

13th Dubrovnik Conference on Cognitive Science
Cognitive and Functional Perspectives on Emotions

Program and abstracts

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Thursday, 19 May

15:00–18:00	<i>Registration</i>
18:00	<i>Welcome reception</i>

Friday, 20 May

9:00–10:00	Carlos Crivelli (De Montfort University)
10:00–11:30	Poster session A + coffee break
11:30–12:30	Disa Sauter (University of Amsterdam)
12:30–14:30	<i>Lunch</i>
14:30–15:30	Alan Fiske (University of California Los Angeles)
15:30–17:00	Poster session B + coffee break
17:00–18:00	Lawrence Ian Reed (New York University)

Saturday, 21 May

9:00–10:00	Guillaume Dezecache (Université Clermont Auvergne)
10:00–11:30	Poster session C + coffee break
11:30–12:30	Debra Lieberman (University of Miami)
12:30–14:30	<i>Lunch</i>
14:30–15:50	Young researchers' presentation
15:50–16:30	<i>Coffee break</i>
16:30–17:30	Zanna Clay (Durham University)
18:00	<i>Social event</i>

Sunday, 22 May

Departure

Invited talks

Beyond WEIRD affective science

Carlos Crivelli

De Montfort University, UK

Friday, 20 May, 9:00–10:00

Are affective scientists really committed to overcoming narrow sampling? Which theoretical, methodological, and logistic factors prevent affective scientists from developing a less WEIRD-centered affective science? In this talk, I will identify and critically evaluate the major challenges that we face when planning a research project in non-WEIRD societies, potential solutions, and the impact that this type of research has on our WEIRD theories of emotion.

Emotion preparedness: The foundation of emotional expressions

Disa Sauter

University of Amsterdam, Netherlands

Friday, 20 May, 11:20–12:30

We all have emotions, but where do they come from? In this talk, I will present evidence that some emotional states are associated with discrete, innate expressions. I will draw on investigations of vocal expressions of emotions in non-human primates and congenitally deaf individuals, as well as across different cultures. Emotional vocalisations, like other aspects of emotions, are adaptations that have evolved to help us deal with recurring challenges and opportunities, and are modulated by learning. I will argue that our understanding of what emotions are should include a functional perspective centred around emotion preparedness.

We Don't Know Our Emotions

Alan Fiske

University of California Las Vegas, US

Friday, 20 May, 14:30–15:30

People think and talk about emotions to varying degrees and in various ways in different cultures. But people label their emotions inconsistently and very loosely. Emotion labels in any one language do not map well onto emotion labels of other languages. Moreover, people experience emotions they don't recognize. Unrecognized emotions need not be 'repressed;' some are subjectively salient. My colleagues and I are studying one such emotion, kama muta, that is pervasive across cultures and contexts, and sometimes very intensely felt. It may have great impact on the person experiencing it, it informs and modulates fundamental social relations, and it underlies a great many major social practices. Yet until ten years ago virtually no one recognized it and it was not well conceptualized. Kama muta does not correspond to any one distinctive vernacular lexeme in any language we've studied, and people sometimes can't think of any word for it. Hindi-Urdu, Arabic, and Bikol apparently don't have any specific, distinctive word for kama muta. This is one indication that people – including emotion researchers like myself – lack anything close to a complete or correct taxonomy of emotions. One implication of this is that emotion research cannot rely on people's reports, labels, or ratings of their emotions.

The Communicative Functions of Facial Expressions

Lawrence Ian Reed

New York University, US

Friday, 20 May, 17:00–18:00

Previous research suggests that some facial expressions of emotion serve a communicative function by signaling private feelings and action tendencies. Further, some expressions such as smiles and scowls affect receivers by increasing the credibility of accompanying verbal and/or written statements. Here, I will discuss the credible signaling hypothesis and the evidence in support of it. This will include a discussion of experiments using economic games to create strategic situations in which facial expressions of emotion might benefit signalers and receivers. These experiments test whether a signaler's emotional expressions increase the credibility of promises, threats, claims of danger, and assurances of trustworthiness. The results speak to the hidden strategies behind spontaneous and deliberate expressions and their effects on receiver's behavior.

