that ERN is generated in the anterior cingulate cortex (ACC). Individual differences in ERN are highly heritable and associated with individual differences in behavior, both normal and abnormal. However, little is known about structural brain correlates of individual differences in ERN. We hypothesized that individuals with higher ERN amplitudes would show larger surface area of the ACC.

Methods: Young adults (age 18, n=68) have completed ERP and magnetic resonance imaging (MRI) assessments. ERN was elicited in a flanker task and analyzed using traditional peak amplitude, time-frequency analysis, and low-resolution brain electromagnetic tomography (LORETA). Structural brain images were parcellated and measured using FreeSurfer software.

Results: ERN amplitude correlated significantly with surface area of the right (but not left) caudal ACC (r=.43, p<.001). This was paralleled by small but significant correlations between the same area and the power of event-related theta-band oscillations in the time window of the ERN (r=.22, p=.04) and LORETA signal in both right and left medial prefrontal area (r=.38 and .37, respectively; p=.001). No significant correlations were observed with other frontal lobe regions in follow-up analyses.

Discussion: The present findings indicate that variability in brain structure predicts ERP amplitudes. The finding of maximum correlation in the caudal ACC is consistent with functional imaging findings. The present data also suggest a possibility of hemispheric asymmetry in the neural generators of the ERN.

Conclusion: individual differences in ERN are partially mediated by the structural variability of the caudal anterior cingulate cortex.

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Countering Countermeasures in the Guilty Knowledge Test by using Pupillary Response

Leean Kim, Jang-han Lee
Chung-Ang University, Seoul, Korea, Republic of South

The aim of this study is to examine the availability of pupil dilation as an index of countermeasures when detecting deception with polygraph through Guilty Knowledge Test (GKT). Using countermeasures might require more complex cognitive process when crime-irrelevant item is presented, which leads to increased cognitive load. 84 participants were assigned in three groups (countermeasure-use guilty, non-countermeasure guilty, innocent group). All guilty group committed a mock-crime (i.e., wallet theft) and innocent group performed a simple mission (i.e., sending an e-mail). After that, all participants were examined by polygraph and eye-tracker equipment through GKT including crime relevant items and crime-irrelevant items. The pupil dilation was defined as a difference between the baseline (i.e., 1s before the stimulus) and the answering phase (i.e., 4s after the question) pupil size. The results revealed that when answering crime-relevant items, guilty group showed larger pupil size than innocent group, and there was no difference between countermeasure and non-countermeasure group. On the other hand, when answering crime-irrelevant questions, countermeasure group showed larger pupil size than non-countermeasure group. The increased cognitive load while using countermeasures resulted the larger pupil size than others in countermeasure-use group. These results suggest that pupil size might discriminate countermeasure using individuals from innocents, implicate the effectiveness of eye-traking measure when detecting deceit in the forensic practice.

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Exogenous attention to threat under different ambient light conditions

Luis Carretié[a], Elisabeth Ruiz-Padial[b]
[a]*Facultad de Psicología, Universidad Autónoma de Madrid, Madrid, Spain*
[b]*Departamento de Psicología, Universidad de Jaén, Jaén, Spain*

Background: Planet earth motion yields a 50% day - 50% night yearly balance in every latitude or longitude, so survival must be guaranteed in both in light and darkness. Cone- and rod-dominant vision, respectively specialized in light and darkness, present several processing differences which are –at least partially- reflected in event-related potentials (ERPs).

Methods: The present experiment aimed at characterizing exogenous attention to threatening (spiders) and neutral (wheels) distractors in two environmental light conditions, low mesopic (L, 0.03 lux) and high mesopic (H, 6.5 lux), yielding a differential photoreceptor activity balance: rod>cone and rod.

Results. Enhanced attentional capture by salient distractors was observed regardless ambient light level. However, ERPs showed a differential pattern as a function of ambient light. Thus, significantly enhanced amplitude to salient distractors was observed in posterior P1 and early anterior P2 (P2a) only during the H context, in late P2a during the L context, and in occipital P3 during both H and L contexts.

