due to an earlier encounter with the information). In Alzheimer's disease (AD), whereas there is a clear deficit of recollection, the evidence regarding familiarity is mixed, with some studies showing preserved familiarity and others reporting impairment. The current study aimed at examining whether recognition memory performance can be improved in AD when

the use of familiarity is facilitated by the salience of fluency. In two experiments, AD patients and healthy controls performed two verbal recognition memory tasks where the salience of fluency was manipulated by means of letters overlap. Studied and unstudied words were constituted of either two separate sets of letters (no-overlap condition, high fluency salience) or the same set of letters (overlap condition, low fluency salience). The results from both experiments showed that, although performance was globally poorer in AD patients than in the controls, both groups performed better in the no-overlap condition than in the overlap condition. This suggests that AD patients benefited as much as the controls from the salience of fluency.

Self-appraisal and medial prefrontal activation in early stage Alzheimer's disease  
**Sarah Genon, Fabienne Collette, Lucie Angel, Eric Salmon and Christine Bastin,**  
*Université de Liège, Belgium*

Self-referential processing in healthy subjects is related to activation within cortical midline structures, such as the medial prefrontal cortex (MPFC) and the posterior cingulate cortex (Northoff et al., 2006). The structures are known to be altered in Alzheimer's disease (AD; Buckner et al., 2008). However, little is known about their engagement during self-referential processing in AD patients. Methods. Twenty-two mild AD patients and 22 healthy controls (HC) were administered a self-appraisal task in an fMRI experimentation. The participants saw adjectives and had to indicate if the trait describes them (Self-condition; SC) or the King Albert II/the Queen Fabiola (Other-condition; OC). We examined differences between groups (HC>AD and AD>HC) and a conjunction analysis examined brain activations that were common to both groups during the self-appraisal process ( $p < .001$  uncorrected with a-priori hypotheses). Results. No region was found to be significantly more activated during self-appraisal in HC than in AD and vice versa. The VMPFC was the only region commonly activated in AD and HC during self-appraisal process ( $p < .001$ ). Conclusions. The study demonstrates that AD patients at early stages of the disease may still engage the MPFC during self-referential processing (compared to a well-known but not close "other") as HC do.

The contribution of semantic relatedness to the emotional enhancement  
**Pilar Ferré<sup>1</sup>, Isabel Fraga<sup>2</sup>, Rosa Sánchez-Casas<sup>1</sup>, José Manuel Gavilán<sup>1</sup>, Yolanda Almagro<sup>1</sup> and Montserrat Comesaña<sup>3</sup>**

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<sup>3</sup>University of Minho, Portugal

Memory for emotional words is often better than memory for neutral words (the emotional enhancement of memory). Some studies have tested whether this enhancement is exclusively due to the affective content of words or whether it can be explained by other factors such as semantic relatedness. The results of these studies are inconclusive, as some have found that semantic relatedness can completely account for the effect (e.g., Talmi & Moscovitch, 2004), whereas others suggest that the effects on memory of semantic relatedness and of the emotional content of words are additive (e.g., Buchanan et al., 2006). The aim of the present work is to test the role of both semantic relatedness and the type of encoding task on the emotional enhancement of memory. We investigated whether memory for emotional words was

better than memory for neutral words in two different conditions: words could be presented in the context of either homogeneous or heterogeneous semantic categories. Furthermore, we compared two different encoding tasks, either focused (Experiment 1) or unfocused (Experiment 2) on emotionality. Our results show that the emotional enhancement of memory is modulated by the semantic relatedness between words as well as by the type of encoding task.

Encoding strategy effects on true and false recognition: An event-related potentials (ERPs) study

**Sara Cadavid<sup>1</sup>, Ángela Boldini<sup>2</sup>, Daniel Rodríguez<sup>1</sup>, Ángel Sánchez<sup>1</sup>, Javier Sánchez<sup>1</sup>, Mario Sainz<sup>1</sup> and M. Soledad Beato<sup>1</sup>**

**<sup>1</sup>Universidad de Salamanca - <sup>2</sup>Universidad de Barcelona, Spain**

Event-related potentials (ERPs) were used to investigate the effects of encoding strategy on true and false recognition in the Deese-Roediger-McDermott (DRM) paradigm. Ten six-word lists were presented auditorily to 116 participants who studied the lists under shallow (to respond whether the word contained the letter “o”) or deep (to create a visual mental image for each presented word) level of processing. Visual presentation modality was used on final recognition memory test. As expected, true recognition was higher after deep than shallow encoding. In contrast, false recognition was similar in both experimental groups. ERP analysis revealed no FN400 effect (300-500 ms). However, a left parietal (400-800 ms) and a late right frontal (1000-1500 ms) old/new effects were found in both processing conditions. Specifically, there was more positive activity for true recognition than for rejection of new words. In addition, a more positive cortical activity was found in shallow than deep processing between 1000-1500 ms. No significant differences were observed between true and false recognition in parietal and frontal brain regions. These results suggest that false and true recognition share the same underlying recollective processes, even when the encoding strategy was expected to facilitate the discrimination between studied and lure words.

Acceptable and non acceptable suggestions in preschoolers

**Amparo Moreno, Nieves Pérez-Mata and Margarita Diges**

**Universidad Autónoma de Madrid, Spain**

This study examined the effects of misleading question content –social acceptable/unacceptable events and adult/child actors – on suggestibility and memory. One hundred fifteen preschoolers (32-75 months) were interviewed two times at 1 week interval. Firstly, an interviewer read to preschoolers a tale and introduced to them a family of wood-made dolls, and they were asked yes/no questions about the story read. Then, a second interviewer evaluated correct recognition of the previous session and suggestion acceptance. Recognition task included 20 yes/no question, 10 of those were based on correct information and the remaining 10 were based on misleading information. ANOVAs showed a higher correct recognition for Adult than Child actions, and a lower performance for the 3 years-old compared to 4 and 5 years-old groups. Furthermore, children of any group of age accepted significantly more acceptable than unacceptable events questions and, more specifically, 3 years-old children were more prone to accept acceptable and unacceptable suggestions than the remaining children. Finally, 4 and 5 years-old

children's refuse of misleading unacceptable events performed by Adult was a noteworthy result. So, it seems that that youngest children may be willing to accept any kind of misleading information, what in natural context could have dramatic consequences.

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**Symposium (TRIFAC 3): "Dyslexia in Higher Education" (*Maaïke Callens<sup>1</sup>, Wim Tops<sup>1</sup>, Valérie Vanhees<sup>1</sup>, Jolien De Brauwer<sup>2</sup> and Louisa Bogaerts<sup>1</sup>, <sup>1</sup>Universiteit Gent - <sup>2</sup>Lessius College, Belgium*)**

Cognitive profile of students with dyslexia in higher education

***Maaïke Callens, Wim Tops and Marc Brysbaert***

***Universiteit Gent, Belgium***

For languages other than English there is a lack of empirical evidence about the cognitive profile of students entering higher education with a diagnosis of dyslexia. To obtain such evidence, we compared a group of 100 Dutch-speaking students diagnosed with dyslexia with a control group of 100 students without learning disabilities. Our study showed selective deficits in reading and writing (effect sizes between  $d = 1$  and  $d = 2$ ), arithmetic ( $d \approx 1$ ), and phonological processing ( $d \approx 1$ ). Except for spelling, these deficits were larger for processing speed than for accuracy. Students with dyslexia also performed slightly worse in the KAIT tests of crystallized intelligence, due to the retrieval of verbal information from long-term memory. No significant differences were observed in the KAIT tests of fluid intelligence. The profile we obtained agrees with a recent meta-analysis of English findings (Swanson & Hsieh, 2009), suggesting that it generalizes to all alphabetic languages. Implications for special arrangements for dyslexia students in higher education are outlined.

Evidence based protocols for identifying and supporting students with dyslexia in higher education

***Valérie Van Hees, Maaïke Callens, Wim Tops and Marc Brysbaert***

***Universiteit Gent, Belgium***

Because increasingly more students with dyslexia enter higher education, there is a growing need for evidence based assessment and intervention programs that responds to the specific needs of dyslectic students without ignoring the demands of the institutions. The development of an efficient and optimal protocol for assessment and facilities management for young adults with dyslexia was the focus of the first study. To determine which tests contribute best to make a reliable diagnosis, we evaluated on a large number of tests covering a wide range of cognitive domains which variables differentiated best between the students with ( $N=100$ ) and without dyslexia ( $N=100$ ). The results showed that three tests (word reading, word spelling, and phonological awareness) were adequate enough to make a grounded diagnostic decision. Given the need that the allocation should be based on the specific strengths and the weaknesses of individual students we expanded the assessment with two extra tests (auditory comprehension and auditory delayed recall). In a second study

we aim to evaluate the employability of assistive technology for students with dyslexia in higher education. On the basis of questionnaires and semi-structured interviews we evaluate the experiences of students with reading software (N=79), word prediction programs (N=10) and voice recognition software (N=10). Preliminary results indicate that for students with dyslexia Assistive Technology relieves the burden to some extent.

Beyond spelling: the writing skills of students with dyslexia in higher education  
**Wim Tops, Maaïke Callens, Evelyn Van Cauwenberghe, Jessica Adriaens and Marc Brysbaert**

**Universiteit Gent, Belgium**

To have a clearer idea of the problems students with dyslexia may face during their studies, we compared writings of 100 students with dyslexia and 100 age matched control students in higher education. We studied the number and type of spelling mistakes, the quality of the texts produced, the use of words, and the handwriting, both in a free narrative task (writing a summary of a text) and in a dictation task (sentence writing). The marking was done by experts blind to the aims of the study and where needed on transcriptions corrected for spelling errors. Our results showed medium to large effect sizes for spelling errors ( $d = .93$  for rule-related errors,  $d = .55$  for memory-related spelling errors) and a medium effect size for punctuation errors ( $d = .40$ ). The quality of the texts produced was judged lower for students with dyslexia than for the controls ( $d = .61$  for text structure and  $d = .56$  for agreeability), even though the number and types of words used by both groups were very much the same. There was no significant difference in the quality of the handwriting ( $d = .15$ ). On the basis of these findings we can conclude that written texts of students with dyslexia tend to be judged lower in quality than those of control students, even when the judgment is based on transcriptions free from spelling errors. Given that remedial teaching has been shown to be effective for essay-writing skills, educational support along these lines may be helpful for dyslexic students.

Support of young adults with dyslexia: what is effective according to young adults, parents, tutors, and therapists?

**Jolien De Brauwer, Ellen Meersschaert, Annelies Aerts, Maaïke Loncke and Astrid Geudens**

**Lessius College, Belgium**

Young adults with dyslexia struggle with specific problems in their studies and internships. They therefore need specific types of support. Only few studies focus on this target group and little attention has been paid to the broader context. The present study aimed to get an overview of the effective and ineffective aspects of support, from the viewpoints of young adults with dyslexia, their parents, tutors, and therapists. In a first study, we investigated how these different parties involved experience various aspects of support. To this aim, all participants (24 young adults with dyslexia, 20 parents, 17 tutors and 5 therapists) took part in a semi-structured interview. The interviews concerned different themes: the impact of the learning disorder on studies and daily life, effective and ineffective aspects of therapy and support, and further needs with respect to support. In a second study, we aimed to quantify these findings: what works for most young adults? A questionnaire was

developed on the basis of the topics brought forward in the interviews: compensatory strategies, computer and software use, support at home and at school, impact of the learning disorder and history of therapy. At the moment, the questionnaire is being administered to young adults with dyslexia. Our first study showed that, although young adults are receiving support, both at home and at school, they still experience needs. One of the most frequently and most intensely formulated needs was individually adapted support: individualised tutoring and accommodations. Furthermore, knowledge about dyslexia is seen as a prerequisite for understanding and acceptance by teachers and tutors. These findings, obtained in the interviews, will be linked to those presently being gathered with the questionnaires and implications of the present findings for evidence-based support of young adults with dyslexia will be discussed.

A Hebb learning account of language impairment in dyslexia

**Louisa Bogaerts<sup>1</sup>, Arnaud Szmalec<sup>1</sup>, Wibke Hachmann<sup>1,2</sup>, Mike Page<sup>3</sup> and Wouter Duyck<sup>1</sup>**

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<sup>3</sup>*University of Hertfordshire, Hatfield, UK*

Hebb repetition learning, i.e. the improved recall for repeating sequences of items in a short-term serial recall task, is assumed to be a laboratory analogue of lexical learning (Page & Norris, 2009; Szmalec, Duyck, Vandierendonck, Barbera Mata, & Page, 2009). Recent findings demonstrate that dyslexic individuals show a reduced Hebb repetition effect (Szmalec, Loncke, Page, & Duyck, 2011). This raises the question whether the acquisition of novel lexical representations is also impaired in dyslexia. We addressed this question in an experiment in which a sample of participants with dyslexia and a matched control group learnt novel wordforms (pseudowords) based on a Hebb learning protocol. The results showed slower Hebb learning and weaker consolidation of the novel words in the dyslexic group. Most interestingly, 1 month later, the novel wordforms were clearly lexicalized in the control group, while no trace of lexicalization was found in the participants with dyslexia. These findings are framed within a Hebb learning account which proposes that dyslexia, and its many associated dysfunctions, reflects an impairment in the representation of serial-order information that affects language learning and processing.

## **Thematic session (TRIFAC4): Implicit memory**

Context-Specific Implicit Sequence Learning

**Maria C. D'Angelo<sup>1</sup>, Juan Lupiáñez<sup>2</sup>, Luis Jiménez<sup>3</sup>, Bruce Milliken<sup>1</sup>**

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Traditionally attentional processes have been dichotomized into controlled versus automatic processes (i.e. Posner & Snyder, 1975; Shiffrin & Schneider, 1977). By this view controlled processing is slow, flexible, and intentional, while automatic processing is fast, inflexible, and without intention. Recently, there has been



accumulating evidence for a form of context-specific control over attentional processes that is rapidly and flexibly engaged (Chun & Jiang, 2003; Crump, Gong, & Milliken, 2006; D'Angelo & Milliken, in press). Here we extend the finding of context-specific control over attentional processes to the domain of implicit sequence learning, where participants were able to implicitly learn about two complementary sequences associated to different contexts. Furthermore, when stimuli were presented randomly in one of the two contexts, learning of one or the other sequence was expressed as a function of the context in which the stimuli were presented. Together with recent work that has examined sequential congruency-like effects in sequence learning, these results challenge traditional views in which automatic processes are rigid and points to the role of context-specific control in the acquisition of implicit sequence knowledge.

Can inter-individual differences in semantic priming be explained by inter-individual differences in implicit learning abilities?

**Nicolas Stefaniak<sup>1</sup>, Fiorine Preto<sup>1</sup>, Christelle Declercq<sup>1</sup>, Stéphanie Caillies<sup>1</sup> and Thierry Meulemans<sup>2</sup>**

**<sup>1</sup>University of Reims Champagne-Ardenne - <sup>2</sup>Université de Liège, Belgium**

Several studies have shown that the size of the semantic priming (SP) effect is directly associated to the strength of the association between the prime and the target word (e.g., Chwilla & Kolk, 2002). People who are able to make strong semantic associations between concepts should therefore present a larger SP effect in a lexical decision task. We hypothesized that these semantic associations are made outside of consciousness since people do generally not show any willingness for making such relationships. In other words, our assumption is that the ability to make strong semantic associations would directly depend on implicit learning mechanisms. In order to test this hypothesis, we asked to forty young adults to perform an implicit learning task (i.e., serial reaction time task) and a priming task (i.e., a lexical decision task in which some pairs of words were semantically related - e.g., lion – tiger). Results show significant effects in both tasks, and confirm that the size of the SP effect is predicted by inter-individual differences in implicit learning abilities. These results, which we discuss in the context of Ullman's (2001) declarative/procedural model, give new perspectives concerning the functional role of implicit learning mechanisms on cognition.

The benefits of prior sequence learning on a serial reaction time performance in Alzheimer's disease: Comparison of two learning methods

**Xavier Schmitz<sup>1</sup>, Nathalie Bier<sup>2</sup>, Sven Joubert<sup>2</sup> and Thierry Meulemans<sup>1</sup>**

**<sup>1</sup> Université de Liège - <sup>2</sup>University of Montreal**

It is well known that patients with Alzheimer's disease (AD) are able to acquire new perceptual-motor skills (e.g., Rouleau et al., 2002). However, implicit learning methods should be favored, because they reduce the intervention of controlled processes related to working memory (Van Halteren-Van Tilborg, 2007). We compared two learning methods (implicit vs. declarative) of a perceptual-motor sequence in 12 patients with AD and 12 healthy older adults. In the implicit learning condition, subjects were simply asked to perform the sequence several times by pushing on the keyboard key corresponding to the stimulus on the screen. In the declarative condition, subjects learned the sequence by trial-and-error. The impact of

the two methods was compared in a subsequent serial reaction time task, in which subjects had to respond as quickly as possible to the previously learned sequence. Results show that prior implicit learning is effective in both groups ( $p < .05$ ). In contrast, in the declarative condition, while the two groups showed improving performance during the learning phase ( $p < 0.01$ ), only the control group benefits from this knowledge during the SRT task ( $p < 0.01$ ). In conclusion, our results show preserved perceptual-motor learning in AD when the method induces the intervention of non-declarative, automatic memory processes.

Is perceptual sequence knowledge temporary?

***Daphné Coomans, Natacha Deroost, Eva Van den Bussche and Eric Soetens***  
***Vrije Universiteit Brussel, Belgium***

Past research showed that knowledge acquired in a typical structured serial reaction time task can be consolidated. However, as knowledge in this task consists of perceptual and motor knowledge, it is not known whether both kinds of knowledge are consolidated. In the current experiments, we determined the consolidation of perceptual sequence knowledge. Motor components were minimized by varying the response dimension randomly and by avoiding eye movements, using a circular display with a small visual angle and a short presentation time. Participants had to respond to the identity of a target, presented at one of four locations around a fixation cross. Unknown to the participants, target location changed according to a sequence. To assess learning, the perceptual location sequence turned to random in certain blocks. After participants acquired perceptual sequence knowledge in an initial training session, we assessed whether this knowledge was still present after 1, 4 or 24 hours, using a between subjects design. Results indicated that knowledge was preserved for 1 hour, but declined after 4 and 24 hours. This suggests that perceptual sequence knowledge is temporary, a proposition that fits well in the sequence learning model of Hikosaka et al. (1999).

Chunk formation in sequence learning

***Koen Homblé, Natasha Deroost and Eric Soetens***  
***Vrije Universiteit Brussel, Belgium***

The debate on how people learn a sequence of stimuli in the serial reaction time (SRT) task is ongoing. Continuous, statistical processes as well as discrete chunking methods of learning have been proposed to account for implicit sequence learning. While evidence for chunk formation is available in other sequential learning paradigms, learning of discrete fragments has been difficult to demonstrate in the SRT task. The studies that have found experimental support for discrete learning in a continuous SRT task have been met with criticism. In an attempt to find evidence for chunk learning in this paradigm, we studied the impact of visual cueing of sequence fragments. To achieve uniform chunk formation across participants, we used the color of the target stimuli as a grouping cue. Previous research has shown that such cueing of sequence fragments during training can lead to discrete chunk learning, but that these effects did not extend to a non-cued transfer task. By increasing the similarity between the training and transfer tasks however, we expected to find evidence of lasting chunk formation. Results will be presented and discussed at the conference.

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**Symposium (ROOM SM6):** “Symposium on the impact and role of the psychological traumatism and forensic evaluation on victimization process”  
**(Leontien van der Knaap<sup>1</sup>, Stefan Bogaerts<sup>1</sup> and Adélaïde Blavier<sup>2</sup>;  
<sup>1</sup>INTERVICT, Netherlands - <sup>2</sup>Université de Liège, Belgium)**

Victims' influence on intimate partner violence revictimization: A systematic review of prospective evidence

**Leontien M. van der Knaap**

**International Victimology Institute (INTERVICT), Tilburg University, Netherlands**

Foa, Cascardi, Zoellner and Feeny (2000) developed two models of women's influence on intimate partner violence (IPV), which integrate victim-related variables associated with the cessation or continuation of partner violence (i.e., repeat IPV). One of the models focuses on psychological factors while the other centers on environmental factors. Central to both models are three key factors: partner violence; psychological difficulties; and resilience. Despite the appeal of these models, empirical, prospective research that specifically tests these models appears to be lacking. This article describes a systematic review of the available literature that examines the prospective link between the three key factors of the models and the risk of IPV revictimization. A synthesis of 15 studies reveals that Foa et al.'s models of revictimization are partly supported by prior prospective research. It is beyond doubt that the key factor partner violence (involving the severity and frequency of prior IPV) is a strong predictor for IPV revictimization; the evidence regarding victims' psychological difficulties and resilience is more mixed. Findings are discussed in terms of implications for practice and research and might enable practitioners to help victims to take control of their situations and to contribute to their empowerment. The importance of future prospective research into dynamic, victim-related variables is emphasized, in order to further support Foa's models of victims' influence on IPV revictimization.

Problematic life-cycle factors among forensic patients

**Stefan Bogaerts**

**International Victimology Institute (INTERVICT), Tilburg University, Netherlands**

In order to build up an adequate diagnosis followed by an effective treatment and risk assessment for forensic patients, psychologists and psychiatrists have to estimate the occurrence and severity of personality disorders. The aim of this study was to investigate the role of conduct disorder before age 12, abuse and neglect before age 18, lack of empathy and coping skills in the estimation of the severity of personality disorders among forensic patients. The following questions were addressed: Does abuse and neglect before age 18 predict the severity personality disorders in adult forensic patients? Does conduct disorder before age 12 predict the severity personality disorders in adult forensic patients? Is there an association between coping skills and the severity of personality disorders among forensic patients? Is

there an association between empathic abilities and the severity of personality disorders among forensic patients? Data were retrieved from an electronic database, the Dutch HKT-30, which is a risk assessment and treatment evaluation instrument that has been developed especially for Dutch forensic population. Pearson correlation suggests significant association between the variables (except between abuse and neglect before age 18 and lack of empathy). Principal component analysis confirmed the existence of clinical and historical factors. Binary logistic regression analysis indicated all variables except coping to significantly contribute to the estimation of the occurrence of personality disorders, with lack of empathy as the greatest predictor. Ordinal logistic regression analysis implied both abuse and neglect before age 18 and conduct disorder before age 12 to significantly contribute the estimation of the severity of personality disorders, with conduct disorder before age 12 as the most important predictor.

How to better understand the victimisation process: a review of malingering in forensic assessment

**Adélaïde Blavier, Esther Thiltges and Céline Wertz**  
**Université de Liège, Belgium**

In forensic context, the psychological or psychiatric assessment occurs in a particular and different way than the usual practice in psychotherapy, and malingering has a specific dimension in this context. This article focuses on malingering in situations of damages compensations. We analyse this behaviour through the study of the victimisation process, the family influence, the existent psychological tests and the examiner's role. The injured persons are placed or place their-self in a victim position that seems to be a factor involved in their reconstruction process and by this way, in the use of malingering. The family has also a strong influence on the management of the traumatic incident and by this way, on the (conscious or unconscious) choice of malingering, particularly for children (by example, in the Munchausen by proxy syndrome). Finally, our study shows how the examiner's role and attitude are central in the functioning and the interaction of the two mechanisms (management of the event/reconstruction by the victim and malingering). Although psychological tests can be used in order to discover malingering, a meticulous assessment, empathy, and neutral and benevolent attention are indispensable elements in order to assure authentic complaints and thus to prevent malingering.

*Managing stress among police inspectors: evaluation of a method of operational preparation using hypnosis and self-hypnosis in a simulated situation*

**Frédéric Daubechies**

**Service d'Appui Psychologique aux Intervenants, Institut Provincial de Formation du Hainaut**

A number of studies have not only highlighted the stress that police officers experience in the performance of their duties, but also the value of training emergency personnel, including police officers, in operational stress management. However, no research has been conducted into the psycho-biological correlates of the advantages to police officers of acquiring an operational preparation technique that uses hypnosis and self-hypnosis. Hypnosis techniques have, on the other hand, been the subject of substantial research that highlights their effectiveness in a wide range

of posts and situations. Recent work indicating that stress factors can result in increased secretion of stress hormones (including cortisol), secondary cardiovascular reactivity to certain stress factors and a modulation of immune responses, suggests that operating in a highly emotional environment (shooting simulation video featuring operational situations with possible use of firearm) would also lead to similar results, as well as increased psychological reactions. Acquiring an operational preparation technique using hypnosis and self-hypnosis would therefore enable officers to manage stress and perform their duties more successfully, and in so doing reduce the range of secondary psychological and physiological reactions to the psychological stress associated with the situation depicted on the shooting simulation video.

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**Symposium (ROOM SM10):** Intergroup relationships with a focus on benevolent sexism” (*Benoit Dardenne<sup>1</sup> and Miguel Moya<sup>2</sup>; <sup>1</sup>Université de Liège, Belgium - <sup>2</sup>Universidad de Granada, Spain*)

Compensation effect between the two fundamental dimensions of social perception

*Nicolas Kervyn*

*Université catholique de Louvain Belgium*

A growing body of research is using warmth and competence as the two fundamental dimensions of social perception. This two-dimensional model is particularly successful in research on social perception (Fiske et al. 2002; 2007; Markus and Kityama, 1991; Tafari & Swann, 1995; Wojciske 1995, Abele & Wociszke, 2007). We present some of the classical and recent evidence of the fundamental nature of these two dimensions. Then we review our research program on the compensation effect. Research on the compensation effect has shown that under some circumstances (Yzerbyt, Kervyn, & Judd, 2008), there is a negative relationship between warmth and competence (Judd, Hawkins, Yzerbyt, & Kashima, 2005). The compensation effect was found to impact impression formation (Kervyn, Yzerbyt, Demoulin, & Judd, 2008), impression communication (Kervyn, Bergsieker, & Fiske, 2011), and impression confirmation (Kervyn, Yzerbyt, Judd, & Nunes, 2009). It was also shown to impact implicit measures of impression formation (Kervyn, Yzerbyt, judd, 2011). We discuss how that compensation effect can be interpreted (Kervyn, Yzerbyt, & Judd, 2011).

Is sexism a gender issue? A motivated social cognition perspective on men’s and women’s sexist attitudes toward own and other gender

*Arne Roets, Alain Van Hiel and Kristof Dhont*

*Universiteit Gent, Belgium*

The present research investigated the antecedents of ambivalent sexism (i.e., hostile and benevolent forms) in both men and women toward own and other gender. In two heterogeneous adult samples (Study 1: N = 179 and Study 2: N = 222), it was revealed that gender itself was only a minor predictor of sexist attitudes compared to the

substantial impact of individual differences in general motivated cognition (i.e., Need for closure). Analyses further showed that the relationship between Need for closure and sexism was mediated by social attitudes (i.e., right-wing authoritarianism and social dominance orientation), which were differently related to benevolent and hostile forms of sexism. In the discussion it is argued that sexism primarily stems from individual differences in motivated cognitive style, which relates to peoples' perspective on the social world, rather than from group differences between men and women.

Gentlemen, bring out your wallets, it's time to pay: Benevolent sexism and women's economic behavior

**Aude Silvestre, Marie Sarlet and Benoît Dardenne**  
**Université de Liège, Belgium**

Some women want to be flattered, cherished and protected by men more than others. We tested the hypothesis that this belief, that is, the personal endorsement of Benevolent Sexism (BS) as well as the perceived BS of the men, would lead women to take economic decisions which fit traditional gender roles depicting men as women's financial providers. In Study 1 (Ultimatum Game) and after answering to a BS scale, female participants were proposed fair, quite fair, and very unfair financial offers made by 39 male's faces that varied in perceived BS. When the financial proposition contradicted their beliefs about men as providers (when the offers were very unfair), more offers were rejected by high BS individuals and for high BS faces compared to their low BS counterparts. However, when the financial propositions were more fair, more offers were accepted by high BS individuals and for high BS faces. In Study 2 (Dictator Game), women high (vs. low) in BS propose more unfair offers to men. Moreover, women propose more unfair offers to men with high (vs. low) BS facial characteristics. Economic decisions are shaped by interpersonal as well as individual beliefs about how gender relationships ought to be.

How do women react to sexual aggression from benevolent sexist men?

**Miguel Moya**  
**Universidad de Granada, Spain**

Benevolent sexism (BS) defuses women's resistance to patriarchy by offering the rewards of protection, idealization, and affection to women who accept a conventional role and fulfill men's needs. The goal of the research presented here is to analyze how women react to an hypothetical sexual aggression committed by men toward other women or toward them. Information about perpetrator's sexist ideology was manipulated (he was presented as assuming benevolent/hostile/no information ideology). In the study 1, when the husband was described as a BS man (vs. control), participants perceived that the husband had more right to have sex with his wife (despite her refusal), that she had more marital duties to satisfy her husband's sexual needs and it was less likely to consider the hypothetical forced sex as rape. In study 2, when the male aggressor was presented as high BS, participants blame the victim more (especially when they were also high in BS). In study 3, when the husband was described as high BS women who assumed BS ideology showed less resistance to the aggressor (e.g., ending the relationship). How benevolent sexism can contribute to legitimate marital rape is discussed.

## **Thematic session (ROOM SDC): Face processing**

Familiarization to faces: The effects of depth of encoding on the creation of a viewpoint-independent representation

**Alejandro J. Estudillo<sup>1</sup> and Graham MacKenzie<sup>2</sup>**

**<sup>1</sup>Universitat de Barcelona, Spain - <sup>2</sup>University of Edinburgh, UK**

Bruce and Young's (1986) model proposes that familiar faces have an abstract viewpoint-independent representation stored in memory, which supports recognition of familiar faces independently of the viewpoint they are encountered in. Conversely, unfamiliar faces are quite dependent on the viewpoint in which they were encountered, and therefore people have difficulty recognizing unfamiliar faces when they are presented in an alternative pose or photograph. Martin and Greer (2011) showed that frequency plays an important role in the creation of these viewpoint-independent representations. Here, we have conducted four experiments in which depth of encoding was manipulated across experiments. In the test phase, either the same or different photograph of those presented in the encoding phase was presented. The pattern of results shows that under shallow encoding tasks, unfamiliar faces are recognized quite poorly compared with familiar faces, especially when the photograph used in the test is different. Conversely, following deep encoding, performance for unfamiliar faces appears similar to the pattern observed for familiar faces. These results seem to indicate that, under a deep encoding task, a single exposure to a face is enough to support face recognition, consistent with creation of a viewpoint-independent representation of that face.

Face naming and person knowledge in Alzheimer's disease patients: a priming study

**Marco Calabria<sup>1</sup>, Alicia Sabio<sup>1</sup>, Clara Martin<sup>1</sup>, Montserrat Juncadella<sup>2</sup>, Ramon Reñé<sup>2</sup>, Jordi Ortiz<sup>3</sup>, Lidia Ugas<sup>3</sup> and Albert Costa<sup>1</sup>**

**<sup>1</sup>Universitat Pompeu Fabra, Spain - <sup>2</sup>Unitat de Diagnòstic i Tractament de Demències, Servei de Neurologia de l'Hospital Universitari de Bellvitge, Spain - <sup>3</sup>Hospital General de Granollers, Spain**

Alzheimer's disease (AD) patients are impaired in tasks that depend on semantic memory, such as naming and verbal fluency. Moreover, it has been shown that AD affects more the retrieval of unique entities' names (famous people) than common names (objects). While it is established that AD patients have deficits of proper name retrieval, the nature of such impairment is not fully understood yet. Currently, two main theories explain the nature of the semantic memory deficit in AD. One account claims that AD disrupts the representation whereas other account claims that AD patients have difficulties in retrieving the information. By now, the nature of semantic memory impairment for proper names has been little explored. Here, we aim to investigate whether the proper anomia in AD patients is a representational or access deficit. To test this hypothesis, we compare the performance of AD patients and controls in two measures of semantic memory for proper names, direct (naming) and indirect (priming) ones. Our results show that AD patients compared to controls have a disproportionate deficit in naming faces of famous people. However, in the priming task AD patients, compared with controls, show intact semantic priming for same category items but reduced priming for correct face and name associations. These results suggest that the impairment for proper names and person knowledge in AD

acts in a hierarchical bottom-up manner, such as first affecting the attribute level (proper names) and then the category one (person knowledge).

Processing of facial expressions is modulated by valence and situational context: an ERP study

***Teresa Diéguez Risco, Luis Aguado and José Antonio Hinojosa***  
***Universidad Complutense de Madrid, Spain***

A sentence-face priming procedure was used to explore potential differences in the influence of situational context on different stages of processing of facial expressions of emotion. Target faces were preceded by a short sentence describing happiness-inducing or anger-inducing daily situations and the participants were asked to categorize each face as “happy” or “angry”. Congruent and incongruent trials were defined according to whether the sentence and the following face belonged to the same or to a different emotion category. Early event-related potential (ERP) components associated with perceptual processing of faces (N170) were modulated by emotional expression with no influence of the preceding context. However, amplitude of later ERP components was indeed sensitive to the emotional congruency between the faces and the preceding sentences, thus showing context-sensitivity. These results suggest that processing of facial expressions of emotion proceeds through different steps, from early stages where automatically decoded emotional meaning modulates perceptual processing, to later stages where more complex cognitive processes come into play. Our results suggest that at these later stages processing of facial emotion is modulated according to the correspondence between the specific expression shown by the face and the expectancies generated by the immediately preceding situational context.

Oscillatory dynamics of Retrieval-Induced forgetting on face recognition

***Catarina S. Ferreira<sup>1</sup>, Tobias Staudigl<sup>2</sup>, Alejandra Marful<sup>3</sup>, Teresa Bajo<sup>1</sup> and Simon Hanslmayr<sup>2</sup>***

***<sup>1</sup>Universidad de Granada, Spain - <sup>2</sup>University of Konstanz, Germany - <sup>3</sup>Universidad de Jaén, Spain***

Face recognition is a rather challenging task, since it requires us to distinguish between several extremely similar facial features and to be able to select the correct ones and suppress the irrelevant ones. Recently, we found that dealing with interference situations that arise when recognizing a face might depend on inhibitory mechanisms of a controlled nature (Ferreira, Marful, & Bajo, submitted), such as those accessed by the Retrieval Practice (RP) paradigm (Anderson, Bjork, & Bjork, 1994). Our aim in this study was to investigate the neural correlates of such mechanisms, namely the role of theta (as a marker of interference) and beta (tracing inhibition) oscillations. We adapted the RP paradigm, separating the presentation of the cue and the target and compared two retrieval conditions – a competitive (CR) and a non competitive one (NCR). Using this pre-cuing paradigm, we seem to be able to disentangle the effects of interference and inhibition. Whereas presentation of the cue elicited higher theta power for the CR condition (vs. NCR) in the cingulate cortex, beta power decreased upon cue and this decrease is then less pronounced upon face presentation (in the CR condition), which should reflect the items' sensory reactivation and their subsequent inhibition.