Fear contagion and mass panic? What fear does to crowds

Guillaume Dezecache

Université Clermont Auvergne, France

Saturday, 21 May, 9:00–10:00

Fear is thought to be a highly contagious emotion, such that it is conducive to mass panic, whereby each crowd member experiences intense fear and maximizes their own survival at the expense of others. However, more than fifty years of research have depicted crowds facing deadly threats as calm and orderly. In this talk, I will discuss what fear does to crowds by evaluating the claims that (i) fear is contagious, (ii) that it can lead to ‘mass panic’, and (iii) that it promotes self-preservative behavior. I will also try to sketch an alternative view, whereby the experience of fear leads to the production of alarm signals (‘alarm calls’) and quickly promotes allo-oriented behaviors, such as mobbing and collective defense, as typically observed in a number of nonhuman species.

Intuitions regrading physical leverage in preverbal infants

Debra Lieberman

University of Miami, US

Saturday, 21 May, 11:30–12:30

Past research has demonstrated that preverbal infants have a rich understanding of the social world that unfolds during the first few months of life. One particular developmental trajectory relates to inferences regarding dominance. Whereas 8-month-old infants reveal few expectations regarding the relationship between physical size and social leverage, by 13 months of age, infants increasingly expect smaller agents to physically defer to larger agents. If infants expect different physical outcomes when larger and smaller agents interact, it raises the question of whether infants also expect different emotional outcomes. Evolutionary cognitive scientists have found that physical formidability is indeed linked with the expression of different emotions that serve the purpose of improving the manner in which others regard the self. Whether these self-motivated states are matched with the emotions other individuals expect one to express is a question that has yet to be addressed in young children. In this talk, I present preliminary data that tested the hypothesis that preverbal infants expect different emotional reactions from large versus small agents when the goals of those agents come into conflict. I then flesh out the program of research currently underway that aims to determine the expectations infants hold regarding the influence of physical leverage (or lack thereof) in social interactions.

The expression of emotions and empathy: Evolutionary Insights from great apes

Zanna Clay

Durham University, UK

Saturday, 21 May, 16:30–17:30

As highly social species, humans and other great apes have evolved rich socio-emotional and cognitive capacities that enable them to navigate their complex social worlds. This includes sophisticated ways to produce, perceive and express emotional states, as well as to effectively respond to those of others. Given that cognition and emotions do not fossilise, our closest living relatives, the great apes, provide a particularly relevant window through which we can explore how our emotional capacities evolved. This includes empathy, the capacity to share and understand others' states. Despite empathy being a hallmark of our species, comparative research suggests that empathy has deep evolutionary roots, not only within the primate lineage, but also beyond. In this talk, I will discuss research that examines great ape emotional processes, their relation to humans, including young children, and what insights this provides into the evolutionary basis of Hominid emotionality.

Young researchers' presentations

Saturday, 21 May, 14:30–15:50

Responding to others' emotions: The use of infrared thermal imaging to investigate 10- and 11-month-old infants' responses to emotional auditory stimuli in a Ugandan sample

Elizabeth Renner, Carlo Vreden, Zanna Clay

Durham University, UK

Infants experience distress in response to the crying of other infants in the 'contagious crying' paradigm. This has been considered evidence of infants' sensitivity to others' emotions, which may form an early basis for empathy. However, earlier studies have been criticised for being over-arousing for infants and lacking appropriate controls, so that it remains unclear whether infant distress responses are due to the emotional content of crying or its aversive nature. Here, we addressed these aspects using an infrared thermal imaging study, in which we adapted stimulus intensity and measured more subtle physiological markers of emotional arousal.