Conclusion. In sum, while exogenous attention to threat was equally efficient in light and darkness, cone-dominant exogenous attention was faster than rod-dominant, in line with previous data indicating slower processing times for rod- than for cone-dominant vision.

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Mimicking a robot: Facial EMG in response to emotional robotic facial expressions

Joana G. Adrião[a,b,c], Patrícia Arriaga[a,b], Ana M. Paiva[c,d]
[a]*Instituto Universitário de Lisboa (ISCTE-IUL), Lisboa, Portugal*
[b]*Centro de Investigação e Intervenção Social (CIS-IUL), Lisboa, Portugal*
[c]*Instituto de Engenharia de Sistemas e Computadores - Investigação e Desenvolvimento (INESC-ID), Lisboa, Portugal*
[d]*Instituto Superior Técnico - Universidade de Lisboa, Lisboa, Portugal*

Humans tend to anthropomorphize i.e., to attribute human-like characteristics (e.g. motivations, intentions, emotions) to non-humans. This suggests that we can interact with non-humans (televisions, computers, robots) in a similar way we interact with humans. Robots, in particular, have physical presence and can be programmed to display social interaction capabilities, i.e. to be social robots, amplifying those similarities. Past studies have shown that social robots in negative situations tend to elicit strong emotional responses and empathy in humans. However, it remains to be tested whether empathy can be felt towards a social robot, set in a situation of positive social interaction. We proposed that facial mimicry, one indicator of empathy, may occur towards a robot in a positive social context, i.e. while the robot is playing a board game with human

opponents. Fifty-nine participants (46 females), aged 17 to 27 years (M=19.56, SD=2.11) were exposed to videos of a robotic head (EMYS, the EMotive headY System), previously programmed to display six emotional expressions (joy, surprise, anger, disgust, fear, sadness) and a neutral expression, while playing a board game. EMYS's facial expressions were shown in two blocks: in the first, no social context was provided and sound was omitted; in the second, a positive social context was provided, which included sound of verbal interaction with humans. In each block, 14 videos were randomly presented. Facial electromyography (fEMG) activity, in response to EMYS's facial expressions, was measured over the corrugator supercilii and zygomaticus major muscles. fEMG responses were calculated as difference from stimulus presentation to 1 sec baseline. Changes in fEMG reactivity, between conditions, were analyzed comparing fEMG responses to robotic emotional expressions with responses to robotic neutral expressions. In the positive social context condition, results revealed an overall reduction of corrugator supercilii reactivity for the majority of negative emotional expressions (except anger). There was also a significant reduction of the zygomaticus major activity to surprise, compared to neutral, in the positive social context. Overall, our results suggest the important role of the social context in our physiological responses to a robot, and more specifically a reduction of emotional negativity to non-threatening robotic facial expressions, displayed in a positive social context.

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Images of Distorted Fingers Activate Posterior Primary Somatosensory Cortex: Individual Subject Analysis of Ultra High-Field fMRI Data (7T)

Miguel G.E. Santo[a], Rosa M. Sánchez-Panchuelo[b], Susan Francis[b], Martin Schürmann[a]
[a]*School of Psychology, University of Nottingham, Nottingham, United Kingdom*
[b]*Sir Peter Mansfield Magnetic Resonance Centre, School of Physics and Astronomy, University of Nottingham, Nottingham, United Kingdom*