**Symposium (TRIFAC2): "Do we need more than one learning system?" (Jan de Houwer; Universiteit Gent, Belgium)**

Why two learning systems are better than one

**Helena Matute and Miguel A. Vadillo**

**University of Deusto, Bilbao, Spain**

Two different systems have been proposed to explain how people and animals learn. One is inferential, slow, rational. The other one is automatic, fast, and can operate not only under time pressure but also under conditions of high cognitive pressure and few resources. Evidence has accumulated over the years for one or the other account. It seems clear today that the automatic fast account cannot deal with all the data available, particularly in the human species. It has been proposed, however, that the inferential account can take care of all known results, both in humans and animals. We suggest it cannot. Instead, we argue that a model in which the two learning systems coexist and get activated to a lesser or greater extent as a function of the demands of the environment provides a better fit to the available evidence.

RRR: Representational redescription revisited

**Axel Cleeremans**

**Université libre de Bruxelles, Brussels, Belgium**

In their 1993 paper titled "The Cognizer's innards" (Mind & Language 8), Clark and Karmiloff-Smith state that "genuine thinkers are endowed with an internal organization which is geared towards the repeated redescription of its own stored knowledge. This organization is one in which information already stored in an organism's special-purpose responses to the environment is subsequently made available, by the representational redescription process, to serve a much wider variety of ends. Thus knowledge that is initially embedded in special-purpose effective procedures subsequently becomes a data structure available to other parts of the system" (pp. 487-488). This process of representational redescription is, according to Clark & Karmiloff-Smith, what distinguishes humans from other animals, for it is radically facilitated by language - the redescription tool per excellence. These ideas have strong implications for our conceptions of both learning and consciousness. Learning, from this perspective, always involves association-based mechanisms, but these can be radically altered in different ways by the cortical shortcuts made possible by representational redescription. Consciousness, from this perspective, always involves knowing that one knows, that is, a representation is a conscious representation only when it is itself an object of further representation. Combining the two ideas thus opens up the possibility for learning to be either conscious or not based on the very same kinds of mechanisms. The genuine pending challenge is to understand how symbolic processing can emerge out of subsymbolic neural activity.

Propositional and associative accounts of learning: A question about cognitive architectures

***P.L. Cobos, D. Luque, J. Morís and F.J. López***

***Universidad de Málaga, Spain***

The debate about whether human learning processes can be better understood as association formation or as the result of inferences drawn from propositions can be enriched if it is framed within an older debate in cognitive psychology, namely whether it is the connectionist or the classical symbolic perspective the best one to provide a plausible description of our cognitive architecture. Some of the questions discussed at the time are still relevant for the current debate. Here we focus on the need for grasping as many features of our cognitive system in advance with as few computational principles as possible. In this sense, learning and drawing sensible generalizations from examples, sensitivity to subtle aspects of the represented contents, tolerance to information degradation, content addressable memory, compositionality and systematicity are some of the ubiquitous features that any framework should be able to account for. In our view, even though the propositional approach to learning could provide an explanation of some of these features, neural network computational principles allow to give a more complete and parsimonious account. Finally, we also provide arguments against the idea that connectionist models can be viewed as mere implementations (machine language) of symbolic processes (high level programming language).

Let's see how far we can get with a purely propositional learning system architectures

***Jan de Houwer***

***Universiteit Gent, Belgium***

Associative learning is typically explained in terms of the formation of associations in memory. Recently, however, it has been argued that associative learning is always due to the formation and truth evaluation of propositions about related event. Several arguments have been raised against this idea. I refute these arguments and point at problems that arise when more than one process is assumed to underlie associative learning. I conclude that it remains valuable to maintain the hypotheses that all associative learning is propositionally mediated.

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**Symposium (TRIFAC3): "New perspectives on interpretation of non-literal language (metaphors, sarcams, idioms, indirect demands): implications for development » (*Jacqueline Leybaert and Mikhail Kissine; Université libre de Bruxelles, Belgium*)**

Negation generates metaphoric and sarcastic interpretations by default

***Rachel Giora<sup>1</sup> and Ofer Fein<sup>2</sup>***

***<sup>1</sup>Tel Aviv University - <sup>2</sup>The Academic College of Tel Aviv Yaffo, Israël***

Is there a preferred or a default utterance interpretation? Unlike coded meanings of words and collocations, which are retrieved directly from the mental lexicon (Giora,

1997, 2003), utterance interpretations are noncoded but constructed on the fly (Gibbs, 2002). Admittedly, there are a number of notions of default utterance interpretations in the literature. They differ in the (minimal-maximal) extent to which they involve reliance on specific contextual information (Ariel 2010; Jaszczolt 2010). With the exception of Grice's (1975), the various views of default interpretation do not explicitly commit themselves to any degree of (non)literality. Adopting a minimalist view, we propose here a novel notion - default nonliteral utterance interpretations. For a nonliteral interpretation to be a default, it has to be derived under the following conditions: 1. Constituents have to be unfamiliar so that coded nonliteral meanings of expressions and collocations should be excluded; if negative utterances are considered, they should not be Negative Polarity Items so that conventionality is avoided. 2. Semantic anomaly or any kind of internal incongruity (triggering nonliteralness) should be avoided so that both literal and nonliteral interpretations are permissible. 3. Informative contextual information should not be involved so that pragmatic incongruity or biasing information may not invite a nonliteral interpretation. In this talk negation will be shown to generate nonliteral interpretations by default. Findings collected from 5 experiments demonstrate that some negative utterances of the form "X is not Y" (This is not a safe), "X s/he/it is not" (Ambitious she ain't), and "X is not his/her/forte/best quality (Supportiveness is not her forte)", conforming to conditions (1-3), are interpreted metaphorically or sarcastically by default: (i) when presented in isolation, they are rated as metaphoric or sarcastic compared to their affirmative counterparts and (ii) are processed faster when embedded in a context biasing them toward their nonliteral than toward their (equally strongly biased) literal interpretation. These findings are hard to account for by existing processing models (The Direct Access View, The Graded Salience Hypothesis, or the Standard Pragmatic Model).

Early birds: The development of metaphorical abilities

*Nausicaa Pouscoulous*

*University College of London, UK*

Many experimental studies from the 70s and 80s show that children do not understand metaphors until fairly late in development (not until adolescence, some claim). I will argue that children's metaphorical abilities may not be as weak as they first appear. Findings suggesting a poor comprehension of metaphor by young children might be better explained by factors other than purportedly inadequate pragmatic abilities. To assess children's cognitive capacities to understand (not explain or paraphrase) metaphors, I investigated, in collaboration with Michael Tomasello, how 3-year-olds fare with fully novel metaphors corresponding to their world knowledge and linguistic competences using a behavioural choice paradigm. Unlike what previous literature suggests, our results indicate that 3-year-olds are able to understand novel metaphors that are appropriate for their vocabulary and world knowledge, based on action measures rather than metalinguistic responses. Furthermore, attested cases of metaphor production by children have often been re-analysed either as cases of overextension (i.e., erroneous extension of the term's conventional denotation) or as cases of pretence, and are thus not considered to be genuine metaphors. I would like to explore the hypothesis that such re-analyses do not preclude the possibility that young children possess the necessary abilities to

produce metaphors. Instead, some aspects of overextension and pretence may pave the way to metaphorical abilities.

Children's with autism compliance with requests: the impact of the sentence-type

**Mikhail Kissine<sup>1</sup>, P. De Brabanter<sup>2</sup> and Jacqueline Leybaert<sup>1</sup>**

**<sup>1</sup>Université libre de Bruxelles, Belgium - <sup>2</sup>Paris IV/Institut Jean Nicod**

Children with autism are often said to rely exclusively on the literal meaning of the sentence. The grammatical imperative mood is the prototypical morpho-syntactic marker of the directive illocutionary force, i.e. of speech acts aiming at prompting an action from the addressee. However, many requests are performed using morpho-syntactic forms that are not proper to directive speech acts: most frequently, questions (1), grammatically declarative sentences (2) or nominal phrases (e.g. Your coat). Interpreting such sentence-types as requests requires taking extra linguistic information into account. Previous studies of indirect request comprehension in autism are likely to have underrated request comprehension, either because failure to react to a request in an unfamiliar setting can stem for independent reasons, or because the task involved linguistic and narrative abilities that can be otherwise impaired. In order to avoid such biases we filmed ten children with low-level autism (mean non-verbal IQ = 50,78; mean verbal age = 3 y; mean chronological age = 8:7 y) in familiar settings, after a long period of familiarisation with the camera: four hours of interaction were analysed per child. Four sentence-types were distinguished: imperative, interrogative, declarative and nominal phrase. Requests were coded as complied or not. Paired t-tests revealed that, for each category, the number of requests complied with exceeded that of non-complied requests. A repeated ANOVA revealed no significant difference as to compliance with respect to the linguistic type:  $F(3,24) = 1,51, p = .24$ . Our data show that children with autism do not rely exclusively on linguistic meaning to recover the illocutionary force.

How context might shift the interpretation of idioms: developmental data

**J. Leybaert, L. Janavel, A. Dubreuil and M. Kissine**

**Université libre de Bruxelles, Belgium**

Are children and adults sensitive to context in their understanding of idiomatic expressions ? We elaborated a test which was appropriate for children with typical development as well as for children with atypical development (like children with specific language impairment, or children with cochlear implant). Pictured story completion that was used in order to create a context. The idiomatic expressions were inserted either in a context favouring idiomatic interpretation or in a context favoring literal interpretation. Children from 1st to 6 grade were tested, as well as adults. Structural language (Ecosse) and flexibility were also measured. Our result demonstrate that context plays an important role in shifting interpretation of idiomatic expressions, in 1st/2nd Grade as well as in 5th/6th Grade, more than in 3rd./ 4th grade. It seems that context helps young children to allocate an interpretation to idiomatic expressions they do not really know; in 3rd/4th grade, when the meaning of these expressions are better known, context exerts less influence; finally, in 5th & 6th grades, children become more flexible in their interpretations, taking context into account. These data will be discussed in relation to theories of interpretation of idiomatic expressions.

**Symposium (TRIFAC4): “Mental arithmetic: its precursors and its strategies”  
(Jolien De Brauwer<sup>1</sup> and Ineke Imbo<sup>2</sup>, <sup>1</sup> Lessius Hogeschool Antwerpen -  
<sup>2</sup>Universiteit Gent, Belgium)**

Number transcoding in young adults with dyscalculia: An exploratory study  
**Jolien De Brauwer<sup>1</sup> and Ineke IMBO<sup>2</sup>**

**<sup>1</sup>Lessius Hogeschool Antwerpen - <sup>2</sup>Universiteit Gent, Belgium**

Recent research shows that number transcoding could be an important building block for more complex numerical and arithmetical abilities (Moeller, Pixner, Zuber, Kaufmann & Nuerk, 2011). Consequently, number transcoding could be an important ability to evaluate during a diagnostic assessment of dyscalculia. Transcoding problems have indeed been found in children with dyscalculia (van Loosbroek, Dirckx, Hulstijn & Janssen, 2008). The present study aimed to investigate (1) whether young adults with dyscalculia experience transcoding problems, and (2) the relation between number transcoding and working memory performance in this particular group. To this aim 20 cases were selected from the young adults that entered our expertise centre and were diagnosed with dyscalculia after a detailed diagnostic assessment. Cases were only included if no comorbid disorders were present and if consent was given. A control group of young adults without learning disorders was recruited, matched on sex, age and educational level with the dyscalculia group. The mean age of both groups was 18 years (ranging from 14 to 30 years). Four number transcoding tasks were used: a number dictation task (from verbal to Arabic), reading Arabic digits aloud, calculator use with visual input, calculator use with auditory input. Next to the number transcoding tasks, we also included measures of intelligence and working memory. In this presentation we will give an overview of the results and consider implications for future research and for the diagnostic assessment of dyscalculia.

A new paradigm to bridge the gap between numerical cognition tasks used in different age groups

**Karolien Smets, Titia Gebuis and Bert Reynvoet  
Katholieke Universiteit Leuven, Belgium**

Reasoning with non-symbolic numerosities is rooted in the Approximate Number System. In order to form valid predictions regarding the acuity of this ANS (i.e., the Weber fraction) at each age and relating this to mathematical performance, it is important to model ANS acuity over development. To date, this has not been done accurately, because different paradigms and tasks were used for different age groups. Here, we present a new paradigm for adults that shares more characteristics with the tasks that are used for infants and young children (i.e., habituation studies) than the typical tasks used for adults do. Participants perceived two streams of images, one staying constant in magnitude (non-changing stream) and a second stream alternating between two different magnitudes (changing stream). Participants were instructed to indicate the changing stream by pressing one of two keys. We obtained a typical ratio effect: Discrimination performance of the participants depended on the ratio between the presented numerosities. Further, we also calculated Weber fractions and contrasted the paradigm with the typical tasks used for adults (i.e., comparison and same-different), making use of the same ratios and stimuli. Next, initial steps have

been taken to transform this paradigm into a more implicit measure which has the potential to be used across all ages.

Being strategic or not. Does it matter for estimation performance?

**Koen Luwel and Lieven Verschaffel**

**Centre for Educational Research and Development, Hogeschool-Universiteit  
Brussel - Centre for Instructional Psychology and Technology, Katholieke  
Universiteit Leuven**

The present study investigated whether individuals were able to estimate more accurately when they are given the opportunity to employ a variety of estimation strategies. To achieve this, we asked 44 young adults to estimate different numerosities of colored cells that were presented in a 20 x 20 grid in either a strategic condition, or a perceptual condition. In the strategic condition participants had to arrive at their estimate within 20 seconds, whereas in the perceptual condition, they had to provide an estimate within 1 second. Results showed that participants in the strategic condition used, as expected, a much larger variety of strategies than participants in the perceptual condition. The choice of a specific strategy was dependent on the numerosity range. Interestingly, participants in the strategic condition were – notwithstanding their richer strategy repertoire – only more accurate in the middle range of the numerosity continuum (i.e., numerosities 80-320) but not in the lower and upper end of the continuum compared to those in the perceptual condition. Apparently, participants in the perceptual condition were able to make use of their knowledge of the total grid size to minimize their estimation errors for the upper range of the numerosity continuum.

Numerical magnitude representations and individual differences in children's  
arithmetic strategy use

**Kiran Vanbinst, Pol Ghesquière and Bert De Smedt**  
**Katholieke Universiteit Leuven, Belgium**

Based on neuroimaging studies on how the brain processes numbers, there is now converging evidence that numerical magnitude representations are crucial for successful mathematics achievement. One major drawback of this research is that it mainly investigated mathematics performance with general standardized achievement tests that typically comprise various mathematical skills and do not allow one to pinpoint associations with more specific mathematical skills. The current study aimed to determine how numerical magnitude representations contribute to one specific and crucial aspect of mathematics development, arithmetic strategy use. There is large inter-subject variability in the use of arithmetic strategies and it might be that these individual differences originate from variations in the ability to represent numerical magnitudes. The present study involved typically developing children of third ( $n = 75$ ) and fifth ( $n = 79$ ) grade. Findings revealed that in both age groups symbolic but not nonsymbolic magnitude representation skills correlate with individual differences in general mathematics achievement. However, the present findings go beyond the previous ones, by showing that this pattern of associations is also observed when focusing on arithmetic strategy use in both third and fifth grade. This suggests that access to numerical meaning from Arabic symbols is key for children's arithmetic strategy development.

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**Thematic session (ROOM SM6): Cognitive development**

Genes affecting attention and self-regulation during normal development

**Lina M. Cómbita-Merchán<sup>1</sup>, Joan P. Pozuelos<sup>1</sup>, Alicia Abundis<sup>1</sup>, Pedro M. Paz-Alonso<sup>2</sup>, Pascale Voelker<sup>3</sup> and M. Rosario Rueda<sup>1</sup>**

**<sup>1</sup>Universidad de Granada, Spain - <sup>2</sup>BCBL - <sup>3</sup>University of Oregon, USA**

Preschool age is a period of major development of multiple cognitive abilities including self-regulation. The ability to regulate thoughts, emotions and responses play a crucial role in children socio-emotional development as it positively influences school competence and adjustment. A circuit of areas involving the ACC and prefrontal cortex (the Executive Attention Network, EAN) is considered to be the neural substrate of self-regulation. Gene variations that underlie neurochemical and structural differences in the EAN have been associated with pathologies involving executive attention. In this study, we aimed at understanding how variability in particular genetic markers affecting the EAN relate to performance of a range of tasks targeting attention and self-regulation in normally developing children (n=95). Genes known to affect serotonergic (5HTT), dopaminergic (DAT1, DRD4) and cholinergic (CHRNA4) brain pathways were genotyped. Associative models between genotypes and cognitive phenotypes were tested. Variations on the four genes accounted for individual differences on inhibitory control, self-regulation and conflict resolution measures when allelic and genotypic models were assumed. Additionally, alleles C and 9 of the CHRNA4 and DAT1 genes showed an association with intelligence scores. Working memory was, on the other side related to the presence of the 4r allele of the DRD4 gene.

Assessment of executive functions in young children: relations with developmental outcomes and developmental trends. A latent variable analysis.

**Jean Christophe Meunier, Marie-Pascale Noël, Marie Stievenart, Gaelle Van de Moortele and Isabelle Roskam**

**Université catholique de Louvain, Belgium**

This study intends to explore the validity of standard and newly developed neuropsychological tasks for assessing, in young children, three executive functions (EF): Working Memory, Inhibition of dominant response and Attention. Participants carried out eleven basic experimental EF tasks three times over a two-year period (at study onset and after one and two years, respectively). The data were collected in two independent sub samples of children (from 3- to 5 years at the study onset): a control sample of 300 non-referred children and a clinical sample of 100 children referred for externalizing behaviour problems. Analyses were done in two steps. First, confirmatory factor analyses were conducted to extract latent variables from the basic EF task and to explain variance in children's developmental outcomes (e.g. behaviour, social competence,...), using these latent variables. Second and using multigroup-SEM, the identified latent variables were compared across groups based on age - for identifying developmental trends in EF - and sample - control vs. clinical. The

discussion especially focuses on clinical issues and on the relevance of considering multiple EF variables in clinical assessment and intervention.

Training preschoolers' executive attention: Differential effects related to training strategy

**Joan Paul Pozuelos López, Alicia Abundis, Pedro M. Paz-Alonso, Lina Marcela Combita, Sonia Guerra, Angela Conejero and M. Rosario Rueda**  
**Universidad de Granada, Spain**

The development of cognitive control and self-regulation goes through mayor development during preschool years and is thought to be important for the socio-emotional adjustment of the child and his schooling competence. In recent years, there has been a strong interest in studying susceptibility of the brain network supporting executive control to be enhanced through training. In both adults and children, training programs targeting several executive functions have shown to enhance efficiency of performance on tasks related to the trained ability. Our research aimed at studying whether using a type of feedback during the training phase that promotes children's metacognitive knowledge, as compared to receiving a correct/error feedback, influences the effect of training. A total of 90 children were assessed on various tasks targeting self-regulation skills prior to and following 8 sessions of attention training under normal feedback (NF, n=30), metacognitive feedback (MF, n=30) or control activities (C, n=30). Results show that children significantly increase fluid intelligence following training and that the enhancement was larger for the MF group compared to the NF group. This results support the importance of the metacognitive component in a training program, and provides evidence of the benefits of the training interventions for preschool children.

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## **Thematic session (ROOM SM10): Social Psychology**

Effects of fluency on social distance (or Why you may be close but you are not)

**Karl-Andrew Woltin, Olivier Corneille and Vincent Yzerbyt**  
**Université catholique de Louvain, Belgium**

Recent research indicates that the metacognitive experience of disfluency impacts on estimations of spatial and conceptual distance (Alter & Oppenheimer, 2009). Based on Construal Level Theory's perspective that distances are interchangeable and have bi-directional effects (Liberman, Trope, & Stephan, 2007), the current studies tested the hypothesis that disfluency would also enhance social distance. In accord with this hypothesis, participants in Study 1 judged a disfluently (vs. fluently) presented target person as less similar. Moreover, Study 2 manipulated disfluency in terms of an easy- or difficult-to-read font and showed that participants reported more self-other dissimilarity concerning preference judgments in the disfluent (vs. fluent) questionnaire-version. Studies 3 and 4 addressed possible consequences of disfluency (again manipulated via font-difficulty) impacting on social distance. In line with the notion that people are less egocentric with socially distant, disliked people, participants were better at perspective-taking under disfluent (vs. fluent) conditions

(Study 3). However, in line with the notion that feeling socially close promotes allocation of resources, participants allocated less resources to a target under disfluent (vs. fluent) conditions (Study 4). All studies controlled for mood and task-difficulty. Overall, the research sheds light on how social closeness can be promoted/hindered by a previously underdressed psychological factor.

The role of coincidences and social variables on illusion of control  
**Marcelo Frota Lobato Benvenuti, Flávia Meneses Duarte and Saulo Missiaggia Velasco**  
**University of São Paulo, Brazil**

Biased expectations of personal control may depend on coincidences between actions and environmental changes that are independent of the actions. The role of these coincidences was evaluated in a situation where people could manipulate a cursor and respond in a rectangle in the center of a computer screen. Points were presented independently of the behavior of the participants. Participants' estimation of control in the situation were compared with nonverbal behavior in the task. When exposed individually to the task with little instructions, nonverbal performances of the participants were marked by high variability in rate of responses within and across sessions. Performing consecutive sessions, participants tended to stop responding as if they were responsible for the points' presentation. In a special arrangement, a session began with a confederate participant that responded frequently. A new participant observed this session, then was exposed to independent presentations of points and finally had to instruct another participant. In this case, there was much less variability, and the participants, in successive "generations", acted as if they were responsible for point's presentation. Estimation of personal control were high for these participants. Illusion of control generated by coincidences can therefore be maximized by social variables such as observation and instruction.

A SIDE look: The effect of internet use on participation in collective actions in the "Real World"

**Sandy Schumann<sup>1</sup>, Olivier Klein<sup>1</sup> and Karen Douglas<sup>2</sup>**  
**<sup>1</sup>Université libre de Bruxelles, Belgium - <sup>2</sup>University of Kent at Canterbury, UK**

Previous research showed that Internet use can foster engagement in civic and political collective actions. The underlying processes of this relationship are however only partially understood as the majority of studies consider communication processes online as being unidirectional. They disregard that with the development of a participatory Internet, i.e., social media, users can also engage in interactive processes to create and broadcast content online. In two experiments (N = 84 and N = 106), we assessed the effects of online interactivity on one's willingness to participate in collective actions. Following the model of social identity deindividuation effects (Reicher, Spears, & Postmes, 1995), we investigated the role of group salience, social support and accountability. Results showed that sharing content with, and receiving feedback on it from, other members of an environmentalist movement organization increased the likelihood to engage in collective actions when participants were identifiable towards each other. This condition corresponds to experiencing social support from the organization, while being accountable for one's actions. It led to a stronger sense of empowerment to act offline on behalf of one's organization. The role

of trust and implications for collective action theories as well as online community design are discussed.

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### **Thematic session (ROOM SDC): Attention & Consciousness**

Unconscious priming from unpractised words is reliable and robust with strong  
semantically related word pairs

**Juan José Ortells<sup>1</sup> and Paloma Mari-Beffa<sup>2</sup>**

**<sup>1</sup>University of Almería, Spain - <sup>2</sup>University of Wales Bangor, UK**

We used a congruency-priming task in which unpractised prime words were briefly presented and followed either immediately or after a variable delay by a pattern mask, and then by a target word on which participants performed a categorization task. The primes and targets belonged either to the same (20%) or different (80%) categories. Primes followed by a delayed mask, which rendered them easily identifiable, produced either non-reliable facilitation or reliable reversed (strategic) priming, depending on whether a short (200-ms) or longer (1000-ms) prime-target SOA was used. By contrast, with an immediate mask under which participants claimed to be unaware of the primes' identity, facilitatory priming was found strong (a) even for participants that performed at chance in prime visibility tests, and (b) for high but not for weakly semantically related category coordinates. The unconscious priming effects showed also strong test-retest reliability across participants, particularly when reliability estimates were computed on standardized rather than on raw priming scores. These findings provide evidence that (a) unconscious congruency priming by unpractised words critically depend on associative strength and/or semantic similarity between category co-exemplars, and (b) there is some explainable (predictable) variability in priming even under conditions that highlight an automatic processing of primes.

The ineluctable capture of attention by word deviants: A dual mechanism of  
involuntary semantic processing

**Fabrice B.R. Parmentier**

**University of the Balearic Islands, Spain**

The involuntary capture of attention by deviant sounds has been hypothesized to trigger an involuntary semantic appraisal of the deviant sounds' content that may, in turn, interfere with ongoing performance (distraction-dependent semantic processing). This view, albeit in line with empirical data, contrasts with well-established compatibility effects emanating from other paradigms (e.g., Stroop, flanker, Simon) in which interference effects are observed without prior capture of attention by the distractors' novelty (distraction-independent semantic processing). In this study, we contrasted these two mechanisms by measuring the behavioral aftermath of the involuntary semantic analysis of deviant sounds in the presence and absence of deviance distraction in a cross-modal oddball task. The results unambiguously show that some involuntary semantic analysis of spoken distractors occurs in the absence of deviance distraction but that this processing is significant

after deviant sounds capture attention. We conclude that the automatic processing of spoken distractors reflects two contributions: one contingent upon deviance distraction, and one independent from it. Furthermore, we suggest that the enhanced interference observed in other paradigms (e.g., Stroop, flanker, Simon) when incongruent distractors are rare and unexpected, may in fact reflect the influence of the distraction-dependent semantic processing we identified in this study.

The relationship between alerting and executive attentional networks

***Anna Marzecová and Dariusz Asanowicz***  
***Jagiellonian University, Poland***

Several studies on attentional networks have shown that an alerting network exerts an inhibitory effect on executive network, i.e. when an alerting cue is presented, cost of conflict resolution increases. To investigate the interaction and its temporal characteristics in more detail, we conducted three experiments with different variants of the Attention Network Task (ANT). In the first study (N=125), in which SOA of 500 ms was used, participants, surprisingly, made fewer errors when the alerting cue was presented. In the second experiment (N=19), we employed two different SOAs (100 ms and 800 ms). At the short SOA, alerting produced the inhibitory effect on executive network. At the long SOA, the alerting cue slowed down response times, but improved accuracy of conflict resolution. In the third experiment (N=75), we further explored temporal dynamics of the interaction and a plausible differential impact of single and double alerting cues, in order to distinguish the alerting and temporal preparation effects. The results suggest that alerting generally inhibits conflict resolution at the short SOA, but at the longer SOA, the accuracy of conflict resolution is enhanced by temporal preparation processes.

Endogenous attention, alerting and conscious perception

***Fabiano Botta, Ana Chica and Juan Lupiáñez***  
***Universidad de Granada, Spain***

Attention and perceptual consciousness have often been considered as strictly related processes. Nonetheless recent studies (Chica et al. 2010) have shown a dissociation between exogenous and endogenous mechanisms regarding their modulation over conscious perception (CP). Specifically, it has been observed that while exogenous or stimulus-driven attention has a strong impact on CP, endogenous attention seems to exert weak effects. One possible explanation for this dissociation is that the increase in CP following peripheral exogenous cues might be the result of a synergic action of both spatial orienting and phasic alerting induced by the abrupt onset of the cue. This might not occur with endogenous attention; as endogenous cues need more time to be interpreted, the phasic alerting might be dissipated by the moment in which attention is oriented at the cued location. To test this hypothesis we manipulated both endogenous attention and alerting and we studied their interaction on the modulation of CP. Results demonstrated that top-down attention significantly affects CP only when the level of phasic alerting is increased by the presentation of a tone during the cue-target SOA.

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## **Thematic session (TRIFAC2): Working memory**

### **Spatial attention in working memory**

**Bart Anseeuw<sup>1</sup>, Jean-Philippe Van Dijck<sup>1</sup>, Steve Majerus<sup>2</sup> and Wim Fias<sup>1</sup>**

**<sup>1</sup>Universiteit Gent, Belgium - <sup>2</sup>Université de Liège, Belgium**

Several studies have shown a tight link between attention and working memory (Awh) suggesting that the mechanisms of spatial attention that operate in physical space are also involved in working memory (Nobre). This might be linked to the fact that the position of an item in working memory is associated with spatial response codes (van Dijck et al). To investigate this we investigated to what extent accuracy of information in working memory depends on position. For this purpose we used and extended the method developed by Gorgoraptis, Catalao, Bays & Husain (2011). Participants were presented with a number of lines (2-5) of differing colour and orientation, successively at the center of fixation. Positional memory accuracy was probed by asking the subject to reproduce the orientation of the line at the position cued by the color or a number referring to position. In normal control participants we replicated the results of Gorgoraptis et al. both for recall based on the colour of the stimulus as on positional information. The next step is to compare these results to data obtained in right hemisphere lesioned patients suffering from spatial hemineglect. Despite the fact that all items are presented centrally, we predict that hemineglect patients will show inferior performance for items positioned at the beginning of the sequence. Control conditions will be administered to rule out the impact of elapsed time since presentation as a confounding variable.

### **The impact of aging and hearing status on verbal short-term memory**

**Clémence Verhaegen, Fabienne Collette and Steve Majerus**

**Université de Liège, Belgium**

We determined the impact of hearing status on age-related effects on verbal short-term memory (STM). Rabbit (1991) observed that elderly participants with hearing loss show impaired STM. He suggested that in the case of hearing loss, attentional resources had to be recruited to a larger extent to stimulus perception, reducing the available pool of attentional resources for STM processing. We tested this hypothesis by distinguishing the impact of aging from the impact of hearing status on STM. This was done by administering different verbal STM tasks to elderly and young adult participants matched for hearing threshold, as well as normal-hearing control participants. We observed that elderly participants and hearing-matched young participants showed equal levels of performance on all verbal STM tasks, and performed overall more poorly than the normal-hearing young control participants. These results suggest that mild hearing impairment is a major explanatory factor of reduced STM performance, and importantly, is age-independent. The results are discussed within an interactive framework of STM and attentional processing (Majerus et al., 2009).

Lateralized coding of ordinal information in spatial working memory

**Véronique Ginsburg, Fabienne Chetail and Wim Gevers**

**Université libre de Bruxelles, Belgium**

Recently, an association between the ordinal position of information in working memory (WM) and response side has been demonstrated (Van Dijck & Fias, 2011). When participants were asked to memorize a sequence of words and had to subsequently categorize words belonging to the memorized sequence (e.g. press left if fruit, press right if vegetable), results showed that words presented early in the memorized sequence were responded to faster with the left hand side whereas words later in the sequence were responded to faster with the right hand side. In the present study, we investigated whether this association between ordinal position and response side is still observed when participants have to retain non-verbal spatial information. Instead of words, participants had to memorize the position of randomly presented dots on a computer screen. An ordinal position effect was observed as with verbal information. We conclude that the ordinal position effect reflects a general property of working memory functioning that is not specific to the modality of the information that is encoded.

Spatial and/or visual working memory deficit in unilateral neglect

**Murielle Wansard<sup>1</sup>, Thierry Meulemans<sup>1</sup> and Paolo Bartolomeo<sup>2</sup>**

**<sup>1</sup>Université de Liège - <sup>2</sup>INSERM UMR\_S 610, IFR 70, Hôpital Salpêtrière**

Patients suffering from left unilateral neglect fail to perceive or respond to stimuli presented within the contralesional space. Neglect is generally considered as involving an attentional bias towards the ipsilateral side. Recently, it has been suggested that revisiting and perseveration behaviors in visual search tasks shown in parietal neglect could be related to impairment in visuo-spatial working memory (Husain et al., 2001; Wojciulik et al., 2001). The aim of the present study was to investigate which aspect of visuo-spatial working memory is involved in unilateral neglect. Indeed, different sources of evidence support the idea that visuo-spatial working memory involves at least two separate cognitive subsystems: the visual cache and the inner scribe (Logie, 1995; Pickering et al., 2001). We assessed thirteen right-hemisphere damaged patients suffering from left neglect on two experimental tasks involving either spatial (Corsi test) or visual (Span test) working memory. Results show that visual and/or spatial working memory can be impaired in spatial neglect. This double dissociation provides neuropsychological support for the separation of visuo-spatial working memory into two subcomponents. The clinical and anatomical implications of this finding are discussed.

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## **Thematic session (TRIFAC3): Bilingualism**

The categorical perception of voicing in French-German bilinguals

**Amandine Van Rinsveld<sup>1</sup>, Ingrid Hoonhorst<sup>2</sup>, Gregory Collet<sup>2</sup>, Willy Serniclaes<sup>3</sup> and Cécile Colin<sup>2</sup>**

**<sup>1</sup>University of Luxembourg - <sup>2</sup>Université libre de Bruxelles, Belgium -**

**<sup>3</sup>CNRS/UMR8158 and Université René Descartes, France**

How does bilingualism affect categorical perception of speech? This question was examined by tackling the categorical perception of stop consonants varying along a Voice Onset Time (VOT) continuum in adult bilinguals speaking two languages (French and German), whose phonologic boundaries of voicing differ. In an identification task, French-German bilinguals, French-speaking and German-speaking monolinguals had to decide whether each stimulus (randomly picked from the VOT continuum) presented was a /de/ or a /te/. In a discrimination task, they had to decide whether two stimuli of a pair were same or different. The two stimuli of the different pairs were always separated by the same acoustic distance and straddled the French or the German phonological boundary or arbitrary boundaries. For monolinguals, the results confirmed previous findings: the identification boundary and the discrimination peak were around 0ms for French-speaking monolinguals and around +30ms for German-speaking monolinguals. For the bilinguals, the results revealed an intermediate mean boundary in the identification task. For the discrimination task, bilinguals performed equally well for stimuli that straddled both phonologic boundaries. The present results suggest therefore that bilingualism modulates categorical perception of voicing, as the bilinguals seem to have similar abilities to perceive voicing of both languages. Further theoretical implications will be discussed.

The comparison of semantic, formal and associative relationships between words in the two language of proficient bilinguals in a translation recognition task

**Cornelia Moldovan, Rosa Sánchez-Casas, Pilar Ferré, David Ventura and Josep Demestre**

**University Rovira i Virgili**

Recent evidence on how words are represented and accessed in bilinguals comes from studies using the translation recognition task. This evidence reveals that interference can be obtained in this task when bilinguals are presented with non-translation pairs that are either semantically or formally related across the two languages. However, the results regarding these effects are not entirely consistent. While some authors have found that translation performance is more affected by the semantic than by the formal manipulation, others have reported interference effects of the same magnitude for the two manipulations. The present work aimed to determine to what extent these inconsistencies can be explained by the type of bilinguals tested or/and the type of word relationship across languages. We conducted two experiments with bilinguals of Catalan and Spanish in the two translation directions. Experiment 1 compared purely-semantic, associative, and word form relations (i.e., translation neighbors). Experiment 2 examined a new type of word form relations that includes cross-language lexical neighbors. We obtained a significant interference effect for all the relations tested, but the magnitude of the effect was higher for semantically related



words than for the remaining conditions. The implications of these results for models of bilingual memory are discussed.