We played audiovisual stimuli to a diverse sample of 10- and 11-month-old Ugandan infants (N= 116) while measuring their facial skin temperature using infrared thermal imaging. Social stimuli were negatively (infant crying), positively (infant laughing), or neutrally (infant babbling) valenced; a further stimulus type was an artificial aversive sound with acoustic features matched to infant crying. In a counterbalanced design, each infant heard crying and one other stimulus, separated by a recovery period.

Compared to baseline, the maximum change in nose tip temperature was significantly larger in response to each of the social stimuli compared to the artificial aversive sound; however, there was no effect of valence for social condition. Temperature change was not significantly different across the temporal phases of the stimulus.

Although we did not detect differences in physiological responses to positive and negative social stimuli, we found that infants are sensitive to the social content of auditory stimuli, and their physiological responses to distress are not simply to its aversive nature.

Building Blended Emotions with Affect Programs

Oli Odoffin

University of Antwerp, Belgium

Most affect program (AP) theorists claim that at least some emotion states are composites or blends of more basic emotions. The basic emotions of happiness and fear, for instance, can combine to form a blended state of exhilaration, as one might feel while riding a rollercoaster. It is frequently argued, however, that some blended emotions are ‘more than the sum of their parts’ or ‘not reducible to’ more basic emotions. I call this the across-type heterogeneity problem, the claim that some emotion types, like awe, shame, and guilt, have substantially different properties than other emotion types, like happiness, sadness, and fear, and that these properties preclude a unified explanation of our range of emotion states.

I provide an AP model that addresses the ‘four horsemen’ of across-type heterogeneity—(a) sustained response, (b) cognitive involvement, (c) lack of stereotyped response, (d) specific functional breadth. On this model, AP outputs are not rigidly stereotyped. Rather, the configurational pattern of the output depends on both the properties of the stimulus and the situational context. I argue that APs need not always output responses of brief duration; that cognition can serve as a causal input to an AP; that emotion blends do not require stereotyped output; that the function of a composite emotion often reflects the functions of its components. Consequently, a blended emotion like awe is not ‘more than the sum’ of its parts.

Mismatch of subjective and physiological arousal: the moderating role of expectations and heart rate perception ability

Tamás Nagy, Henriett Ipacs, Eszter Ferentzi, Ferenc G. Köteles

Eötvös Loránd University, Hungary

Previous studies have shown that the human capacity to gauge one's own physiological state is notoriously flawed. The cause for the mismatch between perceived and physiological stress and arousal has not yet been properly identified. In this study, we assumed that cardioceptive accuracy — the ability to correctly perceive cardiac activity — may moderate this discrepancy. In a crossover experiment we assessed cardioceptive accuracy in two ways (mental tracking task and perception of heart rate) and induced physiological (handgrip exercise) and mental (N-back task) stress in 64 participants, while we measured cardiac and electrodermal activity. Corroborating earlier findings, we found that expected heart rate was a better predictor of perceived heart rate than actual change in heart rate, heart rate variability, or electrodermal activity. The mismatch between heart rate and subjective stress was moderated by heart rate perception but not by mental heart tracking ability in both tasks. Moreover, the moderation was negative for the physical task and positive for the mental task. We conclude that heart rate perception and expectations of arousal may shape the subjective experience of arousal and stress better than actual physiological changes in moderate acute stress.

Implicit and explicit mechanisms of collective emotion: moderators and correlates of interpersonal emotion alignment in dyads watching film clips together

Victor Chung¹, Gino Diez¹, Elisabeth Pacherie^{1,2}, Rocco Mennella^{1,3}, Julie Grèzes¹