Understanding what others experience and feel is an important mechanism for human interaction. For example, observing body related abnormalities could lead to visceral and emotional reactions. Is there a somatosensory mechanism, which simulates the observed stimuli with activation of the brain areas that support first-person somatosensory experience? Is there supporting activation in non-somatosensory areas? Primary somatosensory cortex (S1) responses to images of distorted finger postures have been found in fMRI [1] but the contribution of S1 sub-regions to these responses is poorly understood. S1 subregions activate differentially during observation of touch and visual judgment of roughness [2,3], with stronger responses in posterior parts of S1 which have widespread connections to visual and parietal areas. Consequently, it is predicted that observing finger abnormalities will lead to activation in posterior primary somatosensory cortex. Here, were presented subjects (N=5) with images of their own, or from another (classified as belonging to the opposite sex), 3D modelled hands where postural distortions were applied to the fingers vs. natural finger postures. Brain activation patterns to stimuli presentation were measured using fMRI (7T). In order to mimic social perception, hands were presented from egocentric and allocentric perspectives. S1 subregions were established through combination of automatic labelling and visual inspection of individual anatomy. Across subjects, results showed a consistent pattern of activation to the contrast Distorted > Natural (significant at $p<0.01$, FDR corrected) finger postures in posterior parts of S1 bilaterally. Furthermore, whole brain analysis revealed differences occurring in lateral occipito-temporal, superior parietal and premotor areas. Two observations can be made by these findings: First, visual input can indeed lead to activity in the S1, particularly in its posterior parts, confirming assertions made in [2]. Thus, posterior S1 is not an area dedicated to one modality of stimuli, but is likely an area of sensory integration. Secondly, lateral occipito-temporal activity (congruent with extrastriate body area [4]) suggests that finger distortions (and conceivably body distortions in general) are processed in visual areas [5]. These findings implicate that impaired interaction between visual and somatosensory areas may be a contributing factor to disorders involving a visuo-somatosensory dysfunction. [1] Schürmann M., Hlushchuk, Y., Hari, R. (2011). Hum Brain Mapp. [2] Keysers C, Kaas JH, Gazzola V (2010). Nat Rev Neurosci. [3] Kuehn E et al., (2012) Hum Brain Mapp. [4] Downing, P.E., Peelen, M.V (2011) Cogn Neurosci. [5] Avikainen, S., Liuhanen, S., Schürmann, M., Hari, R (2003). J Cogn Neurosci.

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Cross cultural differences in response to social feedback during metacognitive evaluations: An electromyographic study

Amelie Jacquot[a], Terry Eskenazi[b], Shoji Itakura[c], Edith Salès-Wuillemin[d], Atsushi Senju[e], Joëlle Proust[f], Laurence Conty[a]
[a]*Laboratoire de Psychopathologie et Neuropsychologie EA 2027, Paris 8 University, Paris, France*
[b]*Laboratoire de Neurosciences Cognitives UMR 742 INSERM, Ecole Normale Supérieure, Paris, France*
[c]*Department of Psychology, Graduate School of Letters, Kyoto University, Kyoto, Japan*
[d]*Laboratoire Socio-Psychologie et Management du Sport EA 4180, Burgundy University, Dijon, France*
[e]*Centre for Brain and Cognitive Development, Department of Psychological Sciences, Birkbeck University of London, London, United Kingdom*
[f]*Institut Jean Nicod UMR 8129, Ecole Normale Supérieure, Paris, France*

In one hand, our team has recently shown that people modulate their metacognitive evaluations, such as their level of confidence, as a function of non-verbal information provided by other social agents (Eskenazi and al., 2015, Jacquot and al., 2015). In the other hand, cultural values are known to influence how people construe themselves and their relation to the world, and therefore may influence social cognition and contextual self-judgments (Chiao and al., 2009). In this study, we investigated whether the impact of social non-verbal social information on one's own cognitive performance depended on one's own culture. We compared the behavior of French (n=38) and Japanese (n=38) participants known to be shaped by different cultural values (individualism and collectivism respectively). We confronted these participants with videos of in-group social agents expressing agreement, disagreement or uncertainty about a perceptual decision they just performed. The social agents were manipulated to appear either competent or incompetent for the task. At the end of each trial, the participants were asked to rate their confidence in their previous response. Using electromyography, we recorded participants' facial muscle activity of the corrugator and of the zygomaticus, reflecting respectively negative and positive experience associated with the social feedback. Overall, behavioral data indicated that Japanese and French participants' confidence increased with the perception of an agreement as