Local and global control in bilingual language production  
**Eva Van Assche<sup>1</sup>, Wouter Duyck<sup>1</sup> and Tamar H Gollan<sup>2</sup>**  
**<sup>1</sup>Universiteit Gent, Belgium - <sup>2</sup> University of California, USA**

Research on bilingual language processing has shown that information about words from both languages becomes activated even when the task requires processing in one language. The current study investigated language production order effects in 60 late Dutch-English versus 64 early Chinese-English bilinguals, using a verbal fluency task. Bilinguals produced members of phoneme categories in one language and then members of either (a) the same categories, or (b) different categories, in their other language. In both bilingual groups, prior production of exemplars from the same categories in the non-dominant language reduced dominant language fluency, but not vice versa. Without repetition of categories, Dutch-English bilinguals exhibited no testing order effects, whereas Chinese-English bilinguals exhibited reduced fluency in the dominant after non-dominant language production, but not vice versa. The robust and asymmetric effects of category repetition across languages seem to confirm prior proposals of an inhibitory control mechanism for managing between-language interference in bilingual language production. In addition, the testing order effects without repetition present in Chinese-English bilinguals demonstrate that these bilinguals control a language shift with more long-lasting language-general consequences, supporting proposals of global, whole-language inhibition for some types of bilinguals.

Audience design through attenuation of information on native and non-native dialogues

**Sara Rodríguez Cuadrado and Albert Costa Martínez**  
**Universitat Pompeu Fabra, Spain**

In this study, we examined potential speech adaptations in dialogues involving native and non-native interlocutors. This is assessed by exploring to what extent the so-called Attenuation of Information effect is present in such contexts. When a word is repeated, it gets shortened in its duration, intensity and pitch, occurring without awareness and carrying intelligibility loss, which might jeopardize communication with non-natives. We designed a task in which dyads (one participant and one confederate) completed maps in which the participant uttered words twice. Three experiments were conducted. In Experiment 1 (Spanish participant and Spanish confederate), repeated words were shortened in duration, intensity and pitch. In Experiment 2 (English-Spanish bilingual participant, Spanish Confederate), although speakers took longer to produce words in a non-native language, they reduced them across duration, intensity and pitch to the same extent as natives did. In Experiment 3 (Spanish participant and English-Spanish bilingual addressee), participants took longer to utter words than when talking to a native and, although they reduced across duration, intensity and pitch, reduction was smaller compared to when they talked to a native. These results add knowledge to the field of audience design and attenuation of information, providing novel insights on the relationship between them.

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## **Thematic session (TRIFAC4): Cognitive control/Inhibition I**

The modulating effect of COMT genotype on the brain regions underlying inhibition

**Mathieu Jaspar, Julien Grandjean, Eric Salmon, Pierre Maquet and Fabienne Collette**

**Université de Liège, Belgium**

Catechol-O-methyltransferase (COMT) is an important enzyme which degrades catecholamines, such as dopamine, notably in the prefrontal cortex (Männistö & Kaakkola, 1999). A large number of studies reported an effect on executive functioning of COMT genotype (Barnett & al., 2007), each genotype being associated with a different COMT enzymatic activity (Weinshilboum & al., 1999). In an event-related fMRI study, a modified form of the Stroop task was administered to 45 young adults separated in three groups according to their COMT val158met genotype : 15 homozygous val/val (VV), 15 homozygous met/met (MM) and 15 heterozygotes val/met (VM). Both behavioral and fMRI results indicated the presence of a general interference effect consistent with prior reports (Nee & al., 2007). More interestingly, group comparisons indicate that this effect is associated, for a similar behavioral performance, with increased medial frontal and precentral gyrus activity in VV and VM groups by comparison with MM group. Conversely, no supplementary brain areas were observed for the comparison of the MM to the two other groups. These observations, in parallel with the lower COMT enzymatic activity and, thus, the higher cortical dopamine level in met/met individuals, confirms our expectation of a COMT Val158Met genotype modulation of the brain regions underlying inhibition efficiency.

Placebo-suggestion modulates conflict adaptation in the Stroop Task

**Pedro M. Saldanha da Gama, Hichem Slama, Emile A.Y. Caspar, Wim Gevers and Axel Cleeremans**

**Université libre de Bruxelles, Belgium**

Expectation manipulations such as suggestion, placebo and post-hypnotic suggestion have been shown to bias several cognitive processes (pain, visual awareness and emotions). Here we demonstrate that a mixed placebo-suggestion is able to create expectations that have a profound impact on conflict adaptation assessed by objective measures. Two groups were exposed to a placebo-suggestion to induce either positive or negative expectations about the properties of a sham “brain wave” machine. The experimental design associated a placebo (the equipment and procedure) to a suggestion (verbal and written persuasive information). The machine was described as either enhancing (positive group) or impairing (negative group) participants’ ability to perceive colors. In the baseline condition, participants completed the task without the equipment. We found a double interaction between Stroop conditions, suggestion and group. Planned comparisons indicated that the suggestion only influenced accuracy in the incongruent conditions. Participants committed fewer errors compared to baseline when under the positive suggestion but more errors when under the negative suggestion. Furthermore, participants’ intra-individual variability was influenced by suggestion and group. Discussion: This study thus

demonstrates that expectations induced by a placebo-suggestion can modulate cognitive conflict.

Cognitive control and T1 encoding in a novel AB-like task

**Bruce Milliken, Ellen MacLellan and David Shore**

**McMaster University, Canada**

The attentional blink has been a useful tool for studying the nature of cognitive control in human perception and performance tasks. Three emerging themes in the attentional blink literature are that (1) the attentional blink is sensitive to strategies that impact how T1 is encoded (Olivers & Nieuwenhuis, 2006), and (2) that these T1 encoding strategies can be adapted rapidly in accord with expectations concerning the difficulty of encoding (Akyurek, Toffanin, Hommel, 2008), and that individual differences in selective filtering of distractors is related to attentional blink magnitude (Arnell, & Stubitz, 2010; Martins & Valchev, 2009). We pulled together these three themes using a novel AB-like task that involves just two stimuli, T1 and T2, no masking of T1, and yet large AB-like effects when T1 requires the selective filtering of distractors. This task allowed us to ask some straightforward questions about cognitive control and T1 encoding processes. The results revealed that, indeed, strategies can impact T1 encoding, but yet they also revealed some surprising rigidity in control over T1 encoding.

Does fluid intelligence protect from age-related decline in cognitive control?

**Marine Manard, Delphine Carabin and Fabienne Collette**

**Université de Liège, Belgium**

With aging, deficits have been reported on proactive control whereas reactive control seems to remain intact. This study investigates the age effect hypothesis and the potential influence of fluid intelligence on proactive control age-related decline. We used a working memory recognition paradigm involving the two kinds of cognitive control by the manipulation of the interference level. 80 young adults (aged from 18 to 29 years old) and 80 healthy older adults (aged from 60 to 89 years old) were included. Main results revealed significant effects of age and fluid intelligence level on sensitivity to interference. As expected, the reactive control performances remained intact with aging (similar interference effect in the two groups). However, we observed a larger interference effect in the proactive condition in aging. Finally, elderly participants with a low level of fluid intelligence showed proactive control decline whereas the high fluid intelligence group revealed similar performances to young adults. Beyond the fact that this study confirms the selective age-related decline of proactive control, it also indicates that the level of fluid intelligence influences the efficiency of proactive control in aging.

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**Thematic session (ROOM SM6): Atypical development**

Verbal short-term memory deficits in children with specific language impairment:  
impact of linguistic complexity and attentional control

**Anne-Lise Leclercq, Christelle Maillart, Océane Genêt and Steve Majerus**  
**Université de Liège, Belgium**

Children with specific language impairment (SLI) constantly show poor performance in verbal short term memory (STM) tasks. However, the precise mechanism at the root of this problem is still unclear. Verbal STM tasks, such as nonword repetition, are complex tasks recruiting linguistic and non linguistic abilities. Recent studies emphasize the role played by attentional capacities in verbal STM performances (e.g., Majerus, Bastin, et al., 2007; Majerus, Heiligenstein, et al., 2009; Majerus, Poncelet, et al., 2006). Moreover, a number of studies have demonstrated an impact of linguistic knowledge on verbal STM (e.g., Majerus & Van der Linden, 2003). In the light of these developments, two studies re-explored the nature of verbal STM deficits in children with SLI by assessing the impact of attentional capacity and linguistic complexity. The first study assessed the impact of attentional capacities on STM via a nonverbal dual-tasking paradigm in children with SLI, in children matched on age, and in children matched on STM span. The second study assessed the impact of lexical, perceptual and phonological variables on STM performance in children with SLI, in children matched on age, and in children matched on vocabulary knowledge. We will show that neither the attentional nor the linguistic complexity accounts can satisfactorily explain the verbal STM deficits observed in children with SLI.

Assessing attentional systems in children with Attention Deficit Hyperactivity  
Disorder (ADHD)

**Diana Martella<sup>1</sup>, Maria Casagrande<sup>2</sup>, Lisa Maccari<sup>2</sup>, Augusto Pasini<sup>3</sup> and Luis J. Fuentes<sup>4</sup>**

**<sup>1</sup>Basque Center on Cognition, Brain and Language, Spain - <sup>2</sup>Sapienza - Università di Roma, Italy - <sup>3</sup>Tor Vergata - Università di Roma - <sup>4</sup>Universidad de Murcia, Spain**

The aim of this study was to evaluate the efficiency and interactions of attentional systems in children with ADHD by considering the effects of reinforcement and auditory warning on each component of attention. Thirty-six drug-naïve children (18 children with ADHD) performed two revised versions of the Attentional Network Test, which assesses the efficiency of alerting, orienting, and executive systems. In feedback trials, children received feedback about their accuracy, whereas in the no-feedback trials, feedback was not given. In both conditions, children with ADHD performed more slowly than did typically developing children. They also showed impairments in the ability to disengage attention and in executive functioning, which improved when alertness was increased by administering the auditory warning. The performance of the attentional networks appeared to be modulated by the absence or the presence of

reinforcement. We suggest that the observed executive system deficit in children with ADHD could depend on their low level of arousal rather than being an independent disorder.

The spatial distribution of auditory attention in early blindness

***Elodie Lerens, Laurent Renier and Anne De Volder***

***Université catholique de Louvain, Belgium***

Early blind people compensate for their lack of vision by developing superior abilities in the remaining senses such as audition. Previous studies reported supra-normal abilities in localizing stimuli and particularly for peripheral sounds as compared to frontal sounds (Roder et al., 1999). However, it is unknown whether such supra-normal attentional abilities also apply to non-spatial tasks. Here we compared the performance of early blind and sighted control participants during a sound detection task. In particular, we measured the potential effect of the sound source location (peripheral vs. frontal) on the speed of a target detection among distractors. Blind subjects displayed shorter reaction times than sighted subjects for both peripheral and frontal stimuli. In both groups of subjects, an interaction between the target location and the distractors location was observed: the target was faster detected when its location was different than the distractors location. However, this effect was attenuated in early blind subjects and even absent when targets came from the frontal location and the distractors from peripheral locations. We conclude that early blind people compensate for the lack of vision by enhancing their ability to process auditory information but also by changing the spatial distribution of their auditory attentional resources.

Developing maturity in adolescents with learning disabilities and developmental disorders

***Els Mampaey and Caroline Andries***

***Vrije Universiteit Brussel, Belgium***

The Sensible Sentences project at the Vrije Universiteit Brussel (Brussels, Belgium) has two aims. A first aim is to add empirical evidence to the body of knowledge on the theory of ego development (Loevinger, 1976) and to substantiate the validity and reliability of the Sentence Completion Test for Youth (SCT-Y; Westenberg et al., 2000). The second aim is to describe the ego maturation in a clinical group of adolescents with learning disabilities (LD), Attention Deficit Hyperactivity Disorder (ADHD) and Autism Spectrum Disorder (AD). 330 adolescents with a diagnosis of ADHD, LD or AD were assessed with the SCT-Y. This clinical group was compared with a group of 740 normal developing peers. The clinical group showed a slower than expected increase in psychosocial maturity with age. Adolescents with a delayed maturity can experience a mismatch with the expectations of their parents and teachers and have difficulties in relating to their peers. This may lead to behavioral and emotional problems. Therefore correlations between maturation level and externalizing and internalizing symptoms were assessed. The results will be discussed in more detail during the presentation.

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**Symposium (ROOM SM10): "Social representations of history, social identities, and intergroup relations" (Laurent Licata<sup>1</sup> and Darío Páez<sup>2</sup>, <sup>1</sup>Université libre de Bruxelles, Belgium - <sup>2</sup>University of the Basque country, Spain)**

Culture and social representations of history: Beliefs about history, evaluation of historical events, cultural values, and willingness to fight in a collective level analysis of 38 nations

**Darío Páez<sup>1</sup>, James H. Liu<sup>2</sup>, Magdalena Bobowik<sup>1</sup>, Nekane Basabe<sup>1</sup> and Katja Hanke<sup>3</sup>**

**<sup>1</sup>University of the Basque country, Spain - <sup>2</sup>University of Wellington, New Zealand - <sup>3</sup>Jacobs University Bremen, Germany**

Beliefs about history were investigated through a collective level analysis of 38 nations' student samples. National means show differential agreement with a "Premodern" cyclical view of history, with a "Modern" view of history as progress, with a "Romantic" view of history as the effect of great men, and a "Post-Modern" view of history as technological development. All views, except the Modern view, were related to post-materialistic values. Viewing History as progress, submitting to natural and divine laws, representing WWII as a necessary war, and a less negative evaluation of historical calamities were associated to countries with low social development; to materialistic, collectivistic, hierarchical values; and to willingness to fight for one's country in future conflicts. Materialistic and developing nations share a Modern view of history as progress and show a greater acceptance of negative events, mixed with religious values and normative nationalism. Developed and post-materialistic cultures frame social history more critically, rejecting representations of History as directed by laws or as the product of wars. Pan cultural individual level analysis (N=6400) showed a similar pattern.

Achieving group morality through collective memory: the influence of intergroup moral judgments on group-based emotions, attitudes, and behavioural intentions

**Aurélie Mercy<sup>1</sup>, Laurent Licata<sup>1</sup>, Olivier Klein<sup>1</sup>, Bernard Rimé<sup>2</sup>, Batja Mesquita<sup>3</sup> and Ellen Delvaux<sup>3</sup>**

**<sup>1</sup>Université libre de Bruxelles - <sup>2</sup>Université catholique de Louvain, Belgium - <sup>3</sup>Katholieke Universiteit Leuven, Belgium**

Morality was shown to be an important component of one's group evaluation (Leach, Ellemers, & Barreto, 2007 ; Ellemers, Pagliaro, Barreto, & Leach, 2008). The present research investigates the moral side of collective memory in the context of intergroup conflicts. More specifically, we examine moral judgements over ingroup and outgroup past actions. Across three studies, conducted in different societal contexts (the Belgian linguistic conflict, and the Israeli-Palestinian conflict), we describe strategies employed by group members to improve their ingroup moral status at the outgroup's expense. Results show that moral judgements about the past mediate the effects of group identification on group-based emotions, intergroup attitudes, and behavioural intentions. We discuss the role of these moral judgments in the construction of a positive social identity during intergroup conflict, as well as their influence on reconciliation processes.

Transfer effects of group-based emotions: The moderating role of past and present  
out-group similarity

**Kaat van Acker<sup>1</sup> and Anouk Smeekes<sup>2</sup>**

**<sup>1</sup>Katholieke Universiteit Leuven, Belgium - <sup>2</sup>Utrecht University, Netherlands**

The present research examines the effect of group-based emotions for ingroup wrongdoing towards a minority out-group in the past (i.e., Jews during WWII) on attitudes towards a minority out-group in the present (i.e., Muslim immigrants). Thus, we investigate transfer effects of group-based emotions. Previous research has shown that group-based emotions affect group member's attitudes and behaviors, such as support for affirmative action or formulating apologies, towards the victimized out-group (e.g. Doosje et al., 1998). We hypothesized that group-based emotions can also affect attitudes towards a different (victimized) minority out-group in the present if people perceive similarities between the treatment and social construction of the past/present minority out-groups. We conducted two studies in Belgium to test this hypothesis. Study 1 was a survey study in which minority similarity was measured, and, in Study 2, minority similarity was experimentally induced. The results of both studies confirmed that collective guilt and collective shame about the ingroup's harmful past (i.e. collaboration with the Nazi regime) only resulted into more positive attitudes towards Muslim immigrants for ingroup members who perceived (or were experimentally induced with) high minority similarity. Theoretical and practical implications about the transfer of group-based emotions effects for current intergroup relations are discussed.

Remembering together: Assessing psychosocial effects of participation in the "Gacaca"  
Truth and Reconciliation process after the 1994 Rwandan genocide

**Bernard Rimé<sup>1</sup>, Patrick Kanyangara<sup>1,2</sup>, Darío Páez<sup>3</sup> and Vincent Yzerbyt<sup>1</sup>**

**<sup>1</sup>Université catholique de Louvain, Belgium - <sup>2</sup>National University of Rwanda, Butare, Rwanda - <sup>3</sup>University of Basque Country, Spain**

In three quasi-experimental field studies, we investigated psychosocial effects of participation in the Gacaca process initiated across every community of the country in the post-genocide Rwanda. We tested hypotheses derived from a theory-based analysis of effects of remembering collective emotional events together. In a model relying upon Durkheim's classic views, we conceived emotional mass meetings as cultural tools for transforming emotions, reasserting common norms, and enhancing social cohesion. In each of the three studies, victims of the 1994 genocide and prisoners accused of genocidal acts answered questionnaires assessing emotions, attitudes and behaviors before and after their participation to Truth and Reconciliation Gacaca trials. This presentation intends to put together and to evaluate the findings of these three studies under the light of study 3. This study, which is not yet published, was specifically focused upon the assessment of reconciliation attitudes and behaviors after Gacaca and yielded mitigated findings in this regard.

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## **Thematic session (ROOM SDC): Emotion**

How to generate, intensify or prolong positive emotions? Presentation of an Integrative Positive Emotion Regulation Program

***Fanny Weytens, Moïra Mikolajczak and Olivier Luminet***  
***Université catholique de Louvain, Belgium***

Benefits of positive emotions (e.g. joy, pride, awe, gratitude) have been well established in the past ten years (e.g. Frederickson, 2001; Keyes, 2007 ; Lyubomirsky, King, & Diener, 2005; Ryff & Singer, 2008). Among the validated techniques designed to improve people's happiness, one finds methods as diverse as cognitive reframing (Seligman, Rashid, & Parks, 2006; Seligman, Steen, Park, & Peterson, 2005), savoring (Bryant, 1989), gratitude (Emmons & McCullough, 2003; Sheldon & Lyubomirsky, 2006), expression of positive emotions (Adelmann & Zajonc, 1989), remembering of positive events (Lyubomirsky, Sousa, & Dickerhoof, 2006; Quoidbach, Hansenne, & Mottet, 2008) to cite but a few examples. These techniques (and others) have been recently organized by Quoidbach (2012) in a theoretical model based on Gross' Process Model of Emotion Regulation (1998, 2007). While there is a miscellaneous of techniques to increase one's happiness, there is currently no psychological intervention that integrates and organises them. We therefore designed an Integrative Positive Emotion Regulation-Program (IPER-Program) including a set of effective techniques to teach people how to generate, intensify or prolong positive emotions, based on Quoidbach (2012). The aim of our study was to analyse the benefits of the program on subjective well-being, physical health and social relationships. To achieve this goal, 80 students were randomly assigned to either the 12-hours IPER-Program or a waiting-list control group. As the study is still in progress, results will be presented and discussed at the conference.

Primacy of emotional expression processing in face identification: Evidence from a double task

***Luis Aguado, Elisa Pérez Moreno, Ana García Gutiérrez and Verónica Romero-Ferreiro***

***Universidad Complutense de Madrid, Spain***

Accuracy and eye-tracking measures were taken in three experiments aimed at studying the relation between the identification of gender and the expression of faces. In Experiment 1, target faces of different durations were backward masked by a different face. Performance on a double facial task where the participants were unpredictably asked to identify gender or expression was compared with two control conditions. In the double facial condition, higher accuracy of expression than of gender categorization was observed for all target durations. More importantly, expression was identified with similar accuracy than in the corresponding control task. On the other hand, gender identification was significantly impaired compared to its corresponding control condition. In Experiment 2, eye-tracking measures showed a more distributed scanning pattern for expression than for gender identification. In Experiment 3, a significant interaction was obtained for Face Category (gender or expression) x Secondary Task (facial or non-facial) on fixation number and duration, indicative of a scanning pattern driven by facial expression. These results suggest a primacy for expression processing in face identification tasks. While processing of

expression can proceed in parallel with gender processing without cost in accuracy, processing of gender is interfered by simultaneous attention to expression.

The effect of race and emotion on feedback processing  
***María Tortosa, Juan Lupiáñez and María Ruz***  
***Universidad de Granada, Spain***

Feedback Related Negativity is an electrophysiological correlate of the brain response to feedback and has been seldom investigated in the context of social interactions. Using Event Related Potentials, we studied the neural correlates underlying the processing of race and emotional facial expressions in a trust game setting, in which neither race, emotional expression or identity of the partners had predictive value regarding their reciprocation rate. Our goal was to explore the differences in brain responses to the evaluation of the cooperation feedback participants received from their partners. To this end, we focused on the FRN component. In agreement with the predictions of the reinforcement learning theory, we obtained overall a more pronounced FRN related to unfavourable feedback. Furthermore, we observed previously unreported modulations depending on the race and emotional expression of the partners in the game. Our future studies will be aimed at exploring the potential interactions between the processing of race and emotion cues in social settings.

Dealing with shame, dealing with self-threat  
***Stephanie Welten<sup>1</sup>, Seger Breugelmans<sup>2</sup> and Marcel Zeelenberg<sup>2</sup>***  
***<sup>1</sup>University of Amsterdam - <sup>2</sup>Tilburg University, Netherlands***

Emotions motivate behavior; they signal that our concerns are threatened or satisfied and prioritize behavior to act on these concerns. Shame is an emotion that people experience when their concern for a positive self-view is threatened. Classically, shame has been linked to withdrawal behavior in order to deal with this intense feeling of self-threat. Recent findings also link shame to approach behaviors, obscuring the view of shame as a reliable motivator of behavior. In addition, people can feel shame vicariously for others. How do such experiences of shame relate to the concern of a self-threat and how do they motivate ensuing behavior? These questions are important for our understanding of the workings of this intense self-conscious emotion. Our studies will show that behavior dealing with shame can be understood when considering the central concern of a self-threat. This self-threat is also present in vicarious shame, yet differently. Two experiments reveal that behavior following from (vicarious) shame will be aimed at restoring the specific self-threat experienced. Importantly, behaviors following from shame are grounded in the context; that is, they use the means offered by the situation at hand when dealing with self-threats.

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## **Thematic session (TRIFAC2): Internal representations & Thinking**

Mind-wandering and attentional control: two sides of the same coin or independent processes?

**David Stawarczyk, Steve Majerus and Arnaud D'Argembeau**  
*Université de Liège, Belgium*

Mind-wandering refers to the occurrence of thoughts whose content is both unrelated to the task that we are currently carrying out and decoupled from current sensory perceptions (e.g., having our mind distracted by past memories or future concerns when reading a novel). Recent frameworks suggest that the occurrence of mind-wandering reflects temporary breakdowns in attentional control processes. Other proposals however consider that mind-wandering is a cognitive process of its own, independent of attentional control. Based on the dual mechanisms of control framework (Braver et al., 2007), we examined whether proactive and reactive attentional control processes (measured with the A-X Continuous Performance Test), as well as working memory capacity (WMC), are related to the occurrence of mind-wandering during the Sustained Attention to Response Task (SART). Results showed that WMC was positively related to proactive but not reactive control, while the frequency of mind-wandering was unrelated to these three measures of attentional control. Additionally, we found that proactive control, reactive control, WMC, and mind-wandering contributed significantly and independently to the prediction of commission errors during the SART. These results suggest that mind-wandering is not the mere reflection of attentional control abilities and that these two factors have separate influences on task performance.

The effects of action force observation on action responses and neural activity

**Martin G Edwards<sup>1</sup>, Islam M.M. Salama<sup>2</sup>**

*<sup>1</sup>Université catholique de Louvain - <sup>2</sup>Al Azhar University, Egypt*

We report three studies that investigated the effects of action force observation on action responses and neural activity. In the first study, we examined the effects of observing force on a trained executed force response. This showed that the executed force was moderated by the observation condition, with the observation of a 100% force causing an increased force response compared to the observation of a 50% or 0% force. In the second study, we used fMRI to examine the brain activity during the observation of action force. This revealed significant activity in the Superior Frontal Gyrus (SMA), part of the mirror neuron system. The finding, consistent with other findings in the literature, suggests that the observation of action force activates the same areas of the brain as those used for execution. In the final study, we examined the relationship between the action prime effects and subsequent resting brain activity. This showed significant activity in the mirror neuron system areas following action force observation compared to pre-action-observation and control observation conditions. To end the presentation, we will discuss the mechanism of action priming and present some suggestions of how these findings could be used clinically for rehabilitation.

An experimental approach to enthymeme as rhetorical syllogism

**Daniel Rivera and Josep Demestre**

**Universitat Rovira i Virgili, Spain**

According to rhetorics and argumentation theory, an enthymeme is a syllogism conceived to produce belief changes in communicative contexts. Characteristically, it takes as premises beliefs accepted by an audience (data/facts and warrants/rules) yielding a novel probable conclusion. This study aimed to examine how the plausibility of the premises affects the conclusion's subjective probability about future events. Experiment 1 used a test-retest repeated measures design. First, we measured the subjective probability of a set of propositions presented in isolation. Then, we measured it again but presented these propositions as argument conclusions. With such arguments we aimed to examine the influence of the premises' strength (causal conditionals with high versus low associated effect given a potential cause) on the conclusion's subjective probability. We predicted that whereas for strong warrants belief in the conclusion should increase, for weak warrants it should remain unchanged or even decrease. Experiment 2 aimed to establish a formal relation between the degree of belief of each premise and the degree of belief of the conclusion. We constructed four premise conditions (major/warrant and minor/data, high and low probability) for every single conclusion. We predicted that the subjective probability of the conclusion should resemble the product of the subjective probabilities of the premises. Results gave support for all the aforementioned predictions.

Blocking is affected by additivity-related assumptions manipulated through causal structure

**Fernando Blanco<sup>1</sup> and Frank Baeyens<sup>2</sup>**

**<sup>1</sup>University, Bilbao, Spain - <sup>2</sup>Katholieke Universiteit Leuven, Belgium**

Additivity-related assumptions have been proven able to modulate blocking in Humans. Typically, these assumptions are manipulated by means of pretraining phases (including exposure to different outcome magnitudes), or of explicit instructions. In the current experiment, we used a different approach that included neither pretraining nor instructional sets. Rather, we manipulated the causal structure in which the cues were embedded, appealing directly to the participant's prior knowledge about causal relations and how causes would add up to yield stronger outcomes. Specifically, in our "separate causal systems" condition, additivity should be assumed, while in our "same causal system" condition, a ceiling effect prevented the assumption. Consistent with our predictions, when two cues from separate causal systems were combined, the participants did expect a stronger outcome, and hence blocking was found, whereas when the cues belonged to the same causal system, the participants did not expect a stronger outcome and thus blocking was not observed. These results support the claim that prior knowledge about the nature of causal relations can come into play in human causal learning tasks. In addition, the fact that we did not induce the assumptions via pretraining renders the results harder to be accounted for by associative theories of learning.

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## **Thematic session (TRIFAC3): Language II**

On the development of sensitivity to orthographic regularities in a transparent system  
(Spanish)

**María Soledad Carrillo<sup>1</sup>, Noelia Sánchez<sup>1</sup>, Juana María Álvarez<sup>1</sup> and Jesús Alegría<sup>2</sup>**

**<sup>1</sup>Universidad de Murcia - <sup>2</sup>Université libre de Bruxelles, Belgium**

The aim of this study was to collect data concerning the sensitivity to orthographic regularities in Spanish-speaking children from 2nd to 6th grade. They were asked to spell words beginning with /b/ which can be spelled either “b” or “v”; that is, it is not possible to derive the correct spelling from phonology. Low frequency words were used to reduce the use of lexical information in spelling. In Spanish, the frequency of graphemes “b” and “v” depends on the following vowel, i.e. the bigram “vi” is more frequent than “bi” while “vu” is less frequent than “bu”. Evidence concerning the use of sub-lexical regularities in English and French - opaque orthographic systems - is already available. The question was whether this also occurs in a transparent system like Spanish, in which a phonologically-based strategy is more efficient. The main finding was that participants’ spelling strongly depended on the relative frequency of bigrams. This is already evident in 2nd graders and increases with schooling. The results exclude a functional view of spelling, which supposes that orthographic resources in consistent orthographic systems are not used to spell, since phonologically-based mechanisms are sufficient to override any others.

The role of lexical and sublexical strategies in relation to the transparency of the  
spelling system: A cross-linguistic study on Spanish and Dutch

**Sergio Baauw<sup>1</sup>, Javier Rodríguez-Ferreiro<sup>2</sup>, María González-Nosti<sup>3</sup> and Fernando Cuetos<sup>3</sup>**

**<sup>1</sup>Utrecht University, Netherlands - <sup>2</sup>University of Barcelona, Spain - <sup>3</sup>University of Oviedo, Spain**

The aim of this study was to compare the lexical and sublexical reading strategies in two different spelling systems: Spanish, which is completely transparent with respect to reading, and Dutch, which is more opaque than Spanish. It is expected that the effects of lexical-semantic variables play a slightly different role in these languages. This prediction was tested with a word naming experiment in which 34 Spanish and 27 Dutch speakers had to read aloud 200 words and 50 pseudo-words in one session of about 20 minutes. RTs were registered. The main results were that frequency speeded up RTs and interaction effects were found between lexicality (word vs. pseudo-word), language and word length, since RTs were slower in pseudo-word than in word reading, but this effect was stronger for Dutch than for Spanish. Conversely, there was a stronger length effect in the RTs corresponding to pseudo-word reading. The effect of frequency on RTs evidences the use of lexical strategies by Dutch and Spanish readers. When no lexical information is available to support the reading process, as with pseudo-words, sublexical strategies become mandatory, leading to slower RTs in languages with less transparent spelling systems such as Dutch.

Central visual word recognition requires interhemispheric communication

***Lise Van der Haegen and Marc Brysbaert***

***Universiteit Gent, Belgium***

The split fovea theory states that foveally presented words (i.e. within the central 3 visual degrees) are initially split and sent to the contralateral cortex. As such, letters presented in the left(LVF)/right(RVF) visual field are projected to the right(RH)/left(LH) hemisphere. We tested the consequences of a foveal split for word reading in left- and right-handers with typical/atypical left/right speech dominance. Their lateralization was measured by a silent word generation task in fMRI. All participants then named three/four/six-letter words, while fixating at all possible letter positions. In addition, they read texts in silence. An eye-tracker monitored their eyes binocularly. Results showed that left dominants named the words fastest while fixating at the word beginning (i.e. when most letters fall in RVF/LH), while the optimal viewing position of the right dominants was situated more towards the word end (i.e. with most letters in LVF/RH). Reading behavior also interacted with speech lateralization in the reading test: The eyes of the left-dominant group landed more/less at the word beginning/end relative to the initial fixation positions of the right-dominant group. These findings clearly demonstrate that interhemispheric communication is needed in central visual word recognition. Moreover, reading behavior is optimized in function of speech lateralization.

Basic Colour Terms (BCTs) in three different versions of Spanish: Similarities and differences as measured by elicited lists

***Julio Lillo, Lilia Prado, Nicolasa Morales, Delia Majarín, Ignacio Rebollo and Leticia Álvaro***

***Universidad Complutense de Madrid***

Three Spanish-speaking samples (97 Mexicans, 62 Uruguayan and 49 Spanish) participated in a research about basic color terms (BCTs) use. A list of monolexemic words was recorded for each participant. Frequency (number of lists including a BCT) and list relative position was computed for each term. We considered BCTs all the words appearing in at least 50% of the lists. The main between-samples similarities were: (1) there were no differences between men and women in the number of lists terms. (2) Primary categories (red, green, blue, yellow, white and black) frequency were over derivate ones (orange, purple, brown, pink and gray) (3) Primary colour categories appeared before than achromatic and derivate ones. The main between-samples differences were: (1) there was an additional BCT for the Uruguayans (sky). For this sample, sky behaved like another chromatic primary category. (2) Some basic colour categories were named with different terms (brown was named coffee by the Mexicans, purple was named morado by Spaniards and Mexicans, but violeta by the Uruguayans). (3) White behaved as a derived BCT for the Mexican sample. The relevance of these results is discussed.

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## **Thematic session (TRIFAC 4) : Cognitive control/Inhibition II**

Relationship between language proficiency, control of interference and magnitude of the Stroop effect: new evidence from Polish-English speakers in a trilingual Stroop task

**Marek Muszyński, Zofia Wodniecka, Edward Nęcka and Anna Marzecová**  
*Jagiellonian University, Poland*

Initial claims about the magnitude of the Stroop effect (SE) assumed that the higher the language proficiency, the bigger the interference. Later studies demonstrated a more complex pattern: the lowest and the highest proficiency levels were associated with smaller SE whereas for intermediate proficiency the greatest SE was observed. The reversed “U” function suggests that performance on a Stroop task is controlled differently for different levels of language proficiency. We report two experiments with L1 Polish speakers with L2 English who performed a trilingual Stroop task (L1, L2 and a novel language L3). We also manipulated relative frequency of each types of items in a block (proportion congruent), since it has been shown that SE is reduced when incongruent trials are more frequent. Our results show that SE was greatest for L2 and smaller for L1 and L3; the L2 was also most affected by the proportion manipulation and L3 was not affected at all. The results from both experiments seem to support the theory of the reversed “U” dependency and suggest that cognitive control is implemented differently for languages of different proficiencies. The data point to different mechanism responsible for SE in languages of different proficiencies.

Spacing retrieval practice makes memory inhibition last longer

**Almudena Ortega<sup>1</sup>, Carlos J. Gómez-Ariza<sup>2</sup> and Teresa Bajo<sup>1</sup>**

*<sup>1</sup>Universidad de Granada - <sup>2</sup>Universidad de Jaén, Spain*

The role of inhibition to overcome memory interference at retrieval has widely been studied with the retrieval practice paradigm (Anderson, Bjork & Bjork, 1994). However, a relevant question that remains to be answered is how long-lasting the aftereffect of suppressing competing memories is. In the first two experiments, we explored the effects of time intervals between the retrieval practice phase and the final test (Experiment 1) and between the study phase and the retrieval practice phase (Experiment 2) using a recognition test in the final phase to minimize the effects of associative blocking and output interference. Results are in agreement with a transient nature of RIF (MacLeod & Macrae, 2001). In Experiment 3, we explored the role of a spaced schedule of practice in long-term inhibition. Result support the hypothesis that spaced retrieval practice leads to longer-lived forgetting effects.