¹ PSL University, France; ² EHESS, France; ³ Université Paris Nanterre, France

Some of our emotional experiences are elicited as we attend events in presence of other individuals. For example, watching emotional film clips in groups leads to synchronization and convergence in emotional responses across group members. Emotion alignment between individuals is a defining feature of collective emotion. However, it is still unclear how interpersonal emotion alignment relates to the perception of other individuals, the explicit representation of their emotional states and the emergence of a feeling of connectedness. Moreover, the relation between emotion alignment and prosocial attitudes remains underexplored. The present study tested the hypothesis that interpersonal emotion alignment (autonomic and subjective) increases with levels of other-directed visual attention, other-awareness, empathic accuracy and feeling of connectedness, respectively. We also tested the hypothesis that emotion alignment positively correlates with increases in prosocial attitudes. Same-sex dyads ($n = 80$, half female) of physically co-located participants watched emotional film clips of different valences (positive, negative, neutral), while dyad members were either visible to each other ($n = 40$) or not ($n = 40$). During each film clip, we recorded participants' autonomic activity (respiratory, cardiac, electrodermal) and videotaped their facial reactions. After each film clip, participants were asked to self-report their own feelings, the inferred feelings of the other dyad member and their feeling of connectedness. We measured autonomic synchrony as the phase locking value between the autonomic signals of dyad members, and subjective convergence as the correlation between their emotion ratings. Compared to previous studies, we investigated for the first time the relation between implicit correlates of emotion alignment (i.e. autonomic synchrony) and explicit processes (i.e. reciprocal other-awareness and feeling of connectedness), while manipulating both the social setting and the emotional context. We expect our findings to extend research on collective emotion, its mechanisms and possible consequences. Data currently under analysis.

Poster session

A

Friday, 20 May, 10:00–11:30

A01: The early emergence of belief justification in young children

Illdikó Király¹, Réka Schvajda¹, Mikolaj Hernik², Pierre Jacob³, Dan Sperber³, Gergely György⁴

¹ Eötvös Loránd University, Hungary; ² University of Tromsø, Norway; ³ Institute Jean Nicod, France; ⁴ Central European University, Austria

The aim of our study was to explore the early emergence of reason-giving ability in interactive situations. In our study we tested whether children adjust their communicative actions in a false belief situation in order to justify their own behavior, when the task at hand allows them to take into account the desires of another person. Our goal was to explore this process at an age when verbal communication is very limited (18 months), and compare their pattern of behavior with a group of children who are already competent users of language (42-48 months). During the procedure, the child and an experimenter (E) sat behind two containers with snacks (apples and carrots), which were occluded from the protagonist (P). P stated which food she preferred, E shared a piece with her and P left the room. In P's absence, E ate some snacks, which resulted in only one piece remaining: either from P's preferred (control condition) or non-preferred kind (experimental condition). Upon returning, P requested a snack, and in case the child gave one, she prompted them to justify their behavior. Preliminary analyses indicate that older children interpreted the two conditions differently: they declined giving any food to the protagonist in the experimental condition more often, than in the control condition. Moreover, they showed sensitivity to the different epistemic states of the protagonist generated in the two conditions and tended to justify their behavior spontaneously more often in the experimental condition compared to the control condition (Fisher's exact test: $p=.001$). The testings are still in progress for the 18-month-old participants. In conclusion, our results indicate that children - at the age of 3 - are able to identify situations during which justifying their behavior is necessary, and spontaneously share relevant information if needed.

A02: Online level-2 perspective taking for newly learnt symbols

Réka Pető, Fruzsina Elekes, Ildikó Király

Eötvös Loránd University, Hungary

Humans demonstrate spontaneous sensitivity to other people's perspective regarding object identities in online tasks (level-2 perspective taking, L2PT). Accumulating evidence shows that this includes representing perspective content rather than mere discrepancy in perspectives. However, evidence comes from studies using culturally grounded symbols as stimuli, leaving open the possibility that extensive, automatically accessible background knowledge on the target object is a precondition of the PT effect. Experiment 1 tested this question by comparing L2PT across two groups: one performing a verification task on Arabic numbers and one on newly learnt symbol-label pairs. Half of the visual stimuli in both groups was symmetric (perspective independent), half asymmetric (perspective dependent). In the joint condition, pairs of participants performed the task in parallel with their partner, observing stimuli from opposite viewing angles and thus had conflicting interpretations for asymmetric characters. Participants also performed the verification task individually, while their partner sat passively, with no visual access to the stimuli. We found similar interference effect in the two groups: decreased decision efficiency for jointly observed asymmetric characters. However, while the effect was stable in the number group, it diminished over time in the symbol group. Experiment 2a and 2b demonstrated that the complexity of the recently learnt symbols has an impact on the process of spontaneous level-2 PT. The very same procedure but with more complex symbols did not elicit any interference effect. Our findings demonstrate that online L2PT is not constrained to objects that participants have proficiency in identifying. The cognitive capacities involved in the process of learning and retrieving newly learnt symbols and the computation of the recently learnt symbols alternative object identities may surpass the capacities of the online PT mechanism.