Memory inhibition and independent probes: Direct evidence against the Covert Cuing Hypothesis

**Peter D. Weller<sup>1</sup>, Carlos J. Gómez-Ariza<sup>2</sup>, Michael C. Anderson<sup>3</sup> and Teresa M. Bajo<sup>1</sup>**

*<sup>1</sup>Universidad de Granada, Spain - <sup>2</sup>Universidad de Jaén - <sup>3</sup>MRC Cognition and Brain Sciences Unit, UK*

Retrieving long-term memories can impair recall of other related memories, a phenomenon demonstrated through the retrieval practice paradigm. This retrieval-induced forgetting (RIF) effect also occurs when items are tested with independent probes (IP), leading to the proposal that forgetting in the retrieval practice paradigm

is due to inhibitory control mechanisms that are recruited to overcome interference during mnemonic retrieval. Recently, Camp, Pecher, Schmidt, & Zeelenberg, (2009) have suggested that when target items are tested with IP's, participants augment the amount of information available to them by covertly retrieving the category labels under which the items were originally encoded and, consequently, occasioning the retrieval of other associate items which block access to targets. Such a covert cuing strategy vitiates the value of IP's as a pure measure of inhibition. Across three experiments we simulated covert cuing by presenting category labels along with the IP in the final test phase. Results revealed that when used, rather than causing associative interference, covert cuing results in an increase in the level of recall, and a reversal of the RIF effect. Our study indicates that covert cuing can take place, but that it cannot be the cause of forgetting in the retrieval practice paradigm.

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## **POSTER PRESENTATIONS**



**May 10 (15h45-17h00): POSTER SESSION I  
(ROOM Mahaim + Entrance Hall)**

**LANGUAGE**

(1) Subtlex-pl: Polish word frequency estimates based on film subtitles  
**Paweł Mander<sup>1</sup>, Zofia Wodniecka-Chlipalska<sup>1</sup> and Emmanuel Keuleers<sup>2</sup>**  
**<sup>1</sup>Jagiellonian University Krakow, Poland – <sup>2</sup>Universiteit Gent, Belgium**

Two of the most important variables for psycholinguistic research are word frequency and contextual diversity. In line with recent research, which suggests that frequency measures based on film and television subtitles may be particularly adequate for psycholinguistic research, we collected a 44mln word corpus of Polish subtitles. Word frequency and contextual diversity were calculated for specific word forms as well as for lemma's. The distinction between wordform and lemma frequencies may be especially important for Polish, which is a highly inflectional language. We will compare the newly collected subtitle word frequencies to existing frequencies for Polish (based on written corpora), and present a preliminary validation of the frequency measures using a lexical decision task, which, in line with research for other languages, suggests that measures based on subtitle frequencies compare favorably to frequency estimates derived from traditional written corpora on predicting behavioral measures of word processing.

(2) Early development of lexical reading in Spanish children  
**Rrezarta Avdyli, Luis Castejón and Fernando Cuetos**  
**University of Oviedo, Spain**

Reading strategies depend on the consistency of the orthographic system. Recently it has been shown that lexical strategies are used at early stages of reading acquisition even in transparent languages. The aim of this study was to know how different psycholinguistic variables affect reaction times (RTs) and articulation times (ATs) of word reading in Spanish children. A group of 68 normal reading children of second, fourth and sixth grade of primary school were asked to read aloud 100 words presented on a computer screen. The stimuli were morphologically simple nouns but differed in length, frequency, imageability, orthographic neighbours and AoA. Reading and articulation time were measured. Differences between second and fourth grade but not between fourth and sixth grade, were observed based on ANOVA analyses including RTs and ATs. Analyses of mixed-effects revealed that word length, a sublexical variable, just as frequency and AoA as lexical variables affected the three grades. The presence of lexical variables in second grade reducing RTs and ATs suggest that lexical reading is present from very early stages in Spanish children. The absence of the interaction between fourth and sixth grade pointed out a ceiling effect in reading from fourth grade.

- (3) The predictors of reading skills: phonological abilities and verbal short-term memory for serial order

***Trecy Martinez Perez, Steve Majerus and Martine Poncelet***  
***Université de Liège, Belgium***

The relationships between verbal short-term memory (STM), phonological awareness and rapid naming, which all have been linked to reading skills, remain unclear. Some authors argued that a common phonological factor underlies these three abilities (e.g., Snowling, 2000) while others suggested that verbal STM capacities predict reading abilities independently of a phonological processing factor (e.g., McDougall, Hulme, Ellis, & Monk, 1994). The present study used the distinction between item and serial order STM capacities to better understand the associations between verbal STM, phonological processes and reading acquisition. According to recent STM models (Burgess & Hitch, 1999; Majerus & D'Argembeau, 2011), item STM requires access to underlying phonological and semantic representations while STM for serial order reflects a language-independent system. We administered tasks maximizing either serial order or item STM and measures of phonological abilities to 127 fourth-grade children. Item STM, but not order STM, was significantly correlated to phonological awareness and rapid naming measures. On the other hand, order STM predicted reading skills independently of item STM and phonological measures. Mechanisms linking STM for order information and reading skills are discussed.

- (4) The internal structure of written words: An influence of C/V alternation in masked priming

***Virginie Drabs, Alain Content and Fabienne Chetail***  
***Université libre de Bruxelles, Belgium***

Numerous recent studies suggest that letter status, consonant (C) or vowel (V), is extracted at an early stage during word identification, but the potential role of this categorisation remains unclear. The aim of the present study was to test the hypothesis that C/V alternation helps readers to organize letter strings into perceptual units. The pseudohomophone priming effect was examined in a lexical decision task with adults. Two kinds of pseudohomophone primes were constructed by relying on different status of the letter E in French. In schwa target words, the E was silent, so that removing it produced a pseudohomophone prime with an orthographic CV template different from that of the base word (e.g., javlot-CVCCVC vs. javelot-CVCVCVC). In control target words, the E was part of a multiletter grapheme and removing it did not change the number of C and V groups (e.g., plateau-CCVCVVV vs. plateau-CCVCVV). Compared to an identity priming condition, schwa-based pseudohomophone primes were significantly less effective than control-based pseudohomophone primes. Such results suggest that the perceptual structure of letter strings, as determined by C/V alternation, contribute to form priming effects. C/V alternation within written words may therefore be a major cue for orthographic parsing in the early stages of word identification.

(5) Towards a developmental model of lexical access

**Julie Trappeniers and Laurent Lefebvre**

**Université de Mons, Belgium**

The study of processes and variables involved in lexical access is usually conducted from oral naming tasks, developed from adults' theoretical models. We postulate that these models are not adapted for evaluating the performance of children whose language skills are constantly changing. The goal of our research is to create a developmental model of the naming process. The model will consider both the visual and psycholinguistic variables as well as the specificities of the language development of the child. We created a set of 111 updated color photographs. Several psycholinguistic objective variables were simultaneously considered when we selected the pictures (e.g. frequency, AoA, phonological complexity ...). Based on this battery, we created specific tasks in order to assess each treatment involved in the naming process: visual recognition, semantic memory, semantic features, mental lexicon and phonological processes (Henrard and Lefebvre, 2010). Our sample is composed of 200 children aged between 3 and 11. Experiments are now in progress. The battery and the first results will be presented during the symposium. We expect that our study will lead to the elaboration of a developmental model of lexical access in children, and valid and updated diagnostic subtests.

(6) Age of acquisition, concreteness and semantic interconnectivity: Evidence from retrieval-induced forgetting

**Analía Barbón, Carlos Gómez-Ariza and Teresa Bajo**

**Universidad de Granada, Spain**

Variables such as age of acquisition (AoA) or concreteness have shown to have a determining influence on tasks such as naming or lexical decision words. Moreover, some authors have put forward the suggestion that AoA influences how information is organized in semantic memory. From this view, words learned at an early age occupy a central position within semantic networks and have a higher number of, as well as stronger, connections. On the contrary, words learned later occupy more peripheral locations and are linked to fewer units and with weaker associations. Regarding concreteness, concrete words tend to be processed more efficiently because it is easier to put them into a semantic context. In our study, we test the hypothesis that early AoA words and concrete words are less vulnerable than late AoA words and abstract words to retrieval-induced forgetting (RIF), an effect usually explained in terms of memory inhibition. Whereas we observed reliable RIF for late AoA and abstract items, no effect was found for early AoA and concrete words what suggests the role of information organization in retrieving inhibited memories.

(7) Using Latent Semantic Analysis to grade brief summaries: a study exploring texts at different academic levels

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In this study we propose an integrated method to automatically evaluate very brief summaries (maximum 50 words) using the computational tool Latent Semantic Analysis (LSA). The method proposed is based on a regression equation calculated

with a corpus of a hundred summaries (the training sample), and is validated on a different sample of summaries (validation sample). The equation incorporates two parameters extracted from LSA: (1) the semantic similarity of the summary, measured using the Summary-expert summaries method (Landauer et al., 1998; León et al., 2006; Olmos et al., 2009) and (2) the vector length (Redher et al., 1998). The study is based on a sample of 786 summaries by students at four academic levels. All of these students summarized either an expository or a narrative text; their summaries were then evaluated by four graders on a scale of 0-10. The results support three ideas. First, that incorporating both parameters into the method is more successful than the traditional cosine measure. The reliability of LSA for evaluating summaries rises above the 0.80 level for the expository text. Second, that LSA shows practically the same level of sensitivity as the human graders to the quality of the summaries at different academic levels. Third, that the method overcomes a serious limitation of LSA: its difficulties evaluating very brief texts (Redher et al., 1998; Wiemer-Hastings et al., 1999).

(8) Qualitative and quantitative inter-individual differences in semantic categorization

**Steven Verheyen**

***University of Leuven, Belgium***

When asked to indicate which items from a set of candidates belong to a particular natural language category inter-individual differences appear: Individuals disagree on the items that should be considered category members. We argue that these inter-individual differences in semantic categorization come in two kinds. Qualitative differences reflect a different organization of the candidate items with respect to the target category. Quantitative differences reflect a different propensity to endorse items as category members. In a first study this claim is supported by an analysis of categorization data with a mixture model. For several of the studied natural language categories the group of categorizers falls apart in distinct subgroups, who regard different items likely category members (i.e., qualitative differences). Within each of these subgroups categorizers differ in their propensity to provide membership responses (i.e., quantitative differences). In a second study the qualitative inter-individual differences are substantiated. The different subgroups are shown to emphasize different sets of category features when making their categorization decisions.

(9) Pleasant nouns attract ambiguous relative clauses: evidence from a sentence completion study

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Fraga et al. (in press, QJEP) have recently shown the relevance of an emotional dimension, namely arousal, in the completion of sentences with the structure 'NP-of-NP + RC...'. High arousal nouns tend to exert a significant attraction effect over the RC independently of their position within the sentence (NP1 vs. NP2). In this research, we try to clarify to what extent affective valence, another emotional dimension, influences disambiguation processes. A sentence completion study with 45 participants was carried out in Spanish. The arousal of the nouns contained in the NPs was kept

neutral, whereas valence was manipulated by using either pleasant or neutral nouns. Thus, three conditions were employed: a control condition with two non-emotional words (i.e., neutral in both valence and arousal) in NP1 and NP2 (N-N), an experimental condition with a pleasant noun in NP1 and a neutral one in NP2 (P-N), and another experimental condition containing a neutral noun in NP1 and a pleasant noun in NP2 (N-P). Results showed the classical preference for NP1 in the control condition. Moreover, this preference was even higher in the P-N condition. Importantly, when the NP2 contained a positive word, participants changed their preference towards a late closure strategy.

- (10) Narrative causality comprehension: A comparative study between secondary's school students and university students through a summary task

**José Antonio León, Tatiana García, Inmaculada Escudero, Ricardo Olmos and Guillermo de Jorge Botana**  
**Universidad Autonoma de Madrid, Spain**

Reading comprehension involves the development of a mental representation of a text which is constructed by the reader through the establishment of causal networks based on the ideas and events in the text and the causal relationships between them. Several authors support the view that causal relations play a key role in the process of understanding, and contribute substantially to the building of the mental model of the text. In the present study, we analyzed the reading comprehension of university students and 4th-year high school students (15 years old) from the point of view of causality, by analyzing the causal network in a narrative text and comparing this to the causal networks generated by the students in their written summaries of the original text. The main hypotheses behind this study were that causal density, or more specifically, nodes in a text that have a greater number of causal relationships, will have a greater affect on reading comprehension, and that the identification of the causal relationships in a text is one of the factors that distinguishes more competent from less competent readers. The results support these hypotheses and furthermore enabled us to detect a predictive value between the recognition of causal nodes and types of reader.

- (11) Children and pragmatic implicatures: A test of the Pragmatic Tolerance Hypothesis with different tasks

**Katrijn Pipijn and Walter Schaeken**  
**Katholieke Universiteit Leuven, Belgium**

The pragmatic tolerance hypothesis (Katsos & Smith, 2010) was originated to explain the difference between children and adults concerning scalar implicatures, namely that adults are more pragmatic than children. They introduced the use of a Likert-scale to test this hypothesis. We conducted a study with a within subjects design in which we compare children's binary and scalar responses to the same scalar implicatures. We also used two separate tasks to look at the effects of task difficulty on performance. The results show that the more difficult task, Euler circles, lead to less pragmatic responses compared to the easier task, drawings. Confirming the study by Katsos and Smith (2010; see also Katsos & Bishop, 2011) children choose the middle options on the scale more when they are confronted with underinformative sentences and they choose more extreme options for the control sentences. The comparison

between the scalar and the binary responses, however, reveal that children show low overall levels of consistency. The link between the two measuring methods appears to be not as straight forward as we would predict.

- (12) Differentiating the underlying linguistic nature of SLI and Dyslexia: an investigation of object clitic pronoun production

**Sandrine Mejias, Jeff Hanna Freie and Marie-Anne Schelstraete**  
**Université catholique de Louvain, Belgium**

A current debate concerns whether specific language impairment (SLI) and dyslexia are the same or distinct disorders. We hypothesized that different linguistic component deficits would characterize performance and distinguish these disorders. To test this we investigated direct object clitic pronouns in 4 French-speaking groups of children: children with SLI (N = 16), dyslexic children (N = 21) and 2 groups of typically developing children (TDC), paired on language (N= 14) or on age (N = 21). We employed an elicitation task, using pictures to create an appropriate context. Our findings reveal that (1) children with SLI are significantly worse in producing clitics than all TDC; (2) are significantly worse than dyslexic children; (3) only a few dyslexic children were impaired in producing clitics. We interpret our findings as supporting the Computational Grammatical Complexity hypothesis (van der Lely, 2005) where complexity at different linguistic levels (phonological, morphology and syntactic) has a cumulative impact on performance. Thus, due to the linguistic characteristics of clitics, this makes them a good clinical marker of language impairment: they distinguish children with SLI and with dyslexia and help identify dyslexic children that are also affected by SLI but who are currently neither diagnosed nor treated.

- (13) Picture naming and word reading in Spanish-speaking developmental dyslexics

**Paz Suárez-Coalla, María González-Nosti and Fernando Cuetos Vega**  
**Universidad de Oviedo, Spain**

Developmental dyslexics show poor accuracy and fluency when reading and a specific difficulty in retrieving verbal labels in picture naming tasks. This problem of fluency, present in picture naming and reading, could indicate the same underlying problem, since in both cases one must access the phonological form of the words. However, in transparent orthographic systems, the regularity could facilitate reading speed in children with some ability to read. Our aim was to investigate the reading and picture naming performance of Spanish-speaking dyslexic children in comparison to children without reading difficulties. Developmental dyslexics and children without dyslexia, matched for chronological age and gender, participated in the study. Eighty written words (nouns) and their corresponding drawings were selected, taking into account the following variables: length, frequency, age of acquisition, imageability and orthographic neighborhood. They performed a word reading task and other tasks of picture naming. The stimuli were presented on a laptop and reaction times were collected by the SuperLab program. The data showed significant differences between the groups involved. Dyslexic children performed better in the naming task than in reading, while the opposite occurred in the control group.



(14) Auditory processing in preschool children

**Rosario Ortiz<sup>1</sup>, Adelina Estévez<sup>1</sup> and Mercedes Muñetón<sup>2</sup>**

**<sup>1</sup>University of La Laguna, Spain - <sup>2</sup>University of Antiquia, Spain**

Current data suggest the importance of early auditory abilities for speech production and reading development. The aim of this study was to examine the auditory processing in children of preschool age, in particular their ability to judge the order and discriminate auditory stimuli. A group of preschool children was evaluated on the temporal order judgment tasks and discrimination tasks with linguistic and nonlinguistic stimuli. The syllable discrimination task was based on contrasts of consonants in the context of the syllables "ba", "pa" and non-linguistic discrimination task used animal sounds (sounds of duck and mouse). The results in the tasks were studied in relation to the Inter-Stimulus-Interval (ISI), ranging from 100 -250 to 500 ms. The effect of stimulus type (linguistic versus nonlinguistic) and task (temporal order judgment vs. discrimination) were analyzed in terms of number of errors and reaction time. Findings are discussed in terms of temporal auditory processing in speech perception.

(15) How Bilinguals process Ambiguity: Exploratory study of translation ambiguity in balanced bilinguals

**Roger Boada<sup>1</sup>, Rosa Sánchez-Casas<sup>1</sup> and Natasha Tokowicz<sup>2</sup>**

**<sup>1</sup>Universitat Rovira i Virgili - <sup>2</sup>University of Pittsburgh**

Cross-language word ambiguity (i.e. words with multiple translations) has been found to influence the translation process (e.g. Boada et al. 2012; Laxén & Lavour, 2010; Tokowicz & Kroll, 2009). Previous studies have shown that participants are slower and less accurate when translating ambiguous words. Moreover, these words are also harder to translate when they are presented with their subordinate (i.e., the less frequent) rather than their dominant translation. In the present study, a set of Catalan-Spanish translation ambiguous pairs (103 pairs in the direction Spanish-Catalan and 109 pairs in the direction Catalan-Spanish) were first evaluated for several lexical (i.e., frequency, length, graphemic similarity) and semantic variables (i.e., translation dominance, concreteness and semantic relation). Once the data was collected, a translation recognition experiment was performed with highly fluent and balanced bilinguals, in order to determine how these variables influence translation performance. In this experiment, participants were asked to decide whether the two visually presented words were correct translations. The results from the regression analyses revealed that participants' responses were faster and more accurate when the word pairs included the dominant translations, they had higher lexical frequency, and were orthographically and semantically related. The implications of these results are discussed within the framework of the DRM (de Groot, 1992).

(16) Executive functioning, bilingualism and simultaneous interpretation

**Julia Morales, Francisca Padilla, Carlos J. Gómez-Ariza, Teresa Bajo**  
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During the last few decades, growing research has shown that cognitive functioning benefits from bilingualism, especially in non verbal tasks that involve conflict resolution (e.g., Bialystok et al., 2004; Costa et al., 2008, 2009; Martin-Rhee & Bialystok, 2008), but also cognitive flexibility (Prior & MacWhinney, 2009). It has been

suggested that, since the two competing language systems become active in the bilingual's mind, continuous executive control is exerted to select the relevant language in a given context what leads to enhanced general-executive-control in bilinguals. In order to further learn about the precise source of bilinguals' executive-control advantages, we compared professional simultaneous interpreters, highly proficient bilinguals and monolinguals. Comparing interpreters and bilinguals would allow us to evaluate the differential effects of long-term training in selecting and switching between languages. The three groups were tested in a dual version of the n-back task (Jaeggi et al., 2003), which entails high working memory demands, and a switching task. The results showed that whereas both bilinguals and interpreters experienced less switching costs, interpreters were more accurate than bilinguals and monolinguals in the dual task thus suggesting that simultaneous interpretation may serve as a training to manage and monitor high quantities of information.

(17) The Impact of CEFR with an asymmetric language competence: A study of Spanish as a foreign language

**Inmaculada Escudero, José Antonio León, Ricardo Olmos and Guillermo de Jorge Botana**

**Universidad Autonoma de Madrid, Spain**

Some studies have shown that language competence is asymmetric. Examples in native languages can be found in PISA (OECD, 2009, 2011) or ECOMPLEC (León, Escudero & Olmos, 2010) in reading comprehension. In Spanish as a foreign language, we can observe this effect in people who have informal experiences with this second language (that is, people who are not included in a regular language education such as immigrants and their children) and in Spanish for Specific Purposes examples. In this research, we analyze asymmetry in a Spanish for Specific Purpose context (immigrant working population) on three levels: different activities of the language (different performance in oral comprehension and expression vs. reading comprehension and written expression), specific linguistic competences (lexical and grammatical domains) and language tasks (formal vs. informal and/or communicative), and how asymmetry affect to communicative competence. Results indicate that this population uses their specific and general language skills and knowledge in a different way, showing that the development of their language competence is irregular but effective. Some important implications arise in order to adapt a standard-based text to CEFR and the use of language frameworks as a tool for teaching and learning.

(18) Contribution to the study of (dys)fluency: comparison between subjective representations and objective phonetical analysis

**Audrey Leclercq, Kathy Huet, Myriam Piccaluga and Bernard Harmegnies**  
**Université de Mons, Belgium**

This paper focuses on the representations of (dys)fluency in listeners with various expertise in language pathology faced with speech audio recordings of persons who stutter (PWS) and non stuttering persons (NSP). Eight French-speaking persons (4 PWS, 4 NSP) were asked to perform map tasks (explaining to a remote, silent interlocutor how to get from a given city to another) under 4 auditory feedback conditions (Normal Auditory Feedback and Delayed Auditory Feedback with three delays : 80, 120 and 160ms). Fifty-two listeners (divided into 3 groups on the basis of

their expertise in language pathology) were asked to listen twice to the first thirty seconds of each 32 recordings in order to produce both direct and indirect subjective assessment of fluency. At first (indirect assessment), no information about the speaker was given and the listener had to globally assess his/her confidence in the fact that the speaker could pursue some given occupational activities that have been chosen on the basis of oral competence required. Afterwards (direct assessment), the listener was asked to evaluate the overall rate of fluency for each recording, using different scales unambiguously evoking stuttering (holistic stuttering evaluation, subjective assessments and dysfluency events quantification). These assessments are compared to objective evaluations obtained using various acoustical tools.

(19) Subjective self-ratings through a prolonged reading task in dysphonic versus normophonic female teachers

***Angélique Remacle, Dominique Morsomme, Elise Berrué and Camille Finck***  
***Université de Liège, Belgium***

The purpose of this study was to evaluate the impact that a 2-hour reading task could have on one's voice in 16 normophonic and 16 dysphonic female teachers. Teachers' voices were orally loaded by reading a novel. They were instructed to read for imaginary students, as in their classroom. Voice intensity was constantly controlled between 70 and 75 dB. Every 30 minutes, participants were asked to answer the following questions using a 100-mm horizontal visual analogue scale: 1) How is your voice quality? 2) Do you feel any phonation effort? 3) Do you feel any vocal fatigue? and 4) Do you feel any laryngeal discomfort? For all subjective self-ratings, the repeated measures ANOVA demonstrated significant main effects for the duration ( $p < 0.0001$ ) and group ( $p < 0.05$ ). Subjects of both groups reported a worsening of their voice quality during the reading while phonation effort, vocal fatigue and laryngeal discomfort increased. Surprisingly, no significant interaction between duration and group was found. This means that subjective self-ratings realized before and during the reading task depict a similar evolution of both groups, while we expected more degradation of voice through time in the dysphonic group.

(20) The influence of linguistic and acoustic variables on sound naming

***Eva Thiry, Laurent Lefebvre and Kathy Huet***  
***Université de Mons, Belgium***

Previous data suggested an impairment of abilities in picture and sound naming in normal ageing from 60 years-old (Ehrlé et al., 2008), with a more important decrease for probable Alzheimer's disease patients (Fabiani et al., 1996). The objectives of our study are (1) to improve knowledge on the decline in cognitive process during normal and pathological ageing (e.g. Alzheimer disease) and then, (2) to elaborate a naming battery including visual and auditory modalities. We elaborated a battery assessing sound naming of 117 environmental sounds divided into 5 categories: actions without object, animals, musical instruments, actions associated with an object, actions not associated with an object. Firstly, we characterised acoustic variables and studied their influence on sound naming in young adults (18-30,  $n=30$ ). We also selected relevant sounds and collected lexical items associated with each sound. Secondly, we tested two groups of 15 participants (30-44 years-old ; 45-60 years-old) in order to determine the possible age influence on sound naming before 60 years-old. The

results will be presented during the conference. Later, we will test older adults and Alzheimer's disease patients in order to evaluate the age and the pathological state influence on sound naming.

(21) The Iambic/Trochaic Law is shared across species  
**Daniela M. de la Mora<sup>1</sup>, Marina Nespor<sup>2</sup> and Juan M. Toro<sup>1</sup>**  
**<sup>1</sup>Universitat Pompeu Fabra, Spain - <sup>2</sup>SISSA, Italy**

The Iambic/Trochaic Law describes humans' tendency to segment duration-varying sequences as iambs (i.e. the longest sound marks group endings), and pitch or intensity-varying sequences as trochees (i.e. the loudest or highest sound marks group beginnings). Interestingly, such grouping biases might play a role during language acquisition, helping to bootstrap syntactic aspects such as word order. Nevertheless, the extent to which these biases generalize across species is unknown. In Experiment 1, we trained rats to discriminate duration-alternating sequences of tones from sequences randomly varying in duration. In Experiment 2, rats were trained to discriminate pitch-alternating sequences of tones from sequences randomly varying in pitch. After training, we tested whether animals had segmented such sequences as trochees or as iambs. We found that rats segment as trochees sequences based on pitch variations, but they do not group as iambs sequences varying in duration. These results point in the same direction as current research with human adults and infants, suggesting an early emergence of the trochaic bias, possibly relying on universal perceptual abilities. At the same time, they suggest the iambic grouping might depend on language experience. More importantly, they show humans share with other species perceptual mechanisms involved in learning linguistic syntax.

(22) Child and classroom predictors of the quality of teacher-child relationship  
**Joana Cadima<sup>1</sup>, Sarah Doumen<sup>2</sup>, Karine Verschueren<sup>2</sup>, Carla Peixoto<sup>1</sup> and Teresa Leal<sup>1</sup>**

**<sup>1</sup>University of Porto, Portugal - <sup>2</sup>Katholieke Universiteit Leuven, Belgium**

In this study, we aimed at examining child and classroom predictors of the quality of teacher-child relationship (closeness and conflict). Participants were 92 children (M = 82.54 months, SD = 3.28) and their preschool and first grade teachers. At the end of the preschool year, child social competence was assessed by teacher reports. A year after, first grade teachers completed the Student-Teacher Relationship Scale (STRS; Pianta, 2001). Results indicated that problem behaviors in preschool and classroom mean level of socioeconomic status uniquely predicted teacher-child conflict, after accounting for child age and sex. Child preschool sociability was positively associated with teacher-child closeness. Classroom mean level of socioeconomic status was also positively related to teacher-child closeness but classroom level of engagement was negatively related. Our findings demonstrate the importance of both child social competence and classroom social processes in predicting relationships between teachers and children.

## NUMERICAL COGNITION

(23) *A developmental investigation of the SNARC effect using a colour discrimination task*

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How do number-space interactions develop from childhood (Opfer et al., 2010) to adulthood (DeHevia et al., 2008)? The SNARC effect (Spatial Numerical Association of Response Codes) consists in faster reaction times responding to small/large digits with the left/right hand respectively (Dehaene et al. 1993). During magnitude-independent parity judgment tasks it is thought to reflect the automaticity of the number-space link. Using a parity task Berch et al. (1999) found a SNARC effect in children of 9.2 years onwards, but not in younger children (7.8 years). But parity judgments might be too difficult and therefore problematic to test young children (VanGalen & Reitsma, 2008). Hence, we designed a colour judgment task and tested 363 children from kindergarten to Grade 6 (5.8-12 years). Arithmetic competencies were briefly assessed, as well as explicit number magnitude access using a magnitude judgment task. The results revealed overall significant SNARC effects [colour task  $t(355)=2.6$ ,  $p<0.01$ ; magnitude task  $t(340)=4.7$ ,  $p<0.001$ ], which interacted with grade [colour task  $F(6,355)=2.18$ ;  $p<0.05$ ; magnitude task  $F(6,340)=2.09$ ;  $p=0.05$ ]. Most interestingly, in the kindergartners, both effects were already present [colour task  $t(28)=1.96$ ;  $p<0.05$ ; magnitude task  $t(24)=1.7$ ;  $p=0.05$ ]. These results show explicit and implicit access to numerical magnitude in children as young as 5.8 years.

(24) Do mathematical abilities depend on subitizing?

**Alice De Visscher and Marie-Pascale Noël**  
**Université catholique de Louvain, Belgium**

Recently, the capacity to quickly and accurately enumerate small numbers of items (subitizing, Kaufman, et al. 1949) has been found to be less efficient in children with math difficulties (Fischer et al 2008; Moeller et al., 2009; Schleifer & Landerl, 2010). Our first aim was to specify the development of subitizing by testing third-grade children, fifth-grade children and students. Secondly, we wanted to explore the impact of different formats (homogeneous dots, heterogeneous dots, and canonical format) of presentation on that development. Third, we tested the link between subitizing and math capacities in these three age groups. Three main results were obtained. First, an evolution in the range of subitizing is observed between 3rd graders and 5th graders, but not between 5th graders and students. Second, we found that canonical format was better performed than heterogeneous format, which was itself better performed than homogeneous format. Third, a significant correlation between performance in subitizing and in calculation is found in 3-grade children. More precisely, the range of subitizing correlated with the performance in subtraction, but not in multiplication. Our study refines the comprehension of this phenomenon and proposes theoretical explanation of the link between subitizing and math.

(25) Acquisition of ordinal number meaning in preschoolers

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The acquisition of ordinal number meaning has been scarcely investigated. The present study aimed to address this scarcity by comparing ordinal meaning development with the much more understood acquisition of cardinal meaning. Three groups of children aged 3, 4, and 5 years were tested on three tasks in both cardinal and ordinal contexts. The first (“tell me”) task required participants to state either the number of elements in a set or the position of a given element in a sequence. In the second (“give me”) task participants were instructed to provide either a quantity of elements or the particular element in a specified position. A third task tested knowledge of the principles underlying cardinality and ordinality. Results showed that the development of cardinality precedes that of ordinality, and also revealed better performance in the “tell me” than in the “give me” task. As for the principles, they were acquired at a different rhythm, and those shared by the two uses of numbers were mastered earlier in the cardinal context.

(26) How do non-symbolic magnitude representation develop in kindergarteners?

Evidence from the comparison and same-different task

**Bieke Maertens, Emmy Defever and Bert Reynvoet**

**Katholieke Universiteit Leuven, Belgium**

This study examined the development of the approximate number system as measured by the internal Weber fraction ( $w$ ) and its relation with mathematics achievement in 64 4-year-old and 47 5-year-old kindergarteners. Children were presented four different tasks. In the non-symbolic comparison task, children had to compare two arrays of dots and decide as soon as possible which array contains the largest number of dots. In the non-symbolic same-different task, children had to compare two arrays of dots and decide whether the two arrays contain a different or a same amount of dots. All children were presented two counting task, one in which they have to count a set of ten items that was placed on the table and one in which the children were asked to give the experimenter six items from a tin of objects. There was a significant main effect of ratio for both experimental tasks. We do not found any interaction effect of ratio and age group. The analyses of the comparison task on accuracy and  $w$  revealed both a main effect of age group, indicating that 5-year-olds conducted the task with more accuracy and 4-year-olds had a larger  $w$  than the 5-year-olds. We found a significant correlation between the  $w$  and the performance on the “give a number task”.

(27) Automatic and strategic number priming effects in students with and without mathematical learning disabilities

**Emmy Defever<sup>1</sup>, Silke M. Göbel<sup>2</sup> and Bert Reynvoet<sup>1</sup>**

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This study examined numerical magnitude processing in ten university students with mathematical learning disabilities (MLD) and ten gender-, age- and IQ matched controls. Method: The performance of both groups was compared during a symbolic and non-symbolic priming task. The stimulus onset asynchrony (SOA) between prime

and target was varied in order to manipulate the automaticity of the priming distance effect. Results: No difference in the priming distance effect was found between the groups in the short SOA condition. Participants with MLD, however, were slower in the symbolic tasks. In addition, in contrast to the controls, participants with MLD showed a priming distance effect when the SOA was long. Conclusions: Taken together, the present findings suggest that participants with MLD do not have a deficient magnitude representation. Participants with MLD seem to have a delayed access to the representation of symbols, which supports the access deficit hypothesis (Landerl & Kölle, 2009; Rousselle & Noël, 2007). Finally, we suggest that the presence of a priming distance effect in the long SOA condition in participants with MLD is due to the use of additional attention controlled strategies to compensate for their underlying deficit.

(28) Diminishing Bayesian reasoning success with words and overcoming it with numeracy

***Eric D. Johnson and Elisabet Tubau***  
***University of Barcelona, Spain***

Effective reasoning with numerical information is a highly need skill, but is greatly lacked by a significant number of adults. Bayesian-like reasoning over statistical and probabilistic word problems has been shown to be influenced by several external factors, including numerical formats and problem structures. Here we add to the list of general effectors of Bayesian reasoning performance simply the number of words in the problem. Furthermore, we show that effects of both numerical and non-numerical aspects of a problem's formulation are highly dependent on individual numeracy—the ability to work with basic statistical concepts. This is demonstrated through a series of analogous but variously formulated Bayesian problems and a standard measure of numeracy. High numerate reasoners generally outperform individuals lower in numeracy, and also show less dependence on the particular task formulation. With a short, transparent problem presenting natural frequency information, however, performance of low numerate reasoners is indistinguishable from those higher in numeracy. In contrast, with probabilistic data, high numeracy appears to be a necessary (though insufficient) condition for successful reasoning with abstract statistical information.

## **PERCEPTION**

(29) Forward bias in the perception of the motion direction of point-light walkers

***Alex Davila Davila, Ben Schouten and Karl Verfaillie***  
***Katholieke Universiteit Leuven, Belgium***

A few point-lights attached to strategic positions on a moving human body is sufficient to allow the observer to pick up several behaviorally relevant properties of the moving person and the action performed. We studied perception of the direction of walking (forward or backward) of a biological-motion walker moving on a treadmill (i.e., without translatory motion). Under the hypothesis that (1) forward motion is visually more familiar and/or (2) motor knowledge influences visual perception of human movements and the anatomy of the human body probably is not optimally

suited for backward walking, we predicted a bias to perceive forward motion, especially when uncertainty (less diagnostic information) about the direction of motion is high. In a task in which participants had to discriminate between forward and backward motion we observed that (a) performance degrades when only the (relatively uninformative) upper part of the body is visible; (b) frontal orientations of figures going either backwards or forwards are less likely to be correctly classified than figures in another orientation, probably because the frontal view is less diagnostic for determining articulation direction, and (3) when confronted with less informative articulation directions, participants show a bias to classify the stimulus as moving forward.