A03: You can't see me now! - Testing the role of gaze in reputation management at an early age

Réka Schvajda¹, Ildikó Király^{1,2}

¹ Eötvös Loránd University, Hungary, ² MTA-ELTE Lendület Social Minds Research Group, Hungary

As humans we are constantly in a social environment. Adults and children alike tend to be more generous if someone observes them and according to the watching eyes-effect the eyes could play a special role in this process. Recent research confirmed that children were more generous when they were exposed to a pair of open eyes, rather than a neutral picture (Kelsey et al., 2018). However, when children were exposed to a different cue (mouth), the results were ambiguous. The behavioral uncertainty of children could be the result of the ambiguity of the mouth as a social cue: it could signal an observer's presence, or it could indicate that an agent is watching, but with uncertainty. Our goal was to replicate the study of Kelsey and colleagues (2018) offline and online as well, and also disentangle the source of the ambiguity in their results. We tested children with the presentation of a pair of closed eyes to grasp the effect of the presence of non-watching agent per se. After the training phase children participated in a resource-allocation task while being exposed to a pair of open or closed eyes or to a neutral picture (flowers). If the mere presence of another person triggers prosocial behaviour, children would distribute resources in the presence of closed and open eyes alike. However, if open eyes and being seen plays a special role in situations where others could evaluate us, children will behave differently in the presence of the two types of eyes.

A04: Validation of social-cognitive tests for mobile touchscreen devices

Ágnes Korom, Krisztina Peres, Jázmin Badics, Zsolt Jurányi, Ákos Pogány, Ádám Miklósi, Veronika Konok

Eötvös Loránd University, Hungary

Children's social-cognitive skills develop intensively during preschool years, and it is important to have easy-to-use measuring tools for testing these skills. In the age of digital technology, mobile touchscreen devices (MTSDs) provide an opportunity to collect a large amount of data in an automatized way. Additionally, these test versions are motivating for children and can be performed in the participant's home, which is especially useful during a pandemic period. In this study, we developed and validated MTSD versions of social-cognitive tests, such as the First-order belief and the Faux pas test. In addition, we systematically examined whether different modifications of MTSD tests decrease the language comprehension and working memory load since these traditional standard tests demand working memory and language skills excessively. Children aged 4-6 (N=60) were tested in two sessions. On one hand, they all accomplished the MTSD versions of the tests in their home (during a video call with the experimenter), on the other hand, the traditional forms of the tests were taken in person. Compared to the traditional tests, MTSD versions differed in whether they contained visual help, simplified- and close-ended questions, and elimination of the need for memorizing arbitrary associations (e.g., characters-names, characters-object). We also measured children's working memory capacity and language comprehension level. Results are discussed in light of methodological (e.g., validity; the difficulty of the traditional and MTSD test versions) and theoretical (to what extent do social-cognitive skills depend on other skills) considerations. Our findings help in developing MTSD versions of social-cognitive tests, particularly in which the performance is not confounded by irrelevant cognitive skills.