(30) The own-age bias in age estimation of voices  
**Aline Beaufort, Evelyne Moyse and Serge Brédart**  
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Recently, it has been evidenced that age estimation performance may be influenced by an own-age bias, i.e. we can estimate more accurately the age of one's own-age people than the age of other age people (George & Hole, 1995). To the best of our knowledge, all the studies that investigated the own-age bias used faces as stimuli. However, there are situations in which the voice is the only information available in order to estimate a person's age (Cerrato et al., 2000). In the present study, the occurrence of an own-age bias in age estimation from voices was assessed by using an experimental design in which the age of participants (young vs old people) and the age of face stimuli (young vs old people) are crossed. Although we did not observe a crossed interaction where each age group would have been more accurate for in-group estimation than for out-group estimation, present results revealed the occurrence of an own-age bias in age estimation in younger adults only. Indeed young participants made smaller absolute errors than older participants when estimating the age of young voices. However, there was no significant difference between age groups when the age of older voices was estimated.

(31) Can recognition be improved for inverted faces following extensive training?  
**Aurélié Biervoye, Renaud Laguesse, Dana Kuefner and Bruno Rossion**  
*Université catholique de Louvain, Belgium*

The face processing system is specifically tuned to the upright face orientation: when faces are presented upside-down, recognition performance is generally poor. Can this performance be improved? We want to know if subjects trained in inverted face recognition are able to develop an expertise for inverted faces. We studied two groups of subjects: a group of experts ( $n = 4$ ) who received a 16 hours specific training program and a group of control subjects ( $n=10$ ) who did not receive this training. During the training program, the experts learned to recognize 30 inverted faces by associating them with their corresponding name. A pre-test and a post-test with different faces than at training were submitted to all participants, at the two orientations (upright and inverted). It consisted in a delayed 4-alternative-forced-choice recognition task. The results demonstrated a significant improvement of the performance in inverted face recognition at the post-test for all the experts, but not at all for the control subjects. Importantly, performance for upright faces remained constant, so that the experts' inversion effect clearly decreased at the post-test. We



conclude that even in adulthood the face processing system remains flexible enough to improve recognition performance for unusual visual orientations.

(32) The influence of verbal descriptions and delay on face identification in children and adults

**Valentine Vanootighem, Serge Brédart and Hedwige Dehon**  
**Université de Liège, Belgium**

The verbal overshadowing effect (VO; e.g., Schooler & Engstler-Schooler, 1990), suggests that providing a verbal description of a previously seen face may impair its recognition on a subsequent lineup identification task in adults. Previous research has examined whether descriptions also impaired children's identification abilities but failed to observe any evidence of VO (Memon & Rose, 2002). However, the method might not have been appropriate to observe this effect as a 24h delay between the description and the identification tasks (associated with a release of the VO effect in adults) was used. Hence, in this current experiment, groups of children (7-8, 10-11, 13-14 years old) and adults were presented with a short video. After, they were assigned to a description or a no description condition before the identification task. Participants were also assigned either to a "no delay", a "24-hour post encoding delay" or a "24-hour post description delay" condition to determine the influence of delay on the VO effect in both children and adults. Results indicated that, compared to the control condition, the description decreased correct identification performance in both children and adults and no release of VO was found with delay.

(33) Differential outcomes: facial identity recognition vs emotional recognition

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Conditional discriminations can be enhanced when specific outcomes follow correct responses to each relation to be learned (differential outcomes procedure). Furthermore, this procedure has been demonstrated to be effective in memory tasks, specifically in facial-identity recognition tasks in young adults (Plaza, López-Crespo, Fuentes & Estévez, 2011), in patients with Alzheimer disease (Plaza, López-Crespo, Antúnez, Fuentes & Estévez, submitted), in aged people (López-Crespo, Plaza, Fuentes & Estévez, 2009) and in adults with alcohol related amnesia (Hochhalter, Sweeney, Bakke, Holub, & Overmier, 2000). In the present study we explore whether the use of the differential outcomes procedure would also improve performance on an emotional recognition task in a group of healthy adults. Participants showed significantly better facial-identity recognition when each face to be remembered was paired with its own outcome (the differential outcomes condition). However, there were no significant differences between both conditions (differential vs. non differential) in the recognition of emotions. These novel findings add new information about the differential outcomes effect and suggest that further experiments are needed to understand 1) how it works and 2) the potential of the differential outcomes methodology as aid to memory.

(34) Re-synchronizing thunder and lightning: temporal recalibration is observed far beyond the temporal limits for multisensory integration

***Irune Fernández, Joel García-Morera and Jordi Navarra***  
***Sanitari Sant Joan de Déu, Fundació Sant Joan de Déu, Spain***

The brain is able to realign asynchronous signals in order to bind them. However, multisensory integration is no longer possible when a certain level of asynchrony is surpassed. We investigated whether audiovisual temporal recalibration can also occur when visual and auditory stimuli fall clearly outside the temporal window for integration. In Experiment 1, temporal realignment was observed, in a simultaneity judgment task, after a 3-min exposure to visual-leading asynchrony, even when the visual and auditory stimuli appeared from markedly different spatial locations and were separated in time by 706ms. In Experiment 2, we analyzed whether extracting an associative link between a geometric figure (embedded in a visually-complex pattern with other figures) and a sound burst, constantly appearing 700ms afterwards, generate temporal recalibration between this figure and the sound. The results showed temporal recalibration between the associated figure and the sound only for a visual-leading asynchrony condition. Our results indicate (1) that temporal recalibration occurs even for audiovisual stimuli appearing clearly outside the temporal window for integration, (2) that this realignment may underlie the extraction of audiovisual associations in complex scenarios, and also (3) that temporal recalibration highly depends on our prior experience with visual-leading –but with not auditory-leading– asynchronies.

(35) Functional similarities of behavioral distraction by tactile and auditory deviance: modality-specific and shared modal processes

***Jessica K. Ljungberg<sup>1</sup> and Fabrice B.R. Parmentier<sup>2</sup>***  
***<sup>1</sup>Umeå University, Sweden - <sup>2</sup>University of the Balearic Islands, Spain***

Unexpected changes in a stream of auditory distracters capture attention in an unavoidable manner and delay responses in an ongoing visual categorization task (behavioral deviance distraction). Here we extended the study of this phenomenon by reporting the first within-participant comparison of such distraction in the tactile and auditory modalities using vibrotactile-visual and auditory-visual cross-modal oddball tasks. The results showed a number of functional similarities between the tactile and auditory modalities: a negative impact of deviants on performance in the ongoing visual task (deviance distraction), distraction on the subsequent trial (post-deviance distraction), and a proportionally similar decrease of these across the two modalities (but not their disappearance). Despite these functional similarities, deviance distraction only correlated between the auditory and tactile modalities for the accuracy-based measure of deviance distraction and not for response latencies. Post-deviance distraction showed no correlation between modalities. The findings suggest that behavioral distraction by oddball stimuli might obey both modality-specific and a-modal mechanisms while post-deviance distraction may primarily relate to modality-specific processes.

(36) Basic chromatic terms (BCTs) used by dichromats and the residual activity of the red-green mechanism: Individual and inter-categorical differences

**Humberto Moreira, Julio Lillo, Leticia Álvaro and Delia Majarín**  
**Universidad Complutense de Madrid, Spain**

Two stimulus-selection tasks (mapping and best representative) showed that dichromats' (protanopes and deuteranopes) BCT use depends on the residual activity of the red-green mechanism. Dichromats' performance was analysed using a three-variable model. The first variable ( $L^*T$ , transformed lightness) was similar to its CIE equivalent ( $L^*$ ), but modified to take into account that dichromats lack a cone type (L for protanopes, M for deuteranopes). The second and third variables were computed using confusion lines.  $S'$  (estimated saturation) was related to the CIEu'v' saturation for the yellow or blue stimulus included in the target stimulus confusion line.  $\Delta RG_{res}$  (estimated red-green residual variation) was computed using the distance in the confusion line between the target stimulus and the BCT best representative. Model-based analysis showed important differences in  $\Delta RG_{res}$  relevance depending on the BCT considered. For some BCTs (red, green and blue for protanopes; green, red and orange for deuteranopes), this variable use significantly increased the proportion of explained variance. For others (white and yellow for both dichromat types),  $\Delta RG_{res}$  was irrelevant. Important differences were also found between observers belonging to the same clinical group in relation to the variable relevance of  $\Delta RG_{res}$ .

## ATTENTION AND COGNITIVE CONTROL

(37) Cost effect in children from 11 to 12 years in task switching

**Encarna Carmona, Vanesa Plaza-Ayllón, Sara Fenoy, Laura Parra, Carmen Noguera and Dolores Álvarez**  
**Universidad de Almería, Spain**

People frequently attempt to perform many tasks at once. However, problems can occur when a person switches from performing one task to performing another. This ability to change activity is performed by executive processes. In our research, we have studied this capacity using a task-switching paradigm, in which participants had to perform two tasks in a sequential order. This sequence could be predictable or totally unpredictable. Children from 11 to 12 years old were instructed to categorize a face depending on emotion ("happy" or "sad") or gender ("male" or "female"). By conducting this experiment we will be able to compare the cost effects shown by children with young adults. In fact, we found non-standard results with adults showing a higher repetition cost effect instead of switching cost effect. Data from children will be discussed in the light of the development of executive system.

(38) Relationship between video game practice and attentional performance in children

**Corinne Catale, Caroline Lejeune and Thierry Meulemans**  
**Université de Liège, Belgium**

Recent studies in adults have shown an advantage for video game players compared to non-video game players on several attentional tasks, and particularly those involving visual processing and spatial distribution of attention. However, little is

known about the influence of video game practice on children's attentional and executive abilities. In this study, eighty 8-10 years old children divided into three groups (non-video-game players [NVGP], moderate video game players [MVGP], and intense video game player [IVGP]) were administered computerized attentional/executive tasks tapping vigilance, visual and auditory selective attention, inhibition, and cognitive flexibility. Parents were also asked to complete behavioral scales. Results indicated limited effects of video game practice on attentional/executive tasks, with an advantage in reaction time only for vigilance and flexibility tasks. On the other hand, results on behavioral measures showed a positive relationship between the importance of video-game practice and hyperactive behaviors. In conclusion, these results support the idea that video game practice has a limited influence on attentional performance in children, while they might have an effect on the behavioral area.

(39) Attentional networks functioning in taxi drivers performing long working journeys

**María Fernanda López-Ramón, Cándida Castro Ramírez, Javier Roca and Juan Lupiáñez**

**Universidad de Granada, Spain**

The attentional fatigue caused by driving for extended periods can impair driver's performance and compromise transportation safety. The current study aims to evaluate the relationship between the attentional functioning of alertness (phasic and vigilance), orientation and executive control networks in professional taxi drivers and their attention-related error proneness. A sample of 38 taxi drivers from the city of Mar del Plata (Argentina) who's work involves 12-hour journeys, were evaluated. The ANTI-V was used to analyze the attentional functioning in two evaluation sessions (pre-post work) and proneness to commit attentional errors while driving was measured with a self-report questionnaire. We found that in the more demanding driving situation, i.e. when distracters were incongruent, the warning cue induced a reduced alertness effect in the post-work session, especially on drivers more prone to have attentional errors. Additionally, drivers that reported having more attentional errors were slower in their general attentional performance and showed less hits in the vigilance task in the post-work session. Therefore, we can observe fatigue-related symptoms in the alerting network functioning (phasic and vigilance) in the post-work session, both in the complete sample and specifically in the group more prone to inattention errors.

(40) Impaired selective attention and inhibition in adolescents: comparison of neuropsychological rehabilitation and a pharmaceutical approach

**Lieve Filbrich and Marie-Pascale Noël**

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Neuropsychological rehabilitation gains more and more importance among clinicians, but little empirical research has been carried out as to its efficacy, especially in children and adolescents. Consequently, the present study aims to examine the effectiveness of specific, intensive and repetitive neuropsychological training of selective attention and/or inhibition in adolescents and to compare it with the efficacy of a pharmaceutical approach. For this purpose, 21 adolescents presenting impaired

selective attention and inhibition capacities were divided into three groups. The first two groups received 20-30 sessions of neuropsychological rehabilitation to improve inhibition capacities (group 1) or both inhibition and selective attention capacities (group 2). Group 3 received methylphenidate treatment for 2-3 months. In each case, measures of inhibition and attention capacities were taken before and after treatment (and on methylphenidate for group 3). The results showed that specific rehabilitation training was effective in group 1 and 2. A positive, non-specific effect of inhibition training (group 1) was only seen on selective auditory attention. Inhibition training seemed more effective than simultaneous inhibition and selective attention training on measures of behavioural inhibition. Finally, there was no significant difference between the effect of neuropsychological versus pharmaceutical approach regarding the improvement of selective attention and inhibition capacities.

(41) The role of working memory in syllogistic reasoning

**Ping Ping Tse<sup>1</sup>, Juan Antonio García Madruga<sup>2</sup> and M. Teresa Bajo Molina<sup>1</sup>**

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According to the dual process theory of thinking, there are two different processing systems. The first system which is fast, automatic, heuristic and intuitive is enough for daily problem solving. While for some complicated situations, the slower, sequential and analytic system, which loads on cognitive resources, takes its turn in the problem solving process. The role of working memory (WM) was investigated in a syllogistic conclusion generation task and evaluation task. It was found that the visuospatial WM capacity correlated with the generation task but not the evaluation task, suggesting that the cognitive processes employed changes according to the task requirement. In the evaluation task, participants may use some non-logical heuristic strategy, similar to atmosphere strategy, to solve the syllogistic problems with the help of the given conclusion (employing system one). As these heuristics are supposed to be automatically activated and employed, individual difference in WM capacity would not predict the performance in the evaluation task. The effects of atmosphere in syllogistic reasoning and complexity of the syllogism, in terms of the number of mental models that have to be constructed, were also investigated in this study.

(42) Where are expectations when they are not being measured?

**Amavia Méndez and Luis Jiménez**

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In conflict paradigms (e.g., Stroop) the sequential congruency effect (SCE) refers to a decrease in the effect of congruency observed as a consequence of a previous exposure to incongruent trials. This effect was initially considered as an effect of repetition expectancies (Gratton et al., 1992), but such direct relation between expectancies and the SCE still remains unclear. We have found that, when the temporal interval between trials is reduced, the SCE depends on the nature of the previous trials, and can become dissociated from explicit expectancies (Jiménez & Méndez, in press). With larger intervals, one may assume that participants could be able to adjust performance according to their expectancies. However, we have repeatedly observed that congruency in this condition keeps depending on the context rather than on the expectancies measured on independent blocks. We compared the

SCE obtained over different blocks, depending on whether or not participants were being asked to report on their expectancies on these blocks. Expectancies affected performance exclusively in those blocks in which expectancy reports were required, thus supporting the idea that such expectancies were not built by default, but they affected performance exclusively when they were generated in response to task demands.

(43) Stimulus-response compatibility and cognitive control  
**Eduardo Madrid, María Ruz, Ana B. Chica and Pío Tudela**  
*Universidad de Granada*

We investigated the cortical dynamics related to cognitive control using high-density electroencephalographic measures in humans. Stimulus-response compatibility was manipulated in a Go/No-Go task. On a No-Go trial, inhibiting a response to a highly compatible stimulus-response pair requires additional resources compared to low compatible pairs. In the same vein, in the context of a Go trial, executing a response to an incompatible stimulus would require additional resources compared with a response execution to a compatible one. The stimulus-response compatibility manipulation generated an effect on No-Go but not for Go stimuli over the N200 event-related potential (ERP), that had a larger amplitude for No-Go high compatible pairs. Most interesting, this compatibility generated an effect over right frontal scalp areas, with larger amplitude for trials demanding additional resources, either Go or No-Go. We used time frequency analysis to track the cortical dynamics of the additional resources involved in cognitive control, which we hypothesize require the frontal inferior cortex of the right hemisphere.

(44) Unconscious cognitive control: Using an unconscious context to improve responding

**Kobe Desender<sup>1</sup>, Heiko Reuss<sup>2</sup>, Wilfried Kunde<sup>2</sup> and Andrea Kiesel<sup>2</sup>**  
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According to prominent theories of consciousness, cognitive control is a set of strategic operations exclusively associated with consciousness. In an attempt to show that adaptation to unconscious conflict is nonetheless possible, previous studies manipulated the proportion of masked congruent trials in a blocked design. However, the observed adaptation to this unconscious manipulation can be explained by an adaptation to the conscious experience that mainly incongruent blocks are harder than mainly congruent blocks. In our study, a mainly congruent and a mainly incongruent context were mixed within the same block, and the prime format was used as context cue. We tested whether consciousness of the prime (and consequently the context) is a prerequisite to use this context information. Results showed that the congruency effect was sharply reduced in the mainly incongruent, compared to the mainly congruent context. Importantly, the unconscious context effect was also apparent on an unbiased set of test-stimuli, ruling out low-level learning mechanisms. These findings demonstrate that consciousness is not necessary to improve responding based on an unconscious context.

(45) Executive processes and their interaction with theory of mind in early adolescent's social and academic competence

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The aim of the present study is to explore whether there are differences in executive functions and the ability to attribute mental states (theory of mind -TOM) between students with high and low social and academic competences. One hundred and eighty-five secondary school students aged 12 to 15 were administered an adaptation of Keysar et al.'s Director Task presented on a computer (Dumontheil, Apperly & Blakemore, 2009). In the Director condition, students were instructed to take into account which objects the director could and could not see, whereas in the No-director condition, participants were instructed to take into account the colour of the slot the object was in. In the Experimental trials, a distractor object appeared, and in the control trials an irrelevant object replaced the distractor object. Experimental trials in both Director and No-Director conditions involved executive functions and the Director condition involved the interaction between these executive functions and TOM. Social competence was measured with prosocial behavior as all classmates assessed each other. Academic competence was measured by the academic outcomes at the end of the academic year. High and Low Social and Academic competence groups were selected according to median scores. The main results in the Experimental trials showed that the High Academic competence group had fewer errors in the No-director condition, i.e. better executive functions, than the Low Academic competence group. However, the High Social competence group had fewer errors in the Director condition, i.e. better interaction between executive functions and TOM, than the Low Social competence group. These results suggest that students with high social and academic competence are better in executive functions and that the relationship between social competence and executive functions involves the interaction with TOM.

(46) Effects of aerobic and anaerobic acute exercise on exogenous spatial attention and stimulus-response conflict

**Francesc Llorens Martinez<sup>1</sup>, Florentino Huertas Olmedo<sup>1</sup> and Daniel Sanabria**

**Lucena<sup>2</sup>**

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There is growing evidence regarding the effect of acute bouts of aerobic exercise in the functioning of attention (McMorris, Tomporowski & Audiffren, 2009). This study explored the effects of aerobic and anaerobic acute physical activity on the deployment of exogenous spatial attention and stimulus-response conflict. In our study, spatial attention and stimulus-response conflict were measured by means of a typical Posner's cuing paradigm. Participants performed the task: 1) at rest, 2) during an acute bout of anaerobic exercise at 100% of anaerobic threshold 3) after recovering the basal heart rate (HR) following an acute bout of anaerobic exercise 4) during an acute bout of aerobic exercise at 80% of anaerobic threshold and 5) after recovering the basal HR following an acute bout of aerobic exercise. The results showed differential effects of aerobic and anaerobic acute exercise on exogenous spatial attention and stimulus-response conflict resolution. The results are discussed

in the context of the recent evidence of the significant influence of physical activity on brain function.

(47) Relationship between heart rate variability and cognitive function: influence of physical fitness

**Antonio Luque Casado, Daniel Sanabria Lucena, Esther Morales Ortiz, Manuel Mateo-March and Mikel Zabala Díaz**  
**Universidad de Granada, Spain**

The present study investigated the relationship between exercise, heart rate variability (HRV) and cognitive performance. There were two groups of participants (athletes and sedentary) who performed three cognitive tasks: Psychomotor Vigilance Task (PVT), temporal orienting of attention and time perception. The results showed that the type of task and cognitive load influenced directly and differentially the participants' HRV. The PVT was associated with a parasympathetic predominance and temporal orienting and time perception tasks respectively showed greater sympathetic predominance (mean R-R, SDNN, rMSSD, SD1 and DFA- $\alpha$ 1). Additionally, the group of athletes showed greater vagal cardiac involvement during the cognitive tasks compared to the group of sedentary participants. A significant benefit in PVT's reaction times was found for the group of athletes compared to the sedentary group. We conclude that HRV is closely related to cognitive performance. Furthermore, physical fitness positively affects this relationship although it depends on the cognitive function that is involved.

(48) Effect of physical activity and cardio respiratory fitness on attentional variables

**Antonio Luque Casado, Mikel Zabala Díaz, Esther Morales Ortiz and Daniel Sanabria Lucena**  
**Universidad de Granada, Spain**

The effect of training on cognitive performance appears to produce robust benefits. The aim of this study was to show the relationship between physical fitness and attentional performance. We compared the performance of two groups of participants (athletes and sedentary) who conducted three experimental conditions: rest, incremental exercise test and anaerobic power test. Three cognitive tasks were performed at rest (Psychomotor Vigilance Task "PVT", temporal orienting and time perception). In addition, participants performed the PVT immediately after an acute bout of exercise (incremental and anaerobic power test). The results showed a significant benefit in the PVT's reaction times in the group of participants trained as compared to the sedentary group. This difference disappeared after performing acute exercise. No significant differences between groups were observed in the temporal orienting task or in the time perception task. We conclude that good physical fitness can improve sustained attention. This benefit is lost after strenuous exercise, but future research should consider what would happen after low-intensity effort.



## EMOTION AND SOCIAL COGNITION

(49) EMOCLIPS - A new collection of emotional film clips: Behavioral and psychophysiological measures

**María Fernández-Cahill, Luis Aguado, Iván Blanco and Javier Echegaray**  
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Fifty short clips (10 sec duration) representing affectively positive (20), negative (20) or neutral (10) complex scenes were created based on excerpts from commercial movies and TV documentaries. Positive clips were of three different thematic categories (nature, children or couples-erotica), while the negative ones represented disgust or threat-related scenes. In Study 1 (N=38, 19 female and 19 male University students) participants rated each clip in terms of valence, arousal and emotion category. Both valence and specific emotional content had significant influences on valence and arousal evaluations, thus confirming the validity of the selection of clips. In Study 2 (N=20, 10 male, 10 female) psychophysiological measures were taken while the participants viewed the clips. Skin Conductance Response (SCR) data discriminated between clip categories and correlated with arousal evaluations. These preliminary results suggest that the EmoClip collection can be a useful tool to be employed in future research on reactions to complex emotional stimuli.

(50) Eliciting an affective context uncover the effects of emotions on gaze-mediated orienting of attention

**Mario Dalmaso<sup>1</sup>, Luis J. Fuentes<sup>2</sup> and Giovanni Galfano<sup>1</sup>**  
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In this experiment we investigated the role of facial expressions and target-faces of different emotional valence on gaze-mediated orienting of attention. A centrally-displayed White cue-face shifted gaze rightwards or leftwards and its emotional expression dynamically became either fearful or happy. After either 225 or 525 ms, a target-face depicting a White or a Black individual appeared. The results showed a gaze cueing effect in response to fearful and happy faces at the 225-ms and 525-ms interval respectively. This pattern seems to highlight the different adaptive value of the two emotional expressions.

(51) Congruency effects on the N400 and LPC components in affective priming with facial expressions of emotion

**Luis Aguado, José Antonio Hinojosa, Constantino Méndez Bértolo and Teresa Diéguez Risco**  
**Universidad Complutense de Madrid, Spain**

Priming by facial expressions of emotion was studied with a double task procedure where the participants were unpredictably asked to identify the gender of a 300 ms prime face (male and female faces showing happy or angry expressions) or to evaluate a target word as pleasant or unpleasant. Behavioral and electrophysiological responses (event-related potentials or ERPs) were recorded during the task. A trend for a congruency effect on reaction time, with slower responses on incongruent trials, was observed only with positive targets. Significant congruency effects were observed on two temporal components identified through Principal Component Analysis (PCA), corresponding to the N400 and LPP (Late Positive Potential) components. A

Congruency x Target valence interaction was found at parieto-occipital and fronto-central regions for the N400 component. Specifically, a reversed priming effect was obtained in the case of negative targets, with more negative-going amplitudes in response to congruent targets. For the LPP, positive targets elicited enhanced amplitudes compared to negative targets at parieto-occipital, frontocentral and left temporal regions. Results are discussed in terms of the relative role that activation of affective valence and specific emotion information by facial expressions of emotion may have on processing of immediately following stimuli.

(52) The US-preexposure effect with an appetitive procedure: exploring the role of motivational factors

**Marta Gil<sup>1</sup>, Isabel de Brugada<sup>1</sup>, Michelle Symonds<sup>2</sup> and Geoffrey Hall<sup>2</sup>**

**<sup>1</sup>Universidad de Granada - <sup>2</sup>University of York**

Prior exposure to a stimulus will result in a retardation of subsequent conditioning when that stimulus is employed as an unconditioned stimulus (US) in a classical conditioning procedure. In a series of experiments, we sought to explore the conditions under which this US preexposure effect could be obtained using an appetitive conditioning preparation. In our first experiment, hungry and thirsty rats given prior exposure to either sucrose or saccharin showed weaker subsequent conditioning when either of these flavours served as the US in a conditioned flavour preference procedure - that is, the US preexposure effect was obtained with both sucrose and saccharin. In a second experiment, we explicitly compared the effectiveness of motivational state (either hungry or thirsty) in generating the US preexposure effect using saccharin as the US. Our results showed that preexposure to saccharin produced a retardation of subsequent conditioning in both animals that were hungry and thirsty prior to the conditioning trials. The implications of these findings for theories of the US preexposure effect that make predictions regarding the effects of motivational variables are discussed

(53) The impact of emotional competencies training on brain plasticity

**Michel Hansenne, Eric Salmon and Steve Majerus**

**Université de Liège, Belgium**

Earlier studies have shown that adult emotional competence (EC) can be improved through relatively brief training. This increase has been assessed, thus far, using self-reported questionnaires. The aim of the present functional magnetic resonance imaging (fMRI) study was to evaluate the cerebral correlates underlying improvement in EC. Participants in the experimental group received an empirically-derived EC training (three days) while control participants received brief sessions of improvisation (three sessions of two hours). Participants viewed negative, positive, and neutral pictures while attempting to decrease, increase, or not modulate their emotional reactions. Subjective reactions were assessed via on-line ratings. After the intervention, the training group showed less cerebral activity than the control group within different regions related to emotional regulation and attention including the bilateral inferior parietal lobule, the right precentral gyrus and the intraparietal sulcus. These results suggested increased neural efficiency in the training group as a result of emotional competencies training.

(54) The role of arousal in selective forgetting of emotionally valenced material  
**Laura B. Hansen<sup>2</sup>, Carlos J. Gómez-Ariza<sup>1</sup> and M. Teresa Bajo<sup>2</sup>**

**<sup>1</sup>Universidad de Jaén, Spain - <sup>2</sup>Universidad de Granada, Spain**

The selective forgetting (SDF) paradigm, introduced by Delaney, Nghiem & Waldum (2009) as an extension of the list method of directed forgetting, has been used to show that people are capable of intentionally forgetting a selected subset of previously studied material. This effect arguably draws upon an inhibitory mechanism that decreases the accessibility of the respective memory traces. In the context of memory inhibition, emotionally valenced material has been suggested to constitute a distinct class of stimuli that are less susceptible to intentional forgetting, or generally behave differently from material that is free of emotional content. In the present study, we aimed to replicate the SDF effect and extend it to a set of emotionally valenced negative stimuli while controlling the level of emotional arousal. Results indicate that when arousal is generally moderate, emotionally valenced negative material is affected by intentional forgetting in the same way and to the same extent as is neutral material. For the same set of emotionally valenced negative stimuli, the level of individually perceived arousal showed a negative relation with forgetting, thus suggesting that emotional arousal may determine the susceptibility of emotional memories to intentional forgetting.

(55) Empathy for pain and alexithymia  
**Morgan Lemaire**

**Université de Liège, Belgium**

Empathy is a multi-faceted function that regulates social life. In this study, we investigated empathy in relation to alexithymia. Alexithymia refers to difficulties in the identification and distinction of one's own emotional life, as well as difficulties in the identification/distinction of others emotions. Thus, alexithymia is considered as an empathy disorder. Previous studies demonstrated that alexithymia is characterized by a particular pattern of cerebral activation comprising some important zones of emotional control (i.e., left DLPFC hyperactivation, left ACC hypoactivation). In the present study, we investigated the electrodermal response of participants during an empathy for pain task before and after an inhibiting rTMS on the right DLPFC to facilitate ACC activation, with the aim to enhance the emotional expression for a alexithymic population. Results showed that rTMS on the right DLPFC increased the relaxation of the alexithymic participants facing the stimuli. This is in agreement with our assumptions but further research is needed.

(56) Setting the alarm: the role of consolidation in acquiring the emotional attributes of words

**Nicolas Dumay<sup>1</sup>, Dinkar Sharma<sup>2</sup>, Nora Kellen<sup>2</sup> and Sarah Abdelrahim<sup>2</sup>**

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This study examines how words' emotional attributes affect linguistic processing and whether their acquisition requires consolidation. Participants were exposed to two sets of associations between made-up words (e.g., 'knirck'), both spoken and written, and pictures with either an emotionally negative or a neutral content (e.g., 'a dead sheep' vs. 'a pizza'). One set of associations was learnt one week before the test, giving them more time/sleep to consolidate; the other set was learnt either 6hrs or

immediately before the test. The novel words' ability to evoke their emotional attributes was assessed using both a Stroop-like colour identification task (which did not work) and an auditory analog, i.e., pause detection. Picture-word association showed poorer memory for negative than neutral words and similar forgetting in both conditions. In striking contrast, pause detection revealed no emotionality effect for words learnt either 6hrs or immediately before the test (-4 and -3 ms), but robust interference (+30 ms) for seven-day old negative compared to neutral words. These findings indicate that it takes words' emotional attributes between 6hrs and seven days to be fully operational. Given our rotated design, they also demonstrate that alarming words produce a cost in attentional tasks orthogonal to word processing.

(57) Cognitive and affective control: dissociable brain mechanisms as shown by ERPs

***Sonia Alguacil, Pío Tudela and María Ruz***

***Universidad de Granada, Spain***

Conflict can occur over cognitive or affective materials, but their joint study has not been frequent, especially using electroencephalography. The present study investigated control mechanisms over conflict along different processing stages by combining both kinds of materials in a flanker word task. In different blocks, participants were asked to focus on the target and to indicate either its valence or its semantic category. We used high density electroencephalographic recordings to compare the temporal dynamics of the control mechanisms involved in the two types of situations. Cognitive and affective tasks showed a behavioral congruency effect in line with previous results. ERPs showed effects due to previous trial congruency in early potentials (P1, N170 and VPP), which varied depending on the specific task. In addition, whereas the N2 was only modulated by the congruency in the cognitive domain, different time windows of the P3 potential reflected conflict in either task. Altogether, our results indicate a clear dissociation of the neural mechanisms involved in resolving conflicting situations in the cognitive and affective domains.

(58) Brain areas for encoding traits: an fMRI adaptation study

***Ning Ma, Kris Baetens, Jenny Kestemont and Frank Van Overwalle***

***Vrije Universiteit Brussel, Belgium***

Neuroimaging studies of trait processing have found a network of brain areas, the critical part of which appears to be medial Prefrontal Cortex (mPFC). In this study, we investigated whether the mPFC plays an essential role in the encoding traits by using fMRI-adaptation, which is a rapid decrease of stimulus-related neuronal responses upon repeated presentation of a stimulus. Participants had to infer an agent's (social) trait from brief trait-implicating behavioral descriptions. In each trial, the critical (target) sentence was preceded by prime sentences that implied the same trait (trait-consistent), the opposite trait (trait-inconsistent), or no trait at all (trait-irrelevant), or the target sentence was not preceded by any prime (baseline trait-singleton). The results revealed robust adaptation effects in the ventral mPFC in all three prime conditions compared to the baseline. Crucially, adaptation after trait-consistent and trait-inconsistent primes was significantly stronger than after trait-irrelevant primes. This effect was absent in other brain areas. In line with previous research on fMRI adaptation, we interpret these findings as indicating that trait concepts are not only processed, but also encoded in the ventral mPFC.

(59) Alexithymia moderates the affective influence of vocalizations on visual processing of emotional stimuli

**Nicolas Vermeulen and Marie P.S. Bayot**  
**Université catholique de Louvain, Belgium**

Alexithymia is a multifaceted personality construct which encompasses difficulties in identifying and expressing feelings along with an externally oriented cognitive style. Very few studies have examined the cross-modal influence of emotion in sounds on the concomitant processing of affective information presented in the visual channel. We first tested the capacity to identify emotions in vocalizations and then investigated how these affective vocalizations influence the simultaneous categorisation and memory of emotional facial expressions (EFE), depending on the alexithymia level. Therefore, we examined whether congruent vs. incongruent emotional vocalizations during the categorisation of EFE would moderate recognition rates as a function of participants' alexithymia level. Findings showed that high alexithymia scorers (HA) are worse than low alexithymia scorers (LA) at categorizing emotional vocalizations. Results also highlight the moderating impact of alexithymia on cross-modal priming of vocalizations on simultaneous EFE processing. Indeed, the typical congruency-incongruency effects (i.e., priming) between vocalizations and EFE was increased in HA compared to LA, such that their categorization and memory rates for EFE associated with incongruent vocalizations were more impaired. The capacity to disengage from irrelevant emotional information (i.e., context) and, the possible role of resources in the observed effects will be discussed.

(60) Emotional background does not affect pseudoneglect

**Rémy Schmitz, Isaline Caudron and Philippe Peigneux**  
**Université libre de Bruxelles, Belgium**

A slight but consistent right visual field pseudoneglect [i.e. a leftward attentional bias (LWB)] is observed within the healthy population. Right hemispheric (RH) dominance in attentional regulation is usually supposed to explain this phenomenon. Additionally, a RH dominance is also proposed to support negative emotional processing. Here, we administered a landmark task (LDM) to 31 right-handed young adults (16 males, mean age=23.7 years) to test whether a negative emotional background would heighten the natural LWB. The LDM task consisted of 100 evenly (EBL) and 100 unevenly bisected lines. Lines were presented in random order on a computer screen for 1000ms concurrently with neutral or negative pictures taken from IAPS. Participants had to judge which section of the line was the longest vs. the shortest according to the displayed instruction. The LWB was computed as the proportion of left longest/right shortest responses for the EBL. Participants judged EBL as "left longer/right shorter" at a higher rate than random level both for neutral (68.90%;  $P < .001$  for t-test against 50) and emotional (67.55%;  $P < .001$ ) backgrounds. As expected, our participants showed a strong attentional LW. However, our results suggest that negative emotional backgrounds do not affect RH attentional functions.