A05: Momentary fluctuations in prepotent response inhibition predict emotional reactivity at the within-individual level

Levente Rónai, Flóra Hann, Beáta Schmidt, Katalin Schmidt-Vig, Bertalan Polner

Budapest University of Technology and Economics, Hungary

Associations between disturbances in cognitive control and maladaptive emotion regulation are extensively explored at the between-individual level, however, it is still an open question whether this relationship can also be found within individuals. In this study, we tested the assumption that momentary within-person fluctuation in cognitive control performance (working memory updating and response inhibition) predicts the intensity of emotional reactivity in everyday life. An experience sampling study was conducted (8 two-hourly prompts daily for max. 28 days) where participants were asked to repeatedly perform short N-back and Go/No-go tasks every day. Unpleasantness of a recent significant event and negative affective states were also measured, whose statistical relationship refers to emotional reactivity. Our nested dataset contained 959 observations from 114 individuals ($N[\text{Females}] = 88$, $\text{Median}[\text{Age}] = 45$, $\text{SD}[\text{Age}] = 12.86$) from the general population. We tested within-person effects of N-back and Go/No-go performance on emotional reactivity using multilevel models. Our statistical analyses revealed that Go/No-go performance moderated the within-person association between perceived stress and negative affective tone: when momentary response inhibition was better than an individual's average, they demonstrated lower emotional reactivity. However, we did not find significant associations between N-back performance and emotional reactivity. These results imply that within-person fluctuations in response inhibition predict the intensity of emotional response to perceived stress. This conclusion is in line with previous within- and between-person findings showing that decreased inhibitory control is associated with maladaptive emotion regulation strategies and reduced self-regulation.

A06: The effects of visualization and social context of storytelling on children's creativity and fantasy

Rebeka Szőke

Eötvös Loránd University, Hungary

In contrast to traditional books, digital stories contain several nonverbal multimodal features (visual images, animations, sound effects) but little is known about how these affect the development of children. The visualization hypothesis suggests that cartoons contain readymade images therefore children's fantasy is neglected. Because watching needs little mental effort, mental processes become lazy in other domains, such as fantasy. Digital stories can be told by a stranger's voice/software depriving storytelling from its social context. Storytelling is important in secure parent-child attachment serving as a basis for socioemotional development, learning, and cognitive development, which are important for creativity. Creativity in children has been constantly decreasing since the 90-es which could be linked to the growing use of digital media in young children. The aim of the study is to explore how the intensity of visualization (animations, pictures) of a story affects children's creativity right after storytelling and how the social context of storytelling affects creativity (parent/stranger's voice). We assume that stories with more intense visualization are linked to lower scores in creativity as well as stories told by the audio. We include 4-6 years old children and their parents. Parents are asked about their child's trait creativity, digital media use, and storytelling habits. Creativity and fantasy are assessed based on the Alternative Uses – and Just Suppose Test, Figure Association Test, and a Mental Comparison Task. First, we assess children's creativity, fantasy. Then they watch or listen to one of two stories on a tablet either read by the parent or the original voice of the cartoon. Stories also vary based on the level of visualization (full animation, pictures, just text). Finally, we assess creativity and fantasy again with the same method but subtle differences in the questions. We videotape the experiment and analyze them.