## LEARNING & MEMORY

(61) Analysis of the associative and occasion-setting properties of exteroceptive contextual cues in flavour-nutrient learning discrimination in rats

***Felisa González<sup>1</sup>, David García-Burgos<sup>1</sup> and Geoffrey Hall<sup>2</sup>***

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In three experiments, rats were given simultaneous flavor-sucrose pairings in a distinctive context (Context A) whereas the flavor was presented unreinforced in an alternative context (Context B). Experiments 1 and 2 used simple Pavlovian discrimination procedure (A: X+, B: X-) and tested consumption of flavor X in each context. In Experiment 1 the consumption of flavor X was higher in Context A than in Context B. In Experiment 2 the experimental group was given an extinction treatment. Rats were allowed to drink water in the experimental contexts whereas control animals drank water in the home cage. Although water consumption decrease along days in Context A and was always below that of the control group in Context B, extinction of Context A did not affect the ability of the context to control flavor X intake. Experiment 3 used a biconditional discrimination procedure (A: X+, Y-; B: X-, Y+) in which no single context or flavor predicted reinforcement. However, animals solved the discrimination showing a higher consumption of each flavor in the context in which the flavor had been previously reinforced. Together these results suggest that exteroceptive contextual cues may acquired both associative and occasion setting properties in flavor-nutrient discrimination

(62) Retroactive interference and memory consolidation after a nap

***Gaétane Deliens, Daniel Neu and Philippe Peigneux***

***Université libre de Bruxelles, Belgium***

Reconsolidation theory states that recall of previously stored and consolidated information makes it sensitive again to interference. Twenty-five volunteers participated in a within-subjects nap paradigm. After learning a list of unrelated word pairs (A) subjects sleep or stay awake for 30 minutes. One hour later, a novel list of word pairs (B) was learned just before delayed recall of list A. List B was composed of 50% word pairs in which the initial word of the pair was also presented in list A, hence creating interference. Data revealed similar recall of word pairs not subjected to interference after a nap than after an equivalent time awake ( $p>0.3$ ). However, interference effects were observed after the nap ( $p<0.001$ ) only, with lower recall of word pairs subjected to interference than pairs not subjected to interference. These results support the reconsolidation theory, suggesting that after a nap, the reactivation of memories consolidated during sleep puts them back in a labile form, again sensitive to interference. By contrast, in the wake condition, subjects would create a dual trace (A&B) protecting them against interference: the second list does not modify the first but the two lists coexist.

(63) Minimizing sleep deprivation effects in healthy adults by differential outcomes  
**Diana Martella<sup>1</sup>, Victoria Plaza<sup>2</sup>, Ángeles F. Estévez<sup>3</sup>, Alejandro Castillo<sup>2</sup> and Luis J. Fuentes<sup>2</sup>**

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Sleep deprivation reduces vigilance or arousal levels, affecting the efficiency of certain cognitive functions such as learning and memory. We assessed whether the differential outcomes procedure (DOP), a learning procedure that has proved useful to ameliorate episodic memory deficits, can also improve memory performance in sleep-deprived participants. Photographs were presented as sample faces. A probe face was then presented for recognition after either short or long delays. In the differential outcomes condition a unique reinforcer followed correct responses. In the non-differential outcomes condition reinforcers were provided in a random manner. The results indicated that the DOP prevented the recognition memory to decrement during the long delay in the control group, replicating previous findings. The sleep-deprived group showed DOP benefits mainly with the short delay, when working memory could be affected by low arousal. These findings confirm that the DOP can overcome impaired recognition memory due to sleep deprivation conditions.

(64) When getting the blues affects the way you learn: The case of visual statistical learning

**Julie Bertels, Catherine Demoulin, Ana Franco and Arnaud Destrebecqz  
Université libre de Bruxelles, Belgium**

It is well established that mood influences many cognitive processes, such as learning and executive functions. Although statistical learning is assumed to be part of our daily life, as mood does, the influence of mood on statistical learning has never been investigated before. In the present study, a sad vs. neutral mood was induced to the participants through the listening of stories while they were exposed to a stream of visual shapes made up of the repeated presentation of four triplets, namely sequences of three shapes presented in a fixed order. Given that the inter-stimulus interval was constant within and across triplets, the only cues available for triplet segmentation were the transitional probabilities between shapes. Both direct and indirect measures of learning revealed that participants learned the statistical regularities between shapes. Interestingly, although they performed similarly in the sad and neutral mood conditions, sad participants were more confident in their responses. Moreover, the combined analysis of objective and subjective measures of consciousness revealed that while “neutral” participants’ performance relied on both explicit and implicit knowledge of the regularities, sad participants’ performance most probably relied exclusively on extensive explicit knowledge.

(65) Boost effect enhances performance both for motor and sequence-related components in a serial pointing task

**Guillermo Borragán Pedraz, Charline Urbain, Alison Mary, Remy Schmitz and Philippe Peigneux  
Université libre de Bruxelles, Belgium**

Motor performance significantly improves after short post-training periods (5-30 minutes), a phenomenon known as the boost effect (Hotermans et al. 2006; Schmitz et

al., 2009). We investigated the boost effect in a tactile screen variant of the deterministic serial reaction time (SRT) task. Eighteen participants practiced the SRT on a tactile screen using their dominant hand. Unbeknownst to them, the sequence followed a deterministic pattern of 8 stimuli locations (S1), repeated 8 times within a block. Eight blocks were administered at learning (L), then 10-20 minutes later, 4 blocks (boost [B] effect). Reaction times (RTs) decreased with practice and increased upon presentation of an alternate pattern ( $p < .0001$ ) during session L, indicating sequence learning. A repeated-measure ANOVA revealed main effects of Boost (RTs B < L) and of Sequence (RTs learned < alternate;  $p < .0002$ ) and an interaction effect ( $p > .016$ ). Post-hoc tests disclosed higher sequence-related decrease in the Boost than in the Learning condition (24.5 % vs. 33.1 %;  $p < .0005$ ). These results not only confirm the presence of a boost effect in motor performance after short inactivity periods, but also of a boost-related improvement in sequence learning.

(66) Associative memory in normal aging: The effect of unitization

**Jessica Simon, Fabienne Collette, Sarah Genon, Eric Salmon and Christine Bastin**  
**Université de Liège, Belgium**

Memory for associations declines in normal aging, but not memory for individual items. Unitization consists of encoding a new association in such a way that it forms a single entity, later treated as an item. The current study aimed at testing the hypothesis that age-related differences in associative memory can be reduced following encoding instructions promoting unitization. Twenty young adults and 20 elderly participants performed two tasks, in which they learned new associations between a word and a background colour (either green or red), and then had to recall the colour associated to each word. In the Standard task, the item and the background colour were associated in such a way that they remained separated components: the participants had to imagine that the item interacted with another green or red object. In the Unitization task, the participants had to imagine that the item is the same colour as the background, an instruction which promotes the integration of the colour as an item detail. The results showed an age-related decrement in memory performance in the Standard task but not in the Unitization task. This suggests that unitization of new associations can overcome the associative memory deficit observed in normal aging.

(67) The role of monitoring processes on false recognition

**Sara Cadavid and M. Soledad Beato**  
**Universidad de Salamanca, Spain**

False recognition (FR) was studied using the Deese/Roediger-McDermott (DRM) paradigm. We aimed two goals: 1) Building materials with an innovative methodology. Forty-eight DRM lists were constructed with 6 to-be-remembered associates and 3 critical words. 2) Determining monitoring processes contribution to FR in lists with different backward associative strength (BAS). BAS was manipulated in order to obtain Low-BAS lists (0.2 to 0.6), Medium-BAS lists (0.6 to 1.0) and High-BAS lists (1.0 to 1.6). One hundred twenty-six participants were randomly assigned to either a Speeded or a Nonspeeded response condition. The first condition was supposed to avoid monitoring processes whereas the second one was expected to allow them. Results showed that the DRM lists produce robust levels of FR, rendering them appropriate for experimental procedures that require more than one critical trial per



list. Besides, FR in Speeded response condition was significantly higher than in Nonspeeded response condition, but only in Low and Medium-BAS lists. High-BAS lists showed similar FR in both conditions. Taking into account the activation-monitoring framework, our findings suggest that monitoring processes play a determinant role in decreasing FR in Low and Medium-BAS lists, whereas monitoring processes are not so relevant in lists with a higher BAS.

(68) Changes in an expected cue or cue compound have the functional properties of a contextual change

***Carmelo P. Cubillas, Nerea Ortega-Castro and Miguel A. Vadillo***  
***Universidad de Deusto, Spain***

Since Pavlov described spontaneous recovery many researchers have focused on the study of information-retrieval effects. Effects such as reinstatement, renewal or spontaneous recovery show that the selective retrieval of information after an interference treatment (e.g., cue-outcome pairings in first phase followed by cue-no outcomes pairings in a second one) depends on the context in which each piece of information was learned and also on the context in which the information is later retrieved. According to current research and theory, any manipulation that takes the participant out of the second-phase context will favor the recovery of the first learned information. However, it is not easy to define what a context is. The context is usually defined as a set of non-salient and non-predictive stimuli that remain in the task's background. We conducted four interference experiments showing that, the omission of an expected cue (Experiments 1-3) or the change in a cue-compound (Experiment 4) have the functional properties usually attributed to a context change. These results suggest that the traditional definition of context might be too narrow to capture all the events that modulate the selective retrieval of information in interference paradigms.

(69) Electrophysiological correlates of attentional effects and Remember/Know judgements in recognition memory

***María Espinosa-García, Joaquín M.M. Vaquero, María Concepción Castellanos and Pío Tudela***  
***Universidad de Granada, Spain***

Dual theories in recognition memory distinguish between familiarity and recollection processes. These processes have been associated with the automatic/controlled distinction because manipulations such as divided attention during study phase impaired recollection more than familiarity. ERPs studies have also contributed to establish these two recognition processes. In this sense, familiarity ("know" judgements) has been related to a frontal old/new effect observed at 300-500 ms (FN400), measured in lateral channels, whereas a later 400-800 ms parietal positive component has been related to recollection ("remember" judgements). Concretely, both recollection and familiarity produce FN400 old/new effects, with no size differences between them. However, for the later parietal component, only recollection old/new effects are found. In contrast to these ERPs findings, in the present study the FN400 old/new effect also revealed differences between recollection and familiarity when central rather than lateral channels were analyzed. On the other hand, the manipulation of attention at study phase (full vs. divided attention) only showed effects for the later parietal component. Therefore, differences

between recollection and familiarity old/new effects appeared earlier than the attentional effects. These results are discussed in terms of the suitability of the automatic/controlled framework to characterize recollection and familiarity.

(70) Differential outcomes and delayed face recognition memory in children  
**Laura Esteban García<sup>1</sup>, Ana B. Vivas<sup>2</sup>, Montserrat Megías Peralta<sup>1</sup>, Ginesa López-Crespo<sup>3</sup> and Ángeles F. Estévez<sup>1</sup>**

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It has been demonstrated that the differential outcomes procedure (DOP) improves delayed face recognition in young adults (e.g., Plaza, López-Crespo, Fuentes, & Estévez, 2011), in aged people (López-Crespo, Plaza, Fuentes, & Estévez, 2009), in adults with alcohol related amnesia (Hochhalter, Sweeney, Bakke, Holub, & Overmier, 2000) and in patients with Alzheimer's disease (Plaza, López-Crespo, Antúnez, Fuentes y Estévez, submitted). In the present study, we aimed to test whether this procedure improves the execution of a delayed face recognition task in children. In the differential outcomes condition each face was paired with its own outcome. In the non-differential condition, outcomes were randomly arranged. Participants showed a significantly better recognition when differential outcomes were arranged. The results obtained suggest that the DOP may be effective in improving working memory-based performance in different populations.

## CLINICAL

(71) Do pathological gamblers perform better than controls on the Probabilistic Reversal Learning (PRL) task? A reinterpretation of reversal learning deficits in addicts

**Ana Torres, Alberto Megías, Antonio Maldonado, Antonio Cándido and Andrés Catena**  
**Universidad de Granada, Spain**

In probabilistic reversal learning (PRL) tasks, participants learn to choose between a frequently rewarded option and an infrequently rewarded one, on the basis of trial-by-trial feedback. Once the behavioral preference is stable, reward contingencies are reversed, in such a way that the learner needs to reconfigure her preference to maintain the rate of reward. Slowed reacquisition after reversal is customarily accounted for in terms of learning inflexibility, that is, as a type of perseveration. We have repeatedly found, however, that pathological gamblers reach higher asymptotic proportions of correct choices before reversal. That implies that so-called perseverative errors are not really perseverative, but can be a natural consequence of the need to extinguish the previously acquired preference (which is stronger in gamblers) and acquire a new one. Serial dependence analyses show that the observed asymptotic (pre-reversal) differences between gamblers and controls can be explained in terms of different sensitivities to punishment in the two groups. Previous results with other populations of addicts are revisited on the basis of this hypothesis.

(72) Action processing obsessive-compulsive checking

**Sanaâ Belayachi<sup>1</sup> and Martial Van der Linden<sup>1,2</sup>**

**<sup>1</sup>Université de Liège - <sup>2</sup>Université de Genève**

Checking behaviors are characterized by excessive doubts about whether an intended goal (e.g., locking the door) has been actually achieved. Impaired action monitoring and difficulties in using goal representations for action processing may prevent individuals with those symptoms to experiment a sense of task completion. Consistently, recent research supports the idea that people with checking proneness are more prone to process details of action rather than focusing on whether a goal has been achieved. The aim of this study was to explore goal processing in individuals with checking proneness by using laboratory experiment. This task consists in presenting various videos, in which people perform familiar/habitual actions. For each event occurring in each videos, participants were asked to segment the ongoing event, whenever they perceived that an action (goal) has been accomplished and a new one is beginning (i.e., new goal), by pushing the *space bar* on the keyboard. For each stimulus, the number of segmentation was systematically computed by the computer; we then computed the mean number of segmentation for all videos for each participant. The main results indicated checking symptoms were characterized by greater number of segmentation during the perception of familiar event, that is, they are less prone to segment an ongoing event regarding goal completion. This seems to indicate that checkers may thus have a goal processing during action perception/execution that is less efficient. This suggests that, during action processing, checking people are more prone to use fine grain processing (i.e., concrete details), rather than meaningful goal completion.

(73) The impact of depression on moral judgment

**Yasmina Okan, Rocío García-Retamero and Antonio Maldonado**

**Universidad de Granada, Spain**

In moral dilemmas our values enter into conflict, but we need to make judgments concerning which actions are acceptable. Many studies have investigated the effect of factors affecting moral judgments, including the way in which potential outcomes are framed, cultural variations or priming of emotions. Fewer studies have examined whether moral judgments vary as a function of affective disorders such as depression. We conducted an experiment to investigate difference in moral judgments in non-depressive vs. depressive individuals, as measured by scores in the Beck Depression Inventory. Results showed that individuals with higher levels of depression were more driven by consequentialist tendencies in their judgments. That is, they tended to show higher levels of agreement with actions that involved harming one individual in order to save a larger number of people. This finding suggests that depressive individuals could be more likely to follow a more analytic form of reasoning when judging moral dilemmas, taking into account all potential outcomes of alternative courses of action. We discuss the implications of these findings for the theoretical understanding of mechanisms underlying moral judgment.

(74) The effect of moral evaluations of doctors' actions on attributions of intentionality

***Yasmina Okan and Rocío García-Retamero***  
***Universidad de Granada, Spain***

A side effect of an action is a consequence of that action that is foreseen but not intended. For example, a doctor may administer sedatives to a patient aiming to relieve his pain, and as a side effect this might hasten the patient's death. Theories of intentional action have frequently postulated that people first judge whether actions are intentional or not, and then use those judgments to make moral evaluations of the actions. However, recent research has shown that moral evaluations can affect judgments concerning the intentionality of side effects. Specifically, an asymmetric effect has been identified whereby people judge that negative side effects are brought about intentionally, while positive side effects are not (a side effect asymmetry; Knobe, 2003, 2006). In an experiment, we investigated how the moral valence of the main goal that a doctor is pursuing affects attributions of intentionality about the side effects of that intervention. Results showed that participants exhibited the side effect asymmetry when the doctor pursued his own benefit but not when he pursued the patients' benefit. We discuss implications for theoretical accounts of the mechanisms underlying the side effect asymmetry, as well as for intentionality attributions in applied contexts.

(75) Effortful control mediates between borderline symptoms and vantage perspective during autobiographical memory retrieval

***Kris Van den Broeck, Jasmin Reza, Laurence Claes, Guido Pieters and Filip Raes***  
***Katholieke Universiteit Leuven, Belgium***

Traumatized and depressed patients have difficulties retrieving specific autobiographical memories (overgeneral memory, OGM), and they more frequently use an observer perspective (as set against a field perspective) during memory retrieval. We studied these phenomena in relation to borderline symptoms and effortful control (EC). 148 (66 males) volunteers completed the Autobiographical Memory Test, the EC Scale of the Adult Temperament Questionnaire, and the Borderline Syndrome Index. When controlled for depression, OGM was not associated with EC levels, nor with borderline symptoms, but higher EC scores reflected less borderline complaints. Furthermore, interpersonal borderline symptoms were positively associated with the proportion of observer memories, and this relationship was found to be mediated by the EC scale activation control, suggesting that borderline patients would benefit from (experiential) exposure. Data of a follow-up study, that was set up in an attempt to replicate these findings, will also be presented.

(76) How do people with depression make decisions for themselves and for others?  
On self-other discrepancies in decision making

***Rocío García-Retamero, Yasmina Okan and Antonio Maldonado***  
***Universidad de Granada, Spain***

Published research on self-other discrepancies in decision making is lacking but the topic is gaining momentum. We wanted to contribute to this research by investigating how depressed (n=108) and non-depressed individuals (n=108) make decisions for themselves and predict others' decisions. Participants read three scenarios (i.e., a

social, a medical, and a financial scenario) describing a risky and a safe option. Afterwards, they indicated which option they or another person would choose. Results showed that non-depressed participants predicted that others would make riskier decisions than themselves. In contrast, depressed participants predicted that others would make similar decisions to themselves. Depressed participants, therefore, showed no self-other discrepancies (i.e., no bias). We provide a theoretical explanation of these discrepancies and outline the implications of our findings for research on decision making and for medical practice.

(77) Mixing apples with oranges: Deficits at filtering out visual information in schizophrenia

***Claudia Caprile, Jorge Cuevas, Susana Ochoa, Judith Usall and Jordi Navarra***  
***Parc Sanitari Sant Joan de Déu, Fundació Sant Joan de Déu, Spain***

Several studies revealed the existence of both attentional and perceptual deficits in schizophrenia. In the present study, we investigated whether a group of schizophrenic patients shows deficits at filtering out irrelevant information in the visual domain when compared with a control group of healthy participants. The Garner paradigm was used in two experiments. In Experiment 1, the participants had to rapidly classify visual stimuli according to their color (orange vs. purple) while ignoring their shape. While healthy perceivers are able to attend to either color or shape independently, our results showed that introducing an irrelevant variation in shape increased reaction times (RTs) to color in the group of patients with schizophrenia. In Experiment 2, the participants classified the width of other visual stimuli while trying to ignore their height. The visual dimensions width and height are 'integrative' and cannot be processed separately. According to our results, the RTs at classifying width increased in both the schizophrenic group and the control group as consequence of perceiving a variation in the irrelevant dimension (height). Our findings demonstrate the presence of severe deficits at filtering out irrelevant visual information in schizophrenia.

(78) Child's expression of a remote traumatic event: Drawings of the 11th September attack

***Céline Wertz, Christine Degraux, Jean-Marie Gauthier and Adélaïde Blavier***  
***Université de Liège, Belgium***

This study aimed to analyze how children perceived and represented a major traumatic event they saw in media (TV) without being directly involved in. In order to answer this question, we analyzed 250 Belgian children's drawings of the 11th September 2001 attack. Our results showed children (aged from 4 to 12) were particularly marked by some details that were present in a large majority of the drawings: 83,6% children drew fire percept and 64,4% smoke percept, 64,4% emphasized disproportion of skyscrapers, 46,8% drew the planes into the towers (impact) and 42,4% drew people jumping. 53,94% drew only one plane while 22,83% drew 2 planes. 34,25% drew one tower while 52,3% drew 2 towers. On the other part, 30,8% drew emergency aid (particularly firetruck), 14,4% wrote verbal expressions and 30% drew environment details (as sun or clouds). Our results also showed boys significantly drew more often emergency aids and planes into the towers than girls. Concerning the age, some characteristics (e.g. number of planes) remain stable while some details changed according to the age (e.g. number of people who were drawn

jumping or huge tower sizes increased with age). All these results are discussed in terms of vicarious traumatism in function of children's age and gender. We also discuss the role of media in this context.

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**May 11 (15h00-16h00): POSTER SESSION II  
(ROOM Mahaim + Entrance Hall)**

**LANGUAGE**

(79) When do children shift to automatic word recognition? An examination of the effect of transposed letter similarity

***Edurne Goikoetxea and Marta Ferrero***  
***University of Deusto, Spain***

Automatic visual word recognition is essential in the development of reading (Adams, 1990). Precisely, there are many beginner and older readers who struggle to read words which is, in fact, the main cause of reading failure (Perfetti, Landi, & Oakhill, 2005). Automatic word reading implies the formation of well-specified orthographic representations of words in order to access them rapidly and accurately in future encounters. We examine the shift between effort word reading to an effortlessly word reading in primary children through the analysis of the effect of transposed letter similarity. Laboratory results have shown that adjacent transposed letter nonwords (e.g., DISONAU) have a stronger tendency to be misperceived as words in a lexical decision task than a replacement letter nonwords (DIROFAU) (see O'Connor & Forster, 1981; Perea & Lupker, 2004). This effect is expected to appear when readers have good orthographic representations of words. Participated 171 first- to sixth graders from a public, Basque-language school. Children made a lexical decision task under time pressure. Results showed that from fourth-grade there are similar effects of transposed letter similarity as observed in adults samples. We discuss these results and their relationship with facts relative to lexical frequency, length and neighborhood effects.

(80) The relationship between morphological regularity and age of acquisition effects

***Alberto Domínguez<sup>1</sup>, Rosario Socas<sup>1</sup>, Shakiela K. Davies<sup>2</sup> and Cristina Izura<sup>2</sup>***

***<sup>1</sup>Universidad de La Laguna, Spain - <sup>2</sup>Swansea University, UK***

The mapping hypothesis predicts AoA effects will emerge when reading aloud inconsistent words because their letter to sound correspondences are arbitrary as in "cough and dough" while no effects are predicted when reading "consistent" words such as "bake and cake". In this study the mapping hypothesis was tested when participants processed morphological regular and irregular words. According to the mapping hypothesis small AoA effects will be observed with transparent derived words, whose stem remains intact with respect to their base form (toothless from tooth), while large AoA effects were expected when processing morphologically opaque words (ability from able) whose stem do not conserve the phonological aspect of the base word. Two experiments, one in a phonologically regular language (Spanish), one in a phonologically opaque language (English) were carried out to investigate the potential relationship between AoA and morphological regularity with a lexical decision task. Both experiments showed the same pattern of results: a main significant effect of AoA for derived words, which was larger for morphologically

irregular words. The third experiment consisted of a naming task in English. Here main effects of AoA and morphological regularity were found but not interaction. These experiments support the arbitrary mapping hypothesis when morphological regularity is manipulated. The lack of interaction in the naming task was possibly due to an overshadowing effect from the English phonological irregularity. Further directions are proposed.

(81) Time perception of written words

**Antonio Ibáñez<sup>1</sup>, Victoria Rojas<sup>1</sup> and Ramón Guevara<sup>2</sup>**

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Perception of duration is prone to distortion. According to one information-processing model (Treisman et al., 1990), distortions in time perception are the result of a change in the speed of an internal clock. Speeding up or slowing down the internal clock would result in a longer or shorter estimation of time for a given stimulus. In this line, some studies have shown that the frequency of a shortly presented flicker, change the time estimation of a subsequent stimulus. Hence, results from experiments using the flicker paradigm suggest that time perception of targets inserted in a sequence of irrelevant stimuli can be modulated by the speed of these non-target stimuli. In two experiments we studied the time perception of written words inserted in two blocks of fast vs. slow non-target words. In general, results showed an effect of type of block (fast vs. slow) in time estimation of words. Targets presented in fast blocks were perceived slower than those presented in slow blocks. Models on time processing and written word processing should provide an explanation of this remarkable effect.

(82) Visual processing in pre-reader children

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Reading is a complex skill. There are many reasons why children may fail in learning to read. The present study investigates the role of visual perceptual processing in a sample of preschool children by examining their ability in a temporal order judgement task, which involves judging the order of two presented stimuli and in a same-different discrimination tasks. Linguistic and non linguistic stimuli were presented at different Inter-Stimulus-Interval (ISI), which varied from 100 - 250 - 500 ms. Capital and lowercase letters were used as linguistic stimuli and pseudo-pictures (drawings that did not represent anything in particular) as non linguistic stimuli. The number of errors and the reaction times showed that some children were specifically impaired at categorizing visual information that differs in terms of rapidly changing temporal cues. The results are discussed in terms of how a temporal specific deficit is present in visual processing and how this is closely linked to children at risk of early reading difficulties.



(83) The role of syntactic predictability and stem frequency during reading: Evidence from Basque

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Eye-movement measures provide online information about processes involved in both word recognition and sentence reading. Two linguistic factors have been shown to strongly influence eye movements: word frequency (high frequency elicits fewer fixations than low frequency) and contextual predictability (words predictable in a given context require less reading time). Furthermore, low frequency words are facilitated by a predictable context. We ask whether syntactic predictability may interact with word frequency in Basque, a highly-inflected “free-word-order” language. High and low stem-frequency inflected nouns were embedded in two sentence frames: SVO (predictable inflection on O) and SOV (unpredictable inflection on O). Early and late measures showed an interaction between predictability and stem frequency. For nouns, stem frequency effects were observed only when the inflection was predictable (more skipping, fewer regressions, less reading time for low frequency nouns). However, the opposite pattern was found for verbs: frequency effects were observed in the unpredictable condition (the verb was skipped less and required less reading time when coming from an unpredictable low frequency noun). This tradeoff suggests that frequency effects are modulated by syntactic predictability during reading, and that word recognition is modulated by anticipation strategies and structural integration demands during ongoing processing.

(84) A training program on executive functions to improve reading comprehension in the classroom

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The aim of this study was to evaluate a training program on executive functions of working memory (i.e. focusing, switching, updating of mental representations and inhibition of irrelevant information) to improve reading comprehension in the classroom. Students with high WM scores typically show good comprehension reading skills. And, conversely, students with poor WM scores tend to perform below average on reading comprehension measures. We hypothesized that a specific training on executive functions of working memory will improve reading comprehension. Seventy-seven children (aged between 8 and 9 years) participated in this study, in the experimental group and a control group. Participants were assessed on reading comprehension, working memory tests (verbal analogy span test, semantic updating task and visual-spatial WM task), and fluid intelligence test (K-bit), before and after training. The training program consisted of 10 sessions where students performed different tasks which were designed to boost the four executive functions. Results showed a pattern of significant correlations among the diverse cognitive measures in pretest and substantial gains in reading comprehension after intervention.

(85) Stress awareness, reading efficiency and reading comprehension

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Prosodic awareness has been related to accurate word reading. Therefore, a connection between this metalinguistic skill and reading efficiency and comprehension is expected. We tested these hypotheses focusing on stress awareness. 164 children from 2<sup>nd</sup>, 4<sup>th</sup> and 6<sup>th</sup> grade participated in our study. As stress and word's rhythm are closely related, further to stress awareness (to detect stressed syllables and compare words' stress) we measured non-linguistic rhythm skills (perception and production of beat sounds). We controlled for phonological awareness (counting and deleting sounds), and measured sentence comprehension (picture-sentence matching, and meaning-sentence matching). The meaning-sentence matching task used minimal pairs of sentences, differing only in the punctuation marks. Our results showed that stress awareness predicted reading efficiency, but only in 4<sup>th</sup> grade, when stress assignment rules are being taught. As regards reading comprehension, it was predicted by stress awareness only in 2<sup>nd</sup> grade. However, when comprehension required using prosody (the punctuation marks) it was predicted in 6<sup>th</sup> grade only. These results are discussed as suggesting that stress awareness might be related to the automation of word reading, and that it can be taken as an index of readers' use of prosody for reading comprehension.

(86) The influence of prosodic skills on reading comprehension in Spanish primary  
aged children

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The relevance of prosodic elements is increasingly recognized in the definitions of fluency. In fact, one of the most recent theories regarding fluency's contribution to reading comprehension highlights the role of prosody on reading comprehension. The purpose of this research was to examine the contribution of prosodic skills in comparison to automaticity in word reading for reading comprehension, taking into account children's grade level. 122 Spanish children (74 second and 48 fourth school graders) were tested in prosodic skills (prosodic reading and prosody sensitivity), automaticity in word reading and reading comprehension abilities. Different experimental tasks were created to measure prosodic skills. Hierarchical regression analyses were carried out in order to analyze the contribution of prosodic skills to literacy. Results showed that prosodic skills predicted reading comprehension differently across grades. The automaticity component of fluency was more relevant in 2<sup>nd</sup> grade, whereas prosody was more relevant in 4<sup>th</sup> grade. However, reading expressiveness was found to be a crucial component in both grades. Results suggest that prosodic skills are very important for reading comprehension, in particular in 4<sup>th</sup> grade, when automaticity in word reading is achieved. The directionality of the relationship between prosody and reading comprehension is discussed.

(87) Speech intelligibility in noise for children

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Oral communication often takes place in noisy backgrounds, where other people are speaking at the same time as the speaker we would like to focus on. To achieve proper comprehension of the target speech, the listener has to extract the relevant signal while ignoring the distracting maskers. This process seems nearly effortless and automatic for normal hearing adults, but can be more difficult for children, even when presented with a small amount of noise [Hall et al., 2005]. We aimed at precisely examining children's identification of speech presented in increasing levels of noise, in order to characterize the shape of their psychometric function in adverse listening conditions. Furthermore, children were presented with stationary and fluctuating noise, in order to evaluate their masking release, that is the ability to « listen in the dips » of the modulated background noise [Lorenzi et al., 2006]. Children aged 10 years and adult controls were required to identify a consonant presented in VCVCV tokens in quiet and at three different signal-to-noise ratios (SNR 0dB, -6dB, -12dB), with either stationary and fluctuating noises. These SNRs were chosen because they induced respectively about 75, 50 and 25% correct identification in children presented with a stationary noise. Results will be discussed on the basis of the psychophysical theories of speech perception in noise.

(88) Exploring the interaction between animacy and emotionality in the completion of the Spanish ambiguous relative clauses

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In the domain of relative clauses (RCs) with a double antecedent (e.g., someone shot the servant [NP1] of the actress [NP2] who... [RC]) previous completion studies in Spanish have shown that people prefer to attach the RC to a preceding animate (Piñeiro et al., 2007) or emotionally arousing (Fraga et al., in press) noun, independently of the position of that noun within the complex NP. The aim of this study is to analyze the effects of animacy and emotionality, and their possible interaction, using the aforementioned task and sentence structure. We have built 96 experimental sentences by combining 24 animate nouns (12 neutral and 12 with high-arousal) and 24 object nouns (12 neutral and 12 with high-arousal) extracted from Ferré et al. (2011) and Redondo et al. (2007) affective databases. Each sentence began with a preamble that maximizes its plausibility. The 24 agents and the 24 objects were arranged so that the full set of sentences includes all possible combinations between the 2 nouns of the complex NP (either when the animated noun was assigned to NP1 or NP2 position: neutral/neutral; high-arousal/neutral; neutral/high-arousal and high-arousal/high-arousal). Preliminary analyses show that both animacy and emotionality modulate subjects' attachment preferences.

(89) How lexical ambiguity distributes activation to semantic neighbors: some possible consequences within a computational framework

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The diversity of contexts a word appears in - the distribution of a word across possible contexts - is a key variable that has an impact on lexical access. Vector space models such as LSA (Latent Semantic Analysis) can be very useful for putting such a concept to the test. Having an objective, discrete model of lexical representation allows us to objectify parameters to define contextual focalization in a more measurable way. In the first part of our study, we investigate whether certain empirical data on ambiguity can be modeled by means of an exclusively symbolic single representation model such as LSA. Our observations support the idea that some ambiguity effects can be explained by the contextual distribution using such a model. In the second part, we put abstract and concrete words to the test. Our LSA model (exclusively symbolic representations) can also explain the penalty paid by abstract words as they activate others through semantic similarity and the advantage through associative similarity. These conclusion support authors who defend the idea that embodied representations are directly mapped onto linguistic representations, and that what Louwerse (2011) refers to as "good enough" meaning can be evoked without access to primary representations.

(90) Inverse distractor frequency in the picture-word paradigm: An effect of neighborhood?

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The picture-word-interference paradigm (i.e., picture naming while ignoring a co-occurring distractor word) has been used extensively in speech production research. The semantic interference effect (i.e., longer naming latencies for same-category distractors) has been interpreted as evidence in support of lexical selection as a competitive process. Miozzo and Caramazza (2003) have argued against lexical competition by demonstrating an inverse distractor-frequency effect (i.e., pictures are named faster with high-frequency distractors than with low-frequency distractors). However, in the material of Miozzo and Caramazza lexical frequency is confounded with the number/frequency of the distractors neighbors. In two picture-word-interference experiments we examined whether the observed interference effects are driven by the frequency of the distractor or by the number and frequency of neighbors of the distractor. We used unrelated high- and low-frequency distractors from three different phonological neighborhood conditions: (i) distractors had no neighbors, (ii) distractors had no high-frequency neighbors (iii) distractors had high-frequency neighbors. Both experiments replicated the inverse distractor-frequency effect (i.e. faster naming latencies for pictures with high-frequency distractors) irrespective of the distractor's phonological neighborhood. Our results indicate that it is indeed the lexical frequency of distractor words and not their neighborhood that modulates naming latencies in the picture-word-interference paradigm.

(91) Perception of vowel length and voice onset time contrasts within words by  
German-Spanish bilingual children

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Vowel duration is used in German to distinguish words, but this feature has no contrastive value in Spanish. Voice onset time (VOT) is a durational cue present in these two languages to distinguish voiced and voiceless stop consonants, but the values differ across these languages (lead and short lag characterize Spanish VOT; short and long lag characterize German VOT). Production data from bilingual children have often revealed cross-language influences in the realization of both vowel length and VOT contrasts, but fewer studies have been focused on phonemic perception. The present research analyzed the phonological discrimination ability of these contrasts by German-Spanish bilingual young children, aged 3 to 5 years ( $n=20$ ). Participants were tested in an XAB task with two conditions (vowel length and VOT). Stimuli were auditorily presented correct and mispronounced versions of real words (frequent in the German child lexicon). Control words involving a change in manner of articulation were included for comparison. Overall children were better at discriminating VOT than vowel length mispronunciations, but results were significantly below those for control words. Further analysis revealed an asymmetry favoring voiced over voiceless target consonants. The role of cross-language influence in bilingual's acquisition of language-specific phonological contrasts will be discussed.

(92) Cognitive advantage in children enrolled in a second-language immersion school  
program for 3 years

**Anne-Catherine Nicolay and Martine Poncelet**

**Université de Liège, Belgium**

Early and highly proficient bilingualism acquired from home or community has been considered as exerting a positive influence on cognitive development. The purpose of the present study was to examine to what extent bilingualism acquired through a second-language immersion school program exerts a similar impact. Participants were 106 8-year-old French-speaking pupils (grade 3). Fifty-three children had attended English immersion classes since the age of 5 (immersion group). The other pupils, matched to the immersion group for age, verbal and nonverbal intelligence, attended monolingual French-speaking classes (monolingual group). The two groups were administered a battery of tasks assessing attentional and executive skills. The immersion group performed significantly better than the monolingual group on most of the tasks: a positive effect of bilingual education was observed in reaction times of the immersion group. These results show that, after only 3 years, a second-language immersion school experience produces the same cognitive benefits as those observed in early bilinguals, at least to some degree.

(93) The effect of an immersive teaching in English/Dutch on the acquisition of French  
orthographic code

**Florence Binamé, Charline Guyon and Martine Poncelet**

**Université de Liège, Belgium**

Most of the children attending bilingual immersion school programs in the French Community of Belgium learn to read in the immersion language before learning to

read in their native language. This study aimed to explore the effect of learning to read in a second language having a transparent (Dutch) versus an opaque (English) orthographic code, on the later acquisition of French spelling. Because literacy acquisition depends on the orthographic depth of the code, the hypothesis is that learning to spell in a transparent language such as Dutch would promote the acquisition of the more opaque French spelling, by transferring the phonological recoding process. Contrariwise, the acquisition of French spelling would be less easy if learners were first immersed in very opaque spelling such as English. Participants were 182 third and fourth-graders immersed in Dutch or English, and monolingual French speakers (control group). Their French spelling skills were tested by word and non-word dictation tasks. Results showed that the performance of Dutch immersed children was not significantly inferior to controls, which was not the case for English immersed children. This corroborates the fact that learning to spell in a more transparent orthographic code than French has a subsequent benefit on its acquisition.

(94) Borderline intellectual functioning children show implicit sequence learning  
whereas dyslexic children fail to learn

**Joaquín M.M. Vaquero, Gracia Jiménez-Fernández, Ian C. Simpson and Sylvia Defior**

**Universidad de Granada, Spain**

Dyslexia is considered a specific learning disability insofar as the deficits in literacy of this disorder are not associated with other high level cognitive deficits. In line with this, some studies suggest that non-strategic processes such as those involved in implicit sequence learning are impaired in this population. In this study we explored whether a deficit in implicit sequence learning could be a specific impairment which explained reading difficulties in dyslexia but not other reading difficulties; for instance, those associated to borderline intellectual functioning. To this aim we compared implicit sequence learning of dyslexic children, good readers, and bad readers that presented borderline intellectual functioning (BIF). The results revealed that both BIF and good readers groups showed implicit sequence learning and there were no significant differences between these two groups. In contrast, dyslexic group failed to show sequence learning. These results support the concept of dyslexia as a specific and unexpected learning disability, different from other reading disabilities that can be related to the level of intellectual functioning.

(95) Collection comparison in deaf children: Exploring the role of perceptual variables

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Recently it has been suggested that the traditional lag of deaf scholars in mathematical achievement might be rooted in deficiencies in their basic numerical skills. In the present research a group of nine deaf children (mean age: 8.5 years) and a control group of hearing participants (equated in age, CI, visual memory and reading comprehension) were presented with two collection comparison tasks. In the density condition the sticks in the collections were of the same size, in the surface condition, the sticks differed in size with the aim of equating the total surface area in each

comparison (see Rousselle et al. 2004). In the surface condition results showed no differences between deaf and hearing participants. On the contrary, deaf participants were considerably slower in the density condition, while showing similar ratio effect. These results are interpreted in terms of the incapacity of deaf participants, in the surface condition, to take advantage of the total surface of the stimuli to solve the task. They seem to apply a rigid numerical (non-perceptual) procedure that is useful in the surface task, but slow, and poor in the density task. It is concluded that deaf children do not show deficiencies on basic numerical processing.

## NUMERICAL COGNITION

(96) Measuring risk literacy: The Berlin Numeracy Test

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The Berlin Numeracy Test is a new psychometrically sound instrument that quickly assesses statistical numeracy and risk literacy. We present 21 studies (n=5336) showing robust psychometric discriminability across 15 countries (e.g., Germany, Pakistan, Japan, USA) and diverse samples (e.g., medical professionals, general populations, Mechanical Turk web panels). Analyses demonstrate desirable patterns of convergent validity (e.g., numeracy, general cognitive abilities), discriminant validity (e.g., personality, motivation), and criterion validity (e.g., numerical and non-numerical questions about risk). The Berlin Numeracy Test was found to be the strongest predictor of comprehension of everyday risks (e.g., evaluating claims about products and treatments; interpreting forecasts), doubling the predictive power of other numeracy instruments and accounting for unique variance beyond other cognitive tests (e.g., cognitive reflection, working memory, intelligence). The Berlin Numeracy Test typically takes about three minutes to complete and is available in multiple languages and formats, including a computer adaptive test that automatically scores and reports data to researchers ([www.riskliteracy.org](http://www.riskliteracy.org)). The online forum also provides interactive content for public outreach and education, and offers a recommendation system for test format selection. Discussion centers on construct validity of numeracy for risk literacy, underlying cognitive mechanisms, and applications in adaptive decision support.

(97) Numerical cognition: Effects in comparison tasks with fractions as stimuli

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The discipline of numerical cognition knows several effects that occur in comparison tasks such as the distance effect and the SNARC effect. While the discipline focuses on research using whole numbers, this exploratory study expands this focus by examining whether the same effects can also be found in comparison tasks with rational numbers, namely fractions. Twenty-nine first year university students solved a series of fraction comparison tasks on a computer. To additionally investigate the

effect of notational form, fractions were both presented in their mathematical form (e.g.  $1/3$ ) as in their graphic form, as marbles in a jar where the colored ones represent the numerator. In both forms, a significant distance effect was found and tasks with the same denominator had significant faster reaction times. In the tasks with the mathematical notation this was also the case with fractions with the same numerator. The common contradiction between holistic and componential approach to fractions was finally confirmed by these data.

(98) Mathematics anxiety and complexity of numeric tasks

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Highly math-anxiety individuals' low performance in numerical task has been related to intrusive thoughts and to inhibitory difficulties, making working memory (WM) less efficient in complex task conditions. However, the math tasks used in these studies differ in processing demands, which makes unclear the contribution of WM to performance in each study. An exploratory study was conducted to compare performance of low and high math anxiety students in tasks varying in their complexity and therefore in their WM demands. We used the RMARs scale to select 22 high math anxiety and 21 low math anxiety students. Four numerical tasks were administrated: a counting task; a verification task (e. g.,  $24 + 3 = 27$ ); an addition task (e. g.,  $24 + 3 = ?$ ); and a modular task ( $51 = 19 \pmod{4}$ ). In the arithmetic tasks, problem size (single or double digits) and carry were manipulated. We found group differences even in the simpler task (i.e., counting), and in the easier conditions of the arithmetical tasks. These results are discussed as suggesting that the origin of cognitive differences associated to math anxiety could be more general than previously hypothesized.

(99) Do the mental number line and spatial sequence synesthesia share neural substrates? A patterned TMS study

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Recently, it has been proposed that subtle forms of synesthesia are widespread across the normal population, providing heuristics which underly and influence normal perception. For example, the mental number line (MNL) shows notable similarity with the mental spatial representation of ordered sequences that is observed in individuals with spatial sequence synesthesia (SSS). In fact, it has been suggested that the mental number line is a widespread, mild form of SSS. Whereas numerical cognition is usually associated with parietal cortex, overlearned ordered sequences have been shown to activate distinct neural networks in the right hemisphere, most notably a region in the posterior right middle temporal gyrus (rpMTG). We investigated whether the MNL and SSS share underlying neural correlates. We applied inhibitive patterned TMS over rpMTG, and observed its effects on two tasks: a classical SNARC task which visualises how the mental number line biases lateralized responses, and a task requiring close evaluation of overlearned ordered sequences. Compared to placebo stimulation, TMS affected performance in both tasks, supporting the proposed similarity of the mental number line and SSS. These results further strengthen the view of synesthesia being at



the extremity of a spectrum of normal, adaptive perceptual processes, influencing everyday perception.

- (100) The influence of a representational illustration and a metacognitive warning on pupils' tendency to model and solve mathematical word problems realistically  
***Tinne Dewolf, Wim Van Dooren, Emre E.V. Cimen and Lieven Verschaffel***  
***Katholieke Universiteit Leuven, Belgium***

Previous research has shown that upper elementary school children often neglect their knowledge of everyday life when solving word problems that are problematic from a realistic modeling perspective (P-items) (Verschaffel, De Corte, & Lasure, 1994). Pupils simply perform the arithmetic operation with the given numbers that are hidden in the problem, instead of taking the realities of the situation seriously into account. In two parallel studies – conducted in Belgium and in Turkey - we investigated, using a between-subjects design, whether presenting P-items together with illustrations that represent the problematic situation and/or a metacognitive warning that alerts about the tricky nature of some problems, helps 10-11-year old pupils to create a mental model of the problematic situation and consequently to solve the P-items more realistically. Contrary to our expectations, the presence of a representational illustration and/or a metacognitive warning had no positive impact on the number of pupils' realistic reactions to P-items. In order to explain the absence of a positive effect, we further provide several complementary explanations that need to be tested in further research.

- (101) Attentional bias induced by solving arithmetic problems  
***Nicolas Masson and Mauro Pesenti***  
***Université catholique de Louvain, Belgium***

Processing numbers has been shown to induce spatial attention shifts in simple probe detection tasks, with small numbers orienting attention to the left and large numbers to the right side of space (Fischer et al., 2003). This has been explained by the concept of the mental number line (MNL, Dehaene, 1992) with number magnitudes ranging from left to right, from small to large numbers. Recently, the investigation of this spatial-numerical interference has been extended to mental arithmetic with the hypothesis that solving addition or subtraction problems may induce attentional displacements along the MNL (respectively, to the right and to the left; Knops et al., 2009; Pinhas & Fisher, 2008). Here we investigated such attentional shifts with a target detection task primed by arithmetic problems in 21 healthy participants. Every constituent of addition and subtraction problems were sequentially flashed (First operand; Operator; Second Operand) in the center of the screen, then followed by a target to detect on the left or on the right of the screen. The results showed that targets were detected faster on the left than on the right side after solving subtractions relative to a non-numerical control task. No evidence of attentional shifts was observed following additions.

(102) IQ, language and working memory and their relation to children's mathematical skills

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***Universidad de Murcia, Spain***

This study examined the contribution of spatial working memory (SWM), verbal working memory (VWM), language, and intelligence to different aspects of mathematical ability. 157 normal population children attending grades 4 to 6 of primary education were tested. We assessed SWM with a computerized Corsi task, VWM with the backward digit span subtest of the WISC-IV, language with the riddles subtest of K-ABC test and intelligence with the Matrices subtest of K-BIT. We assessed mathematical ability with two subtest of the Woodcock-Johnson III Achievement battery (quantitative concepts and fluency), with the arithmetic subtest of the WISC-IV, and by teacher ratings of mathematical ability (TRMA). The results show a positive relation between VWM and performance on fluency, quantitative concepts, WISC-IV arithmetic, and TRMA, whereas SWM was only related to TRMA. Language was related to quantitative concepts, WISC-IV arithmetic and TRMA and also marginally to fluency. Finally, intelligence was related to quantitative concepts, WISC-IV arithmetic and TRMA. These results show that each aspect of mathematical ability is linked to different cognitive skills. These findings have important implications for education, particularly regarding interventions for children with poor performance in specific aspects of mathematics.

## **PERCEPTION**

(103) Designing usable traffic signs: The airport stack-type

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Cognitive science dedicates a lot of effort in designing usable traffic signs. Among all traffic signs, the international conventions for the airport stack-type have received much attention. This is because the jet pictorial has an inherent directional characteristic that can be sensibly rotated, creating signs with different relationships between the plane orientation and the route direction. In the present study we investigated the effect on the response accuracy and reaction time produced by the incongruent graphical solutions, using a modified version of the Eriksen Flankers Task. Sixteen drivers participated in this experiment. The arrow orientation, the pictorial orientation, and the location of both elements were manipulated. Participants were asked to indicate as quickly as possible the direction to reach the airport by pressing the corresponding USB gamepad-key. The results showed that incongruent graphical/space solutions, lead to increased reaction times (537 ms vs 526 ms) and a reduction in the proportion of correct answers (0.80 vs 0.87). These findings suggest that incongruent visual information should be avoided, as this might impair drivers' performance. Furthermore, this research provides important information for the specification of future signage design guidelines to enhance the intuitiveness of road signs.

(104) Spatial and temporal errors in a timing task: Effects of effective and perceived velocity

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Humans can easily synchronize their responses to visual stimuli. However, this synchronization is far from perfect. Temporal and spatial bias and variability are observed even when participants have motion cues to predict the moment of interest to synch with a moving visual target (see Linares et al., 2009). Nonetheless, it is unclear how variations in real and perceived velocity affect these types of errors. To explore this issue, we use a clockwise rotating Gabor and subjects had to synch a click when the Gabor arrived at a specific position. The Gabor could have a drifting carrier in addition to the rotating envelope. With a staircase procedure, we first obtained the effective rotational speed for drifting Gabors that resulted in the same perceived speed than non-drifting ones. The drift could be congruent or incongruent with the envelope's rotational motion. The results in the synchronization task showed that whereas the spatial error is well explained by the perceived velocity (local drift + rotating velocity), the temporal error is better explained by the rotational velocity without the drift. Neither spatial nor temporal synch variability was affected by local drift. This pattern reveals a dissociation of the effect of perceived speed between spatial bias and variability.

(105) The effect of spatial separation on informational masking: Presentation of an original dichotic paradigm

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In cocktail party situations, understanding a given talker's speech might become an impossible task because of the presence of competing speakers, who are masking the relevant signal. If the interference between the target speech and maskers at the cochlear level (i.e. energetic masking) seems to be responsible for a significant part of this difficulty, central mechanisms are also involved (i.e. informational masking). In this case, signal and distractors are both audible, but the listener is unable to disentangle the elements of the target from a similar-sounding distractors. Most of the usual speech masking situations involve both energetic and informational components. Therefore, quantifying the amount of informational masking implies a strict control of the energetic components, that can be achieved using dichotic listening. Unfortunately, classical dichotic paradigms provide the listener with important lateralisation cues, that dramatically reduce informational masking. The current study aims at investigating informational masking in a new dichotic paradigm. Listeners have to detect a regularly repeating auditory stream presented in an informational masking context (cf. Gutschalk et al., 2008), where signal and maskers are switching from one ear to the other within a 10s sequence. We will thus parametrically investigate the effects of the number of switches on informational masking experienced by normally-hearing adults. Data are currently being recorded. Results will be discussed regarding the theories of auditory scene analysis.

(106) Short-term experience increases infants' sensitivity to audiovisual asynchrony  
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Studies in adults reveal that a short-term exposure to asynchronous audiovisual signals induces temporal realignment between these signals (Navarra et al., 2009). In contrast with this evidence in adults, Lewkowicz (2010) observed that infants increased their sensitivity to AV asynchrony after exposure to asynchronous AV speech. We investigated whether brief experience with an asynchronous AV event would increase infants' ability to discriminate AV synchrony from asynchrony in non-speech stimuli or else induce temporal realignment as observed in adults. Twenty-four 6-month-old infants were tested in two phases (Test 1 and 2) using an intersensory paired-preference procedure, with simple stimuli (two balls bouncing against the floor- one ball bouncing in synchrony while the other one in asynchrony with respect to the bouncing sound). Between Test 1 and 2, infants were exposed to AV asynchrony (a presentation of a single audiovisually asynchronous bouncing ball). The results revealed that infants detected the difference between AV synchrony and asynchrony only after being exposed to the asynchronous AV event. Our findings support the idea that experience with AV asynchrony has different consequences for adults and infants: while temporal AV recalibration is observed in adults, an increase of the sensitivity to AV asynchrony is observed in infants.

(107) Post-training sleep favors nonspecific generalization of visual discrimination skills

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It is known that post-training sleep improves performance in a retinotopic manner in the visual texture discrimination (VDT) task (Karni et al. 1994). Here we show that besides retinotopic consolidation of visual texture discrimination skills, sleep also favours the generalization of discrimination abilities to the untrained eye, and possibly to other visual quadrants. Healthy volunteers (n=32) were trained and retested in the morning then in the evening respectively (wake) or in the evening then in the morning (sleep). They learned to discriminate more and more rapidly horizontal/vertical patterns briefly presented in the periphery of the visual field. First trained eye and trained visual quadrant were tested, then untrained eye and same quadrant, and finally another quadrant. Overall, discrimination performance had improved after sleep as compared to wakefulness ( $p=0.032$ ). Additionally in the sleep group, improvement was significant in both eye/same visual quadrant conditions ( $p_s < .001$ ), and close to significance ( $p > .06$ ) in the other eye and visual quadrant. No effect was found in the wake group ( $p_s > .3$ ). These data suggest that sleep favours the generalization of perceptual skills besides retinotopic specificity in V1 area.

(108) Luminance and color contrast have similar effects in binocular rivalry  
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Previous studies on binocular rivalry have suggested an interaction between stimulus properties (brightness, color, contours) for binocular fusion (Levelt, 1965). The aim of the present study is to verify whether color differences between two images will produce the same rate of perceptual alternations as luminance differences. To this end, subjects were probed with two types of orthogonally oriented gratings: Isoluminant color gratings, and achromatic square wave gratings. We measured the corresponding rate of perceptual change associated with the chromatic and achromatic image pairs as a function of spatial frequency of the grating. Our results suggest that there is a logarithmic increase of perceptual alternations with increasing spatial frequency. Furthermore, with increasing contrast differences of the achromatic grating, we obtained a moderate increase in the number of alternations. We could not find a significant difference between the rate of perceptual change of the isoluminant color gratings and the achromatic gratings. Thus, it seems that chromatic and achromatic contrast is similarly processed in perceptual rivalry. This suggests that the strength of contours and their orientation are the important parameters for the rate of perceptual change.

(109) Re-synchronizing thunder and lightning: Observed temporal recalibration is far beyond the multisensory integration for time limits

**Irene Fernández, Joel García-Morera and Jordi Navarra**  
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The brain is able to realign asynchronous signals in order to bind them. However, multisensory integration is no longer possible when a certain level of asynchrony is surpassed. We investigated whether audiovisual temporal recalibration can also occur when visual and auditory stimuli fall clearly outside the temporal window for integration. In Experiment 1, temporal realignment was observed, in a simultaneity judgment task, after a 3-min exposure to visual-leading asynchrony, even when the visual and auditory stimuli appeared from markedly different spatial locations and were separated in time by 706ms. In Experiment 2, we analyzed whether extracting an associative link between a geometric figure (embedded in a visually-complex pattern with other figures) and a sound burst, constantly appearing 700ms afterwards, generate temporal recalibration between this figure and the sound. The results showed temporal recalibration between the associated figure and the sound only for a visual-leading asynchrony condition. Our results indicate (1) that temporal recalibration occurs even for audiovisual stimuli appearing clearly outside the temporal window for integration, (2) that this realignment may underlie the extraction of audiovisual associations in complex scenarios, and also (3) that temporal recalibration highly depends on our prior experience with visual-leading –but with not auditory-leading– asynchronies.

(110) How accurate is this colour-blind simulation? Using simulcheck to evaluate two simulation tools

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Two colour vision alteration simulation tools (vischeck and coblis) were evaluated using simulcheck. Real and simulated dichromats participated in the evaluation. On the one hand, real dichromats responded to original stimuli and, on the other, normal observers responded to stimuli transformed by the evaluated simulator. It was assumed that the less difference between the results provided, the better a simulator was. The first part of simulcheck (pseudo-achromatic selection task) required real (5 protanopes and 5 deuteranopes) and simulated (10 normal trichromats) dichromats to select the least chromatic stimulus from a colour set where the chromatic angle ( $H^*$ ) was systematically changed ( $9^\circ$  between adjacent stimuli) to cover the full colour circle. The second part of simulcheck (lightness matching task) was the application of a spatial version of the AMLA method used to measure the luminance factor ( $Y/Y_n$ ) of the stimuli selected in the first part. At a global level, real and simulated dichromats made very similar adjustments in both parts of the vischeck. However, the Coblis simulation produced important errors for both dichromat types. The most important ones appeared for protanopes in the second task of simulcheck: especially for primary red, simulated colour luminance-lightness was much higher than the one perceived by real protanopes. The practical implications of these results are discussed within the universal design framework.

## ATTENTION & COGNITIVE CONTROL

(111) Eye movements in inference making

**Ana Isabel Pérez<sup>1</sup>, Holly Joseph<sup>2</sup>, Teresa Bajo<sup>1</sup> and Kate Nation<sup>2</sup>**

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In the present experiment we investigate differences in comprehension associated with the generation of inferences in narrative passages. Young adults read several texts composed of four sentences each. The fourth sentence defined one of two conditions: 1) the expected condition, referred to a concept to which the first three sentences biased, or 2) the unexpected condition referred to a concept that, although possible within the previous context was less plausible than the expected. After reading each text, a comprehension yes/no question appeared. This question could be: a) correct with regard to the expected concept but incorrect regarding the unexpected concept, or b) incorrect with regard to the expected concept but correct regarding the unexpected concept. Eye movements were recorded during the presentation of the text and the question. We also assess reading comprehension by using the YARC test (Snowling et al., 2009), and working memory by using four tasks from the AWMA battery (Alloway, 2007). Results showed different patterns of eye movements in inference making depending on the participants' reading comprehension skills. Good comprehenders seem to be faster and more accurate elaborating inference than poor comprehenders. These results are discussed in terms of theories of reading comprehension.

(112) Conflict adaptation in recognition of facial expressions

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We investigated conflict adaptation when people evaluated facial emotional expressions. Participants judged whether a person was happy or sad by focusing on either eyes (Experiment 1) or mouth expression (Experiment 2). We produced a conflict situation in which incongruent faces were presented (smiling eyes/sad mouth, sad eyes/smiling mouth). We also presented congruent facial expressions (smiling eyes/smiling mouth, sad eyes/sad mouth) and neutral faces (smiling eyes/neutral mouth, neutral eyes/smiling mouth). To evaluate conflict adaptation, the ratio of congruent/incongruent faces was manipulated (25% and 75% incompatible trials). In the two experiments, we found interference effects with worse emotional recognition performance for incongruent expressions relative to neutral faces. Moreover, the interference effects were modulated by the amount of incompatible trials: Interference effects decreased as the percentage of incompatible trials increased. These results indicate that participants adapted to conflict in the recognition of facial expressions and feelings. The finding is discussed in terms of cognitive control models.

(113) Modulation of sense of humor on flexibility and interference processes

**Raúl López, Hugo Carretero-Dios, Alberto Acosta and Juan Lupiáñez**

**Universidad de Granada, Spain**

An experiment is described in which trait cheerfulness, as the temperamental basis of the sense of humor, is related with flexibility and cognitive control. Participants completed a task-switching that involved different conditions of repetition of attributes of the stimuli and interference. In each trial participants had to randomly decide whether the face displayed was of a man or a woman (gender judgment task) or whether it expressed anger or happiness (expressed emotion judgment task). The faces always appeared with a written word in the centre which could either match (congruent trials) or not (incongruent trials) their gender or expression. Results indicated that participants with high trait cheerfulness have a lower task-switching cost than those characterized by low trait cheerfulness. In these same participants the differences between congruent and incongruent trials are only significant in the emotional expression judgment task. The relevance of these findings is discussed for a better understanding of cheerfulness and its relationship with emotional regulation processes.

(114) Time of day and circadian typology influence cognitive control

**Tania Lara, Juan Antonio Madrid and Ángel Correa**

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Several studies have shown that time of day influences our cognitive functions, especially those related to executive control (e.g., response inhibition). However, only a few of them have additionally considered the influence of individual differences in circadian typology. We investigated circadian effects in automatic and controlled processes by a modified version of the Sustained Attention to Response Task (SART), which emphasized either speed strategy (automatic response style) or precision strategy (response-inhibition controlled response style). Wrist temperature,

performance on the psychomotor vigilance task and subjective activation were assessed as markers of circadian rhythmicity. Morning-type and evening-type participants, selected by a Morningness-Eveningness Questionnaire, performed two sessions at different times of day (8 a.m. and 8:30 p.m.). Circadian markers confirmed that our time of day manipulation was effective and produced differential effects on the two circadian-type groups. Error commission in SART performance was smaller when participants performed the task at their optimal time of day (morning for morning-type, and evening for evening-type). This finding was constrained to the condition emphasizing precision rather than speed strategy. Circadian factors, like time of day and circadian typology, can influence controlled rather than automatic processes involved in tasks demanding response inhibition.

(115) Response-stimulus interval modulates interference in the Stroop task both in children and adults

***Sophie Galer, Rémy Schmitz, Xavier De Tiège, Patrick Van Bogaert and Philippe Peigneux***

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In the Stroop task, an interference effect between reading a word naming a color and its printed color is a robust phenomenon. Whether changes in the duration of the interval between the subject's response and the next stimulus (i.e. the response-stimulus interval [RSI]) actually exert an effect on the size of the interference effect has not been systematically studied. Additionally, it remains uncertain how and whether RSI variations impact on the existence and/or amplitude of interference effects to the same extent in adults and children. In the present study, we tested the effect of within-task RSI variations on the interference effect in young children and young adults across two experiments. In the first experiment, we used fixed RSIs (1000, 1500 or 3000 milliseconds [ms] duration), whereas in the second experiment RSIs were randomly distributed within the 2000-5000 ms range. Results disclosed a robust interference effect in all experimental conditions. Also, the amplitude of the interference effect was higher at the shortest RSI duration (1000 ms) both in adults and children, suggesting more effective inhibitory processes at longer RSI durations. We observed in both groups faster responses at RSI durations above 3000 ms, independently of the stimuli categories, and slower responses in children than adults in all conditions.

(116) Working memory load, latencies and the truth table task

***Aline Sevenants, Kristien Dieussaert and Walter Schaeken***

***Katholieke Universiteit Leuven, Belgium***

The aim of the present study is to uncover the relation between cognitive ability and the answer patterns yielded by the truth table task. According to the Mental Models Theory, people with high working memory capacity answer according to two-valued or 'logical' answer patterns. The Suppositional Theory however predicts that the answer patterns given by the most intelligent ones are three-valued or 'defective'. Not only correlations are examined, but in three experiments it is tested with a dual task paradigm whether a differential load on participants' working memory alters their answer patterns. A positive correlation is observed between the cognitive ability measures and three-valued answer patterns, but no effect of the working memory



load manipulation is revealed. With an inspection of the classification times we aim to shed light on the processes underlying truth table judgements.

(117) Student engagement in the final dissertation: An integrative conceptual framework and empirical analysis

**Serge Dupont<sup>1</sup>, Benoit Galand<sup>1</sup> and Frédéric Nils<sup>2</sup>**

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According to Skinner and colleagues' model on academic engagement (Skinner, Furrer, Marchand, & Kindermann, 2008; Skinner, Wellborn, & Connell, 1990), the social context wherein learning activities take place strongly influences student's self-perceptions, which, in turn, promote their engagement in a learning task. The present study aimed to test an expanded version of this model in the context of the completion of the final dissertation during the last academic year. This expanded version comprised (1) the role of the social context as a structure, warmth and autonomy support provider, (2) the students' perceived autonomy, relatedness and competence, and (3) their behavioral, cognitive and emotional engagement towards the final dissertation. Three hundred and thirty one students enrolled in their last academic year completed a self-reported questionnaire tapping the targeted variables. Structural equation modeling (SEM) analysis revealed that the social context predicted participants' perceived autonomy, competence and relatedness, which in turn predicted better behavioral, cognitive and emotional engagement. Cognitive engagement was independently predicted by the three participants' self-perception scales, and indirectly by the different facets of the social context.

(118) Impacts on task-performance: Verbal instructions and cue translations

**Alexander J. Kirkham and Paloma Mari-Beffa**

**Bangor University, UK**

Previous work stated that verbalisations of task cues (both spoken aloud and presented aurally) could provide facilitation towards goal-directed behaviours, compared to performing the same task in silence (Kirkham, Breeze, & Mari-Beffa, 2012). Such facilitation from these verbalisations was noted as being substantial within measures of mixing cost, with no impact upon switch cost. In our present work we demonstrate how translation of task cues can impact upon these measures. We present results of three experiments, each with different task cues that required varying degrees of translation. Where minor translation was required, participants demonstrated these same significant effects upon mixing cost. A similar effect, only amplified to a greater extent, was achieved when a larger degree of task cue translation was required. Finally, where no task cue translation was required, this effect was removed, with performance in all three conditions being highly similar. Our results demonstrate that the amount of facilitation to be gained towards task performance when using verbal strategies is highly dependent upon the task cue being used. As task cue complexity increases, the amount of benefit obtained with the use of verbal strategies also increases over that found when performing the task in silence.

(119) Dynamics of task-set preparation

**José Carlos F. Valverde, Sonia Alguacil, Eduardo Madrid and María Ruz**  
**Universidad de Granada, Spain**

Planning in advance is a conspicuous human skill. The neural mechanisms by which advance preparation is achieved are currently under extensive investigation. A previous experiment from our investigation group (Ruz & Nobre, 2008) suggested that the brain enters into task-specific states by the time the onset of the target approaches. However, that study could not distinguish whether the brain uses ample and fixed time to establish task-sets or whether their onset is synchronized with the estimated time of arrival of the target. We designed a new paradigm to study when the neural activation exactly appears: a cue-target paradigm which had four cues to point the semantic/perceptual nature of the task, and which also had three blocks of different cue-target-intervals (CTI). We measured brain activity while the participants were performing the task by means of a high density electrophysiological recording system (EGI). Preliminary behavioral results suggest that the two tasks are equated in terms of speed of responses (RT) and that we obtain normal task-switching effects at the 3 CTIs. Further analyses using topographical approaches, together with classical ERP amplitude comparisons and frequency analyses, will help us investigate the dynamics of semantic and perceptual task preparation.

(120) Relationship among processing levels in the context of the Monty Hall dilemma

**David Aguilar Lleyda and Elisabet Tubau Sala**  
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Dual-processing accounts of thinking differentiate between two type of processes (type 1 and 2), but there is much to be known about how they relate to one another. We used the Monty Hall dilemma (MHD) as a scenario to investigate this issue. Type 1 was promoted by making participants practice with a computer version of the MHD, whereas type 2 was required by a reasoning questionnaire. Awareness of the knowledge acquired in the training phase was also assessed at the end of the computer game. Furthermore, participants completed the Cognitive Reflection Test (CRT) as a measure of reflective thinking. Traditional two-level explanations cannot account for our results, as we found at least three levels of knowledge related to the MHD: implicit (level 1) and explicit (level 2) knowledge of the changing-winning contingency; and explicit knowledge of the probabilistic structure of the problem (level 3). The first two were related, but they were independent from level 3. Performance in the CRT was only associated with level 3. Results are congruent with some theoretical proposals suggesting a third type of thinking processes (reflective thinking), which, as shown by our results, could be independent from the other processing levels.

(121) Predicting academic and social school performance with executive functions tasks

**Julián Marino, Juan Pablo Zorza, Carolina Pérez-Dueñas and Alberto Acosta Mesas**  
**Universidad de Granada, Spain**

Executive functions (EF) are related to high cognitive functioning. Different theoretical models of EF agree on the involvement of different partial functions and a shared central executive component. Our objective was to predict academic and social

performance at school using neuropsychological EF tasks loading high on the Central Executive System (shared component). The Trail Making Test, Stroop Test, and verbal fluency paradigm were selected and administered to a sample of primary (N=89) and secondary (N=93) school students from Granada (Spain). Academic measures used were grade point average and teacher judgment of intelligence. Social performance was evaluated both by classmates (choice/rejection sociograms and prosocial judgments) and teachers. Hierarchical Multiple Regression Analyses were computed, introducing EF values as independent variables. Predictions were mostly significant, particularly those for academic mean ( $R^2 = 0.51$ ). Action Fluency and TMT- B were particularly significant predictors, as compared to other verbal fluency and TMT measures. Stroop tasks only predicted classmate social judgment (primary school), as with action fluency. Primary school models were stronger than secondary ones. EF only significantly predicted social performance (secondary students) when judged by teachers. Results are discussed in light of the EF unity and diversity problem, specifically considering its impact on integral school achievement.

## EMOTION & SOCIAL COGNITION

(122) Does sleep protects declarative memory against emotional interference?

**Médhi Gilson, Gaétane Deliens and Philippe Peigneux**  
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Recent evidence suggests that sleep participates in the protection of declarative memories from associative interference. However, it is not known whether sleep plays a similar protective role against emotional interference. In our study, 22 healthy participants learned 40 word-pair associates in a specific emotional context (sad or happy) induced by music and guided imagery, followed by post-learning sleep deprivation (SD) or by regular sleep (RS). Four days after learning, participants recalled 20 word-pairs in the same emotional context as at learning (no interference condition = NI), and 20 other word-pairs in the opposite emotional context (interference condition = I). The emotional induction procedure was efficient in 13 out of 22 participants, hence “induction efficacy” was entered as a between-group factor in the analyses. A repeated measure ANOVA conducted on recall performance revealed a main effect of post-training sleep ( $p=0.013$ ; mean recall RS = 14.36 vs. SD 17.77 word-pairs) and an interaction between sleep, interference and induction efficacy factors. Post-hoc analyses disclosed an interference effect ( $NI>I$ ) in the SD condition but only when induction of emotion was efficient. Altogether, our results suggest that post-training sleep releases recently learned memories from their emotional context, eventually protecting consolidated memories from emotional interference.

(123) The time course of personality influence on cognitive processing of emotional pictures: An event-related potential study

**Solange Mardaga and Galina Lakimova**  
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A large body of research demonstrated that personality modulates emotional response, regarding somatic, cognitive, behavioral and subjective aspects. Although

automatic aspects of the emotional response play a part in these differences, recent studies advanced that personality dimensions were related to emotion-regulation differences as well. Therefore, the present study aimed to investigate the influence of personality on early and late components of the event-related potentials (ERPs) recorded after emotional picture presentation. ERPs were recorded in 54 healthy subjects during 4000ms following the 2000ms-presentation of neutral and emotional pictures from the International Affective Picture System. Participants completed the Temperaments and Characters Inventory-Revised personality scale. Emotional characteristics of the pictures modulate early as well as late component amplitude, and unpleasant pictures elicit longer late positive potential (LPP) than neutral and pleasant ones. Novelty seeking influenced early attention allocation to unpleasant pictures, as reflected by the P200 amplitude. Harm avoidance and self transcendence modulated the amplitude of the LPP following both pleasant and unpleasant pictures, up to 1000ms after picture offset, indicating an influence on sustained attention and emotion regulation. The present results suggest that personality dimensions modulate different stages of the cognitive processing of emotional pictures, and therefore refer to different mechanisms.

(124) Relational processes and derived generalization of attentional bias for threat  
**Sonsoles Valdivia-Salas<sup>1</sup>, Sebastián Lombas<sup>1</sup>, Geert Crombez<sup>2</sup> and Carmen Luciano<sup>3</sup>**

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Anxious individuals selectively attend to, and show difficulties disengaging from, unpleasant emotional stimuli. Previous research employing the spatial cueing task has shown that cues that signal an aversive stimulus (e.g., white noise) elicit attentional capture and holding effects. An area of interest is to what extent relational processes underlie the derived generalization of attentional bias across stimuli situations. Our goal was to explore the emergence of attentional bias for a neutral stimulus in an equivalence relation with a threatening cue. Healthy university students participated. First, two 3-member equivalence classes (A1-B1-C1, A2-B2-C2) were trained. Participants were then presented with an exogenous spatial cueing task in which either A1, A2, C1 or C2 cued the location of a target across valid and invalid trials. After baseline assessment of attentional capture and holding by the four cues, A1 was provided with a threat value through pairings with an aversive white noise. Response latencies to A1 and A2, and also to C1 (in an equivalence relation with threatening A1) and C2 (in an equivalence relation with nonthreatening A2) were then assessed. Results are discussed considering the role of relational learning on complex behavior such as attentional bias.

(125) Migraineurs should improve their level of emotional competence!  
**Stephanie Miliche, Aurélie Muls and Moira Mikolajczak**  
**Université catholique de Louvain, Belgium**

Previous research has shown that the level of emotional competence (EC) plays a crucial role in health. While the impact of EC on mental health has been amply investigated, there is a lack of research on EC and physical health. This study aimed to explore the role of EC in migraines. We investigated particularly (a) whether there is a

lack of EC in migraineurs ; (b) whether the intensity, the duration and the frequency of migraine attacks vary according to the level of EC ; (c) whether EC have a protective impact on migraineurs' quality of life. 500 fully diagnosed migraineurs completed questionnaires about EC, migraine attacks and quality of life. Results showed that (a) migraineurs' level of EC do not significantly differ from controls' ; (b) EC has a moderating effect on migraine attacks (the higher the level of EC, the less frequent the crises); (c) EC has a moderating effect on migraineurs' quality of life (the higher the level of EC, the higher the quality of life). Findings suggest that developing psychological interventions to improve emotional competences could reduce the frequency of migraine crises and enhance migraineurs' quality of life.

(126) Sensitivity to reward modulates brain activity and connectivity during erotic stimulus processing

**Victor Costumero, Alfonso Barros-Loscertales, Juan Carlos Bustamante, Noelia Ventura-Campos, Paola Fuentes, Patricia Rosell and Cesar Ávila**  
*Universitat Jaume I, Spain*

Behavioral activation system (BAS) from Gray's reinforcement sensitivity theory (RST; Gray 1982) is a neuro-behavioral systems involved in the processing of rewarding stimuli that has been related with dopaminergic system. Gray's theory hypothesizes that the functioning of dopaminergic brain areas will be modulated by BAS-related traits. To test this hypothesis we analyze brain activity and connectivity in an fMRI study where 31 heterosexual men viewed erotic and neutral pictures and cues which predicted their appearance. Participants completed sensitivity to reward (SR) scale (from SCSRQ; Torrubia et al. 2001) as measure of BAS-related trait. Activity and functional connectivity (psycho-physiological interaction analysis) in reward-related areas (amygdala and ventral striatum, VS.) for erotic pictures compared to neutral pictures were correlated with SR scores. Analyses were performed with SPM8. Results showed that SR scores correlate positively with brain activity during the reactivity to erotic pictures in lateral orbitofrontal cortex (bilaterally) and right VS. Indeed, connectivity between amygdala and medial prefrontal cortex was positively correlated with SR scores. All results at  $p < 0.05$  FWE-corrected. This study shows a SR modulation in both the activity and the connectivity of dopaminergic system. These results are consistent with the models which propose the dopaminergic brain areas as a neural substrate for BAS.

(127) Stroop effect in a non-emotional and emotional task

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The aim of the present study was to examine the Stroop effect in both a cognitive and an emotional task, and to explicitly make a comparison between them. We carried out an experiment employing ERPs (28 electrodes) and faces of both males and females displaying the emotions of fear and happiness. In the cognitive task we generated conflict using the word "male" or "female", so that in this task the target response was to the gender of the face. In the emotional task, the conflict was created by using the words "fear" and "happiness", and so the target response was to the emotion of the face (Egner et al, 2008). Results showed a clear main effect of task type and conflict, in the amplitude of the same group of electrodes and within the same time window

between 380-690 milliseconds. Latency was influenced only by task type. The emotional task was slower and more positive in central frontal sites than the cognitive task. In central parietal electrodes the emotional task was also slower and more negative than the cognitive task. As for the conflict variable, incongruent trials showed greater negativity in central parietal electrodes and greater positivity in frontal sites than congruent trials. No interaction between types of task and conflict was found.

(128) The illusion of control in a group context: Individual and coordinated choices  
**Ana Catarina Gonçalves Vieira de Castro<sup>1</sup>, Marcelo Frota Lobato Benvenuti<sup>2</sup> and Saulo Missiaggia Velasco<sup>2</sup>**

**<sup>1</sup>University of Minho - <sup>2</sup>University of São Paulo**

In some situations, people report a degree of control over events which are, in fact, totally independent of their behavior, a phenomenon known as the illusion of control. In the present study, we analyzed estimation of control over environment in a situation where people needed to make choices first individually and then in coordination. At first, participants reported individually whether they wanted to administer a medicine to several fictitious patients. Then, the participants had to reach a consensus and only following group decision the medicine was administered or not and feedback was given. The patients were healed 50 percent of the time, independent of the group decision. All the participants reported the medicine as being to some extent effective (40 to 60 percent) in healing the patients, therefore showing an illusion of control. We showed that the critical variable for determining illusion of control in the present study was the number of coincidences between group choices and outcomes, even when the individual choices diverged from the group decision. The variables responsible for the production of this phenomenon are still not yet understood. Illusion of control may be a function of adaptive mechanisms in both individual and social context.

(129) Being 'in control' may make you lose control: The role of self-regulation in unethical leadership behavior

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The present article suggests that the nature of the leadership role can lead to unethical leadership because the constant pressure that leaders face can limit the willpower that is required to behave according to organizational norms and standards. Drawing upon the ego depletion and moral self-regulation literature, we examined the role of self-regulatory depletion in promoting unethical leadership as contingent upon leaders' moral identity. A laboratory experiment and a multisource field study showed that regulatory resource depletion promotes unethical leader behaviors among leaders low in moral identity. No such effect was found among leaders with a high moral identity.

(130) Threat and right-wing attitudes: A cross-national approach

**Emma Onraet, Alain Van Hiel and Ilse Cornelis**

**Universiteit Gent, Belgium**

Threat relates to right-wing ideological attitudes at the individual level. The present study aims to extend this relationship to the national level. More specifically, in a

sample of 91 nations, we collected country-level indicators of threat (including inflation, unemployment, gross national product, homicide rate, and life expectancy). Moreover, we analyzed data from the European and World Value Survey (total N = 134,516) to obtain aggregated country-level indicators for social-cultural and economic-hierarchical right-wing attitudes for each of these countries. In accordance with previous findings based on the individual level, a positive relationship between threat indicators and right-wing attitudes emerged. This relationship was stronger than what was usually reported at the individual level. In the discussion, we focus on the mutually reinforcing influence at the individual and national levels in terms of right-wing attitudes.

(131) When do we think more about woman? Gender accessibility and temperature

**Gloria Jiménez-Moya, Guillermo B. Willis, Julio Santiago and Rosa Rodríguez-Bailón**

**Universidad de Granada, Spain**

Traditional gender stereotypes determine that women are warm and close, and men are cold and distant in their social relationships. Building on the premise that abstract concepts are, in some ways, linked to physical experiences, we propose that the experience of physical temperature (cold vs. hot) will modulate the accessibility of “men” and “women” concepts. In Study 1 female participants were exposed to either cold (17°-19°) or hot (21°-23°) environmental temperature, and were asked to write twelve first names. Results showed that participants in the cold condition wrote more male than female names, whereas participants in the hot condition wrote more female than male names. In Study 2, female participants drank either cold (15°-21°) or hot (45°-50°) tea. We then asked them to report the gender of a set of ambiguous faces. Results showed that participants tend to categorize ambiguous faces as women in the cold-tea condition, and as men in the hot-tea one. Results suggest that the accessibility of social concepts (such as gender) is affected by sensorimotor processes, but this effect is mediated by a complex set of factors that still needs to be unravelled.

(132) The dehumanization map and its consequences on intergroup relations

**Rocío Martínez<sup>1</sup>, Rosa Rodríguez-Bailón<sup>1</sup>, Miguel Moya<sup>1</sup> and Tendayi Viki<sup>2</sup>**

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The dehumanization model (Haslam, 2006) defines two fundamental forms of considering outgroups as less human than ingroup: animalistic and mechanistic. We first present a study that examined animalistic and mechanistic dehumanization using a new measure. We examined whether people associate different groups with more animal vs. machine related words. The results allowed us to build a map where twenty-six groups were placed differently as a function of their scores on the animalistic and mechanistic dimensions. We found that participants were more likely to associate some groups (e.g. Arabs, Gypsies) with animal words whereas others (e.g. Germans, Japanese) were associated with more machine words. Our results also extend on inhumanization research by showing some of the different consequences of dehumanization on intergroup relations. In a second study we focus on social distance – that is, participant’s intention to interact with dehumanized people – and we investigated whether the animalized group is more preferred to have social contact (vs. professional) and if the mechanized one is chosen more for professional

contact (vs. social). The results of both studies highlight the importance of creating new measures to approach this new implicit prejudice phenomenon and show its effect on intergroup closeness.

(133) People's perception on subliminal advertising  
***Gigliola Brintazzoli and Eva Van den Bussche***  
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There is a lot of controversy about the applicability of unconscious perception in everyday life and advertising and authors openly question its existence (e.g., Broyles, 2006). Furthermore, advertisers deny ever using subliminal advertising (Rogers & Seiler, 1994). Still, ever since Vicary's (bogus) "Drink Coca-Cola" and "Eat popcorn" study in 1957, the idea of unconscious influencing has had a large impact on the public. We therefore wanted to assess people's perception on subliminal influencing (SI). Ninety-nine psychology students received a definition of SI in an experimental context. Afterwards, they were asked to answer six yes-no questions assessing their perception on these kinds of effects in a daily life and advertising situation. Almost all participants believe that SI is present in daily life and that people in general and they themselves are susceptible to it. In advertising, people also believe SI is present, but they are less convinced about its effectiveness for people in general and, especially, for themselves. Interestingly, men believe to be more resistant to subliminal advertising than women. These results show that a large discrepancy exists between the effectiveness of subliminal influencing in everyday life and advertising, its actual use and the perceptions people hold about it.

## **LEARNING & MEMORY**

(134) The prevalence of event clusters in episodic future thoughts  
***Julie Demblon and Arnaud D'Argembeau***  
***Université de Liège, Belgium***

We used an event-cueing paradigm to investigate how episodic future thoughts (i.e., representations of specific events that might happen in the future) are structured in memory. Participants first retrieved a set of memories and imagined a set of events that might take place in their future. Next, they responded to each of these cueing events by retrieving or imagining another related personal event (cued event). Finally, they coded the relations characterizing pairs of cueing and cued events (e.g., one event might have caused the other). In a first study, we found that, as is the case with memories, future events are commonly embedded in broader event sequences (event clusters) that link a set of envisioned events according to causal and thematic relations. In a second study, we found that the frequency of future event pairs that were characterized by a causal relation increased with the temporal distance of the envisaged time period. These findings provide evidence that future thinking relies on multiple representational systems that are organized hierarchically, with general autobiographical knowledge structures providing a frame that organizes imagined events in overarching event sequences. Moreover, the organizational principles underlying future thinking vary somewhat with the distance of envisioned events.



(135) Vanishing retroactive inhibition in running immediate memory

**Marcos Ruiz and María R. Elosúa**

**UNED, Spain**

We have challenged the supposition that in a running memory recall task active updating takes place (Elosúa & Ruiz, 2008; Ruiz, Elosúa, & Lechuga, 2005). In particular, our data cast doubt on the active intake and retroactive inhibition components. The purpose of this research was to examine whether retroactive inhibition occurs while updating the target set. Participants were presented with unknown-length lists of consonants, followed by a probe for recognition. The ISIs were 500ms long, but for a critical ISI (CISI=1000ms). In two groups (G1 and G2) the three target-items were defined as the one before CISI, the one just after CISI and the last one in the list. G2 participants knew the first target position in the list beforehand, while G1 knew it just after its presentation. For another group (G0) CISI was irrelevant, as the last three items of the list were the target set. We found a higher false-alarm rate when the probe-letter was the one before the first target for G0 participants. Our results showed that a pre- (G2) or immediate post-cueing (G1) of the first target allow for inhibition, compared to a delayed cueing (G0).

(136) The effect of the suppression' executive demands in visuospatial and verbal span tasks in Alzheimer patients and healthy elderly

**María José Contreras<sup>1</sup>, María Rosa Elosúa<sup>1</sup>, Matías Peinado<sup>2</sup> and Pedro R. Montoro<sup>1</sup>**

**<sup>1</sup>UNED, Spain - <sup>2</sup>France Alzheimer**

Several studies have observed higher visuospatial memory impairments in Alzheimer disease (AD) patients compared to healthy elderly, even in the early stages of the dementia (e.g. Corkin, 1982; Grossi, Becker, Smith & Trojano, 1993). Thus, the impairment of the spatial component of memory might be a potential symptom of AD. Although a way to assess this component entails using the well known visuospatial span task, recently, a new method has been proposed (Beblo et al., 2004; Toepper et al., 2010). This method made use of the Corsi blocks task including an executive strategy of information suppression. The present study has adapted this new task for application in AD patients. The main aim was to examine the visuospatial impairment in AD patients (n=19) compared to healthy elderly (n = 18). Specifically, we explored (1) whether spatial and verbal deficits were reliable in AD; and (2) the effect of the executive demands in both spatial and verbal memory. The results showed that AD patients demonstrated an impaired performance compared to controls in all the tasks. In addition, effects of the information modality, the suppression strategy and the interaction between these factors were also observed in AD patients.

(137) Updating information in working memory: Facilitation and interference effects

**Santiago Pelegrina, María Eva Puga and Cristina Lendínez**

**Universidad de Jaén, Spain**

Updating in working memory involves substituting some information maintained in memory for new information. In working memory updating tasks there may be different types of information which may be more or less similar. On the one hand, the new information to be memorized; on the other hand, the information to-be-updated; and in addition there may be other information which must be maintained available

for future use without modification. Two experiments were conducted to determine how the similarity among the different types of information affects the updating process. Results showed two different patterns related to the similarity of the information. The similarity between the new and the to-be-updated information produces facilitation, whereas similarity between the new information and that information to be hold in memory without modification leads to interference. Both opposite effects are explained by a feature overwriting mechanism.

(138) Just one look: Direct gaze disrupts visual working memory encoding

**Jessica Wang<sup>1</sup> and Ian A. Apperly<sup>2</sup>**

**<sup>1</sup>Université catholique de Louvain, Belgium - <sup>2</sup>University of Birmingham, UK**

Studies have shown that direct gaze (also known as eye contact) captures visual attention (e.g., Senju et al., 2005). This is likely to be beneficial for social interaction and communication. Relatedly, Hood et al. (2003) demonstrated that faces displaying direct gaze are better remembered. These findings point towards a facilitative role of direct gaze. Nonetheless, other evidence suggests that direct gaze plays a disruptive role in concurrent cognitive tasks (Conty et al., 2010). This raises questions about the effects direct gaze may have on concurrent memory tasks. The current study addresses this topic by employing a change detection paradigm. Across two experiments, we found that firstly, participants' visual working memory performance was worse when direct gaze was present in the display compared to when other gaze directions were present. Secondly, participants' performance recovered when new visual information followed direct gaze stimulus. Interestingly, the recovery effect was not only observed when direct gaze could be reinterpreted in combination with new gaze directions, but also when direct gaze was merely overwritten by a low-level mask. The current findings lend support to the idea that the directionality of direct gaze effect depends on task context, due to its nature of capturing attention.

(139) The impact of implicit musical sequence learning on short-term memory for music

**Simon Gorin and Steve Majerus**

**Université de Liège, Belgium**

The influence of long-term memory (LTM) knowledge on short-term memory (STM) has been amply documented in the verbal STM domain. The present study demonstrates that the dependency of STM on LTM knowledge is not specific to the verbal domain, but can also be observed for temporary storage of musical information. Twenty-five participants first participated in an incidental learning experiment for musical sequences; they heard a continuous sequence of musical tones whose succession was governed by an artificial grammar. Next, they performed a musical STM task, in which they had to reproduce musical sequences of increasing length; half of the sequences obeyed to the same succession rules as those embedded in the incidental learning sequence. A significant advantage for reproducing legal over illegal lists was observed. These results not only demonstrate that musical STM depends on LTM musical knowledge, but more generally they show that verbal and musical STM are supported by similar mechanisms.

(140) Intact motor procedural learning in developmental coordination disorder  
***Lejeune Caroline, Catale Corinne, Schmitz Xavier, Meulemans Thierry and Lambert Mandy***

***Université de Liège, Belgium***

Developmental Coordination Disorder (DCD) is a developmental disorder characterized by marked impairments in motor skills. Despite its negative impact on daily activities and on cognitive and academic performance, the mechanisms underlying DCD remain largely unknown. The aim of our study was to investigate the hypothesis of a motor procedural learning impairment in DCD, which would explain difficulties in motor learning and automation of novel motor skills in these children. A total of 38 children (19 with DCD and 19 typically developing [TD] children) aged between 6 and 12 years old participated in this study. Children were administered a task adapted from the traditional shapes' mirror-tracing task. Results show that TD children performed the task faster than children with DCD. The groups did not differ, however, in their rate of learning, or in the extent to which they were able to generalize the ability to new shapes. These results suggest that motor procedural learning is intact in DCD. The implications of these findings in our understanding of DCD are discussed.

(141) The impact of stimulus-related attention on verbal short-term memory  
***Sophie Rasier<sup>1</sup>, Martial Van der Linden<sup>1,2</sup> and Steve Majerus<sup>1</sup>***

***<sup>1</sup>Université de Liège, Belgium - <sup>2</sup>Université de Genève, Switzerland***

An increasing number of studies suggest close interactions between verbal short-term memory (STM) capacity and attentional capacities. Here we demonstrate that stimulus-related attention, involved in the detection of task-irrelevant stimuli, interacts with verbal STM load and capacity. Participants performed standard digit and word immediate serial recall tasks, as well as a verbal STM probe recognition task assessing the ability to inhibit stimulus-related attention; in this task, brief distractor stimuli occurred unexpectedly during the retention interval of the STM task which required the retention of 2, 4, 6, or 8 letter sequences. We observed that participants were slower for making STM probe recognition judgments when a distractor stimulus had occurred during the retention interval, and this for 2-letter sequences, but not for longer sequences, suggesting that high-load STM conditions inhibit stimulus-related attention processes, leading to an inattentional blindness effect previously shown in the visual STM domain. Importantly, interindividual differences in the size of the participants' reaction to the distractor stimulus predicted performance in standard verbal STM tasks, participants with the weakest reaction to the distractor stimulus showing the best performance on verbal STM tasks. These results suggest that efficient inhibition of stimulus-related attention is a critical determinant of verbal STM capacity.

(142) Memory testing for the early diagnosis of Alzheimer's disease: Comparative study

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Important progress has been made in understanding the discriminant features of memory tests for the early diagnosis of Alzheimer's Disease (AD). However, these memory tasks may not have equal sensitivity for the detection of AD. Indeed, no study has assessed this issue. The aim of this work is to compare the discriminative power of different memory tests selected for early diagnosis of AD in memory clinics included in the European Alzheimer's Disease Consortium. In this context, we propose to present the different memory tasks in a continuum from the tasks that did not give any support at encoding and/or retrieval to the tasks that offered progressively more support. The results are presented in a table that includes for each task the sensibility and specificity values, as well as diverse information regarding the groups examined (mean age, MMSE, etc.). The analysis of this table suggests that there is great methodological heterogeneity between studies which renders the comparison of results difficult. However, it appears that tasks that offer more support during encoding and retrieval appear to be more discriminant. Methodological recommendations are proposed in order to compare studies more efficiently in further research.

## CLINICAL

(143) Assessment of the psychostimulant properties of alcohol in humans

**Fanny Kreusch and Etienne Quertemont**

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Only few studies have tried to measure the psychostimulant properties of alcohol in humans (Addicot et al., 2007). In the present study, we have assessed the psychostimulant effects of ethanol with both explicit and implicit measures. We used a 4 conditions balanced placebo design that crossed the type of drink administered (alcohol or placebo) with the instructions (expectation of drinking alcohol or placebo). Following van den Wildenberg and colleagues (2006), we first assessed alcohol psychostimulation explicit expectations with an auto-report questionnaire (Alcohol Expectancy Questionnaire) and with an implicit association task. This task measured the association between alcohol and psychostimulation (Unipolar Implicit Association task). Participants were then asked to have a drink of either alcohol or placebo. After drinking, alcohol-induced psychostimulation was assessed with both an auto-report questionnaire (Biphasic Alcohol Effects Scale) and an original objective measure of psychostimulation involving a task in which the participants had to press a key to move a manikin on a computer screen. The preliminary results of the study indicate

significant correlations between these various explicit and implicit measures of alcohol-induced psychostimulation.

(144) A new way of predicting everyday life functioning: Validation of a computerized meeting preparation task with persons diagnosed with schizophrenia

**Julien Laloyaux<sup>1</sup>, Marie-Noëlle Levaux<sup>2</sup>, Haitham Mourad<sup>2</sup>, Hervé Bertrand<sup>2</sup>, Marc-André Domken<sup>2</sup>, Martial Van der Linden<sup>1,3</sup> and Frank Larøi<sup>1</sup>**

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Deficits in everyday life functioning are a core feature of persons diagnosed with schizophrenia. However, functional outcome is usually evaluated with questionnaires and performance-based assessments, all of which contain a number of limits. We developed a computerized real-life activity task (meeting preparation task) where participants are required to prepare a meeting room. Twenty-one individuals diagnosed with schizophrenia and 21 matched healthy controls completed the task. Patients were also evaluated with a cognitive battery and measures of symptomatology and functional outcome. Results showed that performance on the computerized task significantly differentiated patients and controls for a certain number of variables. These variables, combined into a composite score, were significantly correlated with both cognitive functioning and functional outcome. Moreover, this composite score significantly predicted 39% of functional outcome, whereas a cognitive composite score did not reach significance. In addition, when the meeting task composite score was combined with symptomatology and the cognitive composite score, these measures significantly predicted 70% of functional outcome. These findings suggest that the meeting preparation task provides a valid and significant indication of the level of everyday life functioning in patients with schizophrenia, and may be viewed as a valuable instrument in both an evaluation and remediation context.

(145) Early child and family risk factors associated to externalizing behavior in young children reared in low contextual risk environment

**Isabelle Roskam, Jean Christophe Meunier, Marie Stievenart and Marie-Pascale Noël**

**Université catholique de Louvain, Belgium**

The main objective of the current study was to identify child and family risk factors associated to externalizing behavior (EB) in young children reared in low contextual risk families. Based on two relevant sets of literature, correlations were hypothesized between EB and personality and inhibition as child factors, and parenting and attachment as family factors. The hypothesis of a cumulative effect from the combination of these four risk factors was tested. Data was collected in a longitudinal 2-waves design among 161 non-referred and referred children aged 3 to 5 years old and their parents from middle to high socio-economic level. The four risk domains were assessed at the onset of the study while EB was rated both at the onset of the study and in the 24-month follow-up. Analyses combined variable- and person-oriented analyses. Results confirmed that these four risk domains were each both strong correlates of EB in preschoolers with low contextual risk and efficient at discriminating non-referred from referred preschoolers; that their combination

regardless of their content (cumulative risk) made a strong prediction of both later EB and non-referred vs. referred sample belonging. The results are discussed both for research and clinical purposes.

(146) Temperament profiles in children diagnosed with ADHD: Low effortful control and poor emotional regulation

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This work sought to identify children's temperament dimensions that are associated with Attention Deficit Hyperactivity Disorder (ADHD) in school years. Temperament characteristics in children with ADHD (clinic group) were compared to those exhibited by a normative sample (control Group). The clinic sample was composed of 65 children (46 boys, 19 girls) with a diagnosis of ADHD aged from 7 to 12 years old. The normative sample was composed of 1454 children (677 boys, 777 girls), with the same age range. Both samples belonged to families with similar social backgrounds. To measure temperament, a Spanish version of the Temperament in Middle Childhood Questionnaire (TMCQ; Simonds & Rothbart, 2004) was used. Mothers informed of their children's characteristics by filling out the TMCQ. The results showed that ADHD children, compared to normative ones, scored lower in Activation control, Focused attention, Inhibitory control, Low intensity pleasure, and Falling reactivity-soothability, and scored higher in Anger/frustration, Impulsivity and Sadness. These results are discussed in the light of executive function deficits in ADHD that lead these children to exhibit lower effortful control and poorer abilities in emotional regulation

(147) The influence of sexual assault in childhood on the feeling of parental competence

**Esther Thiltges, Marie Fivet and Adélaïde Blavier**  
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The purpose of this research was to study the feeling of parental competence in a group of 11 women who were victims of sexual aggression during childhood (0-16 years). We compared their feeling of competence with a matched control group. Our main hypothesis was that the feeling of parental competence would be lower in the sexual assaulted sample than in the control group. We also compared how women perceived her parents' competence, the presence of other infantile ill-treatments during childhood, and the intensity of the undergone trauma. Our research was conducted with three tools: the questionnaire of self-assessment of the parental competence, the TraumaQ and a semi-structured interview. Our results showed the feeling of parental competence was lower for mothers who were sexually assaulted than in the control group. Moreover, the stronger the trauma was, the lower the feeling of parental competence was. Furthermore, mothers felt less competent when they were also victims of other infantile ill-treatments during childhood. And mothers who were victims of sexual assault see their parents as less competent than the control group does. Finally, we found other characteristics influencing the feeling of parental competence like the age at the beginning of the facts, the status of the aggressor, and the presence of depressive and sleeping disorders.

(148) The real effects of a short helping skills training program

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The therapeutic relationship plays a significant role in the psychotherapy effectiveness (Norcross & Wampold, 2011). Given the importance of this relationship, we developed a short helping skills training programme for undergraduate psychology students. Our training programme is based on the “common factors approach” and on existing helping skills trainings (e.g., Hill et al., 2008; Lang & van der Molen, 2009). The empiric evaluation of the training efficiency was conducted on a sample of 72 undergraduates in psychology (2<sup>nd</sup> bachelor). The assessment of the helping skills was based on Miller’s pyramid, a well-established model for the assessment of clinical skills (Miller, 1990). In addition to a self-report questionnaire, the helping skills were assessed by three objective measures (a multiple choice test, a video test and a simulation) corresponding to the three first levels of Miller’s Pyramid (1°knows, 2°knows how, 3°shows). We also evaluated some potential outcomes of the training (personality, empathy, emotional competences). Results suggest that the training is effective. Students’ helping skills significantly improved as a result of the training, and this improvement was noticed by both the student and independent judges. This study indicates that such training programs provide students with the opportunity to develop their helping skills.

(149) Effective communication of risks to young adults: Using visual aids to increase condom use and STD screening

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In a longitudinal experiment we examined the effects of a brief risk awareness intervention (i.e., a sexual health information brochure) in a large sample of sexually active young adults (n=744). We assessed the influence of gain- and loss-framed messages, and visual aids, on affective reactions, risk perceptions, attitudes, behavioral intentions, and reported behaviors relating to the prevention and detection of STDs. Results indicate that gain-framed messages induced greater adherence for prevention behaviors (e.g., condom use), whereas loss-framed messages were more effective in promoting illness-detecting behaviors (e.g., making an appointment with a doctor to discuss about STD screening). The influence of the framed messages on prevention and detection of STDs was mediated by changes in participants’ attitudes toward the health behaviors along with changes in their behavioral intentions. Moreover, when visual aids were added to the health information, both the gain- and loss-framed messages became equally and highly effective in promoting health behaviors. These results converge with other data indicating that well-constructed visual aids are often among the most highly effective, transparent, fast, memorable, and ethically desirable means of risk communication. Theoretical, economic, and public policy implications of these results are discussed.

(150) Neuropsychanalysis: A review of its principals discoveries in dreaming, attention and process of grief

**Manuel Fernández-Alcántara<sup>1</sup>, Sonia Alguacil<sup>1</sup>, Tania Lara<sup>1</sup>, Raúl López<sup>1</sup>, Cayetana Correa<sup>2</sup>, Margaret Zellner<sup>3</sup> and Francisco Cruz-Quintana<sup>1</sup>**

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Neuropsychanalysis is a discipline that promotes the relation between Freud's ideas and the discoveries of cognitive neuroscience. The most relevant authors working on this perspective are Panksepp, Solms, Zellner, Damasio and Kandel. We performed a systematic review in the databases Scopus, PubMed and PsychInfo in order to highlight the key findings resulted from this dialogue. First, we analyzed the point of view of Mark Solms about dreaming. He proposed the difference between dreaming and REM state, indicating that dreams are not only a random activation of forebrain structures. Second, we explained the concept of preconscious (from Freud's first topology) and its relation with recent discoveries in the field of attention. Finally, we reviewed studies that used functional magnetic resonance imaging (fMRI) techniques with people in bereavement. These studies showed that the nucleus accumbens might be a critical structure underlying the difference between "normal" and complicated grief. These results are related to Freud's hypothesis in "Mourning and Melancholia", where he defined grief as a natural and adaptative process that differs from depression. In conclusion, data from our review suggests that psychoanalysis and cognitive neuroscience can learn a lot from each other without losing the particularity of each one.

(151) Infant's self-settling sleep patterns: A prospective approach based on triadic interactions

**Françoise De Gheest, Caroline Blanchard, Lotta Veerle de Coster, Anne Courtois, Véronique Delvenne and Isabelle Duret**

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Falling asleep is an experience of separation for the child. We hypothesize that the infant self-settling sleep patterns are influenced by parental adjustment and coordination within the triad, child's characteristics and family history. The objective of this semi-longitudinal study is to explore triadic interactions between parents and their infant during the bedtime routine. Primiparous parents with a complication-free pregnancy and childbirth. Ten families will be met at four time points across the first year of life of the infant: at birth, 3, 6 and 12 months of age. Triadic interactions will be observed with the Lausanne Trilogue Play standardized situation while the Thematic Apperception Test and the Entretien-R will be used to evaluate parental representations. Other assessment tools will be used such as the Parental Bonding Interview (PBI), the Condon and Corkindale mother-to-infant attachment self-report questionnaire, a semi-structured interview based on the Symptom Check-List (SCL) and finally, a questionnaire exploring parent's bedtime routine perception. Sleeping disorders will be diagnosed at 12 months with the use of the DC: 0-3R. We will present and discuss the hypothesis and methodology.



(152) Mental disorders, symptomatology and inhibitory control  
**V. Lozano, M.F. Soriano, J.I. Aznarte, C.J. Gómez-Ariza and M.T. Bajo**  
**Universidad de Granada, Spain**

A good deal of research suggests that cognitive deficits underlie psychotic symptoms. For example, it has been shown that schizophrenia entails deficits in inhibitory control which predict psychotic symptoms (e.g. hallucinations; Soriano, Román, Jimenez, & Bajo, 2009). In contrast, the role of cognitive dysfunctions in personality and affective disorders has been much less investigated. Rather, these patients have been considered to have preserved cognitive functioning. In an experimental series using a variety of experimental and neuropsychological tasks, we test the hypothesis that personality and affective disorders also involve inhibitory deficits and that this impairment better predicts symptoms than diagnostic categories. Our results support the idea that important cognitive commonalities exist between different mental disorders and point to the relevance of research on cognitive functions as a valuable tool in the classification of mental disorders.

(153) Discourse analysis and Rorschach: Preliminary study about self-perception  
**Laetitia Di Piazza, Jérôme Englebert and Adélaïde Blavier**  
**Université de Liège, Belgium**

With the particular instruction “what might this be?”, the Rorschach is a test where individual is confronted to what he sees, to what he answers from this perception and how he is verbalizing this material. In order to explore these questions, we compared data coming from Rorschach’s Exner analysis and data from the discourse analysis of the content. Our methodological hypothesis was: “Are there correspondences between the perception and the verbalization analysis from the same material?”. We selected eight Rorschach protocols administered to general population and ordered into two categories according to different psychological profiles concerning self-perception: one presenting an egocentricity index over the expected range ( $>0.45$ ), and one under this range ( $<0.33$ ). These identified patterns were analyzed and compared using specific software of textual analysis. Based on Mann-Whitney U tests, data highlighted a significant proportion of synonyms with words “unity” and “relationship” but no personal references in people who have high egocentricity index. In contrast, no significant group differences were found about the use of personal pronouns. These findings are in line with a hypothesis of Mormont (1996) that suggested egocentricity index also assesses individual’s position of being-in-the-world. Therefore, this approach provides preliminary support for future studies.

(154) Sexual abuse: Is regression in borderline functioning a risk factor for acting out within the interfamilial system?

**Suzanne Aubinet, Salvatore d'Amore, Luigi Cancrini and Adélaïde Blavier**  
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This research is based on Luigi Cancrini’s theory of regression in borderline functioning which provides a structured and nuanced reflection on sexual abuse. It offers the possibility of establishing a framework for observation and analysis of both synchronic and diachronic blending; the behavioral characteristics proposed by the victims, perpetrators and their families; and the historical meaning they can give. It leads to the identification of the central link connecting the actors and their life

contexts. We analyzed a clinical situation with sexual abuse. The chosen dyad, composed by a 7 year-old-girl and a 13 ½ year-old-boy, was observed in vivo during hospitalization. Relevant behavioral, relational and historical components were compiled in an analytic scale based on Cancrini (2009) and Barudy (1997) writings. Similar psychopathological functioning among perpetrators, victims and families could thus be seen within this framework. The comparison of the systems reported similar family dynamics within the different subsystems. For these children, this resulted in the emergence of a specific behavioral repertory, typical of a borderline functioning, characterizing both the perpetrator and the aggressed: both were embedded in rigid supporting dyadic relational patterns and intense cleaved positions.

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