A07: Subtle roles of dopamine

Olgierd Borowiecki

Nicolaus Copernicus University, Poland

Dopamine (DA) has been associated with reward system. However, this view seems to be not only inaccurate but also harmful as it influences folk psychology's understanding of emotions in relation to DA. This neurotransmitter is important in a number of cognitive operations beyond rewarding stimuli. DA is released by two midbrain nuclei in relatively independent way (Ilango et al., 2014). Nigrostriatal pathway denotes projections from Substantia Nigra (SN) to striatum (Deumens, Blokland and Prickaerts, 2002), whereas mesolimbic and mesocortical pathways denote projections from Ventral Tegmental Area (VTA) to Nucleus Accumbens (NAc) and Prefrontal Cortex (PFC), respectively (Pierce and Kumaresan, 2006). However, closer investigation of these projections reveals a sophisticated balance of signalling value and salience (Bromberg-Martin, Matsumoto and Hikosaka, 2010). Value-coding DA neurons are predominantly identified in the ventromedial VTA and project to shell of NAc, as well as to dorsal striatum and ventromedial PFC. Salience-coding DA neurons are predominantly identified in the dorsolateral SN and project to core of NAc, as well as to dorsal striatum and dorsolateral PFC; thus, the two types of DA neurons create a gradient (Bromberg-Martin, Matsumoto and Hikosaka, 2010). Projections from the VTA are associated with seeking, evaluation, and value learning (Starkweather et al., 2017; Starkweather, Gershman and Uchida, 2018), whereas projections from the SN are associated with orienting, cognitive processing, and general motivation (da Silva et al., 2018; Kamiński et al., 2018; Nour et al., 2018). The functional complexity of DA neurons bears broad implication for mechanisms behind motivational states (Friston et al., 2012; West, Moschak and Carelli, 2018), addiction (Pierce and Kumaresan, 2006), curiosity (Costa et al., 2014; Gruber and Ranganath, 2019), or feelings of pleasure in general (Berridge and Kringelbach, 2015; Bressan and Crippa, 2005). The sophisticated DA system underlies both cognitive and functional aspects of existence, simultaneously influencing phenomenologically subjective emotional states. Thus, bridging the DA system with emotional states is an important ongoing process, details of which will be presented in this theoretical work.

A08: Abnormal behavioral and neural responses in the right dorsolateral prefrontal cortex during emotional interference on cognitive control in pedophilic sex offenders

Jan Szczypiński^{1,2}, Marek Wypych², Aleksandra Krasowska¹, Paweł Wiśniewski¹, Maciej Kopera¹, Hubert Suszek³, Artur Marchewka², Andrzej Jakubczyk¹, Marcin Wojnar¹

¹ Medical University of Warsaw, Poland; ² Nencki Institute of Experimental Biology of Polish Academy of Sciences, Poland; ³ University of Warsaw, Poland

Studies within the last decade have reported neural and behavioral differences in cognitive control between men with the pedophilic disorder who commit (CSO+) and do not commit (CSO-) child sexual abuse. Prior studies reported a higher number of errors in Go/NoGo task and lower activity of the prefrontal cortex in NoGo trials, in CSO+ compared with CSO-. Moreover, negative mood was reported as a risk factor for child sexual abuse in pedophilic men. We aimed to examine differences in brain function and behavior between CSO+ and CSO- patients with respect to emotional interference on cognitive processes and inhibition. We recruited CSO+ (n=11) and CSO- (n=14) patients and matched healthy control men (HC, n=17). Participants performed the affective Go/NoGo task in a block-design functional magnetic resonance imaging experiment. The task comprised four conditions: Negative Go, including only Go stimuli and negatively valenced pictures; Negative NoGo, including 50% of Go and 50% of NoGo trials and negatively valenced pictures; two corresponding Neutral conditions with neutral pictures. Brain analysis was restricted to the dorsolateral prefrontal (DLPFC), orbitofrontal, and anterior cingulate cortices. The HC and CSO- groups, but not the CSO+ group, showed significantly slower reactions in negative blocks compared with neutral blocks. Brain analysis revealed an increase in the right DLPFC activity during emotional interference (Negative > Neutral contrast) in the HC and CSO- groups; however, such increase was absent in the CSO+ group. In the CSO+ group, negative distractors did not increase cognitive control processes, which was observed in the CSO- and HC groups at the behavioral and neural levels. This is consistent with previous reports that offender status is associated with cognitive and emotional impairments.

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A09: Negative Emodiversity is Associated with Overestimation of Future Negative Affect

Elif Şengül, Robert W. Booth

Sabanci University, Turkey

Affective forecasting – the prediction of future emotions – is often surprisingly inaccurate and shows considerable individual differences. Since imagining the future depends on present and past experience, we investigated whether individual differences in emotional experience would predict individual differences in affective forecasting (in)accuracy. Specifically, we tested whether affective forecasting was predicted by emodiversity, the variety, and evenness of emotional experience. We expected to see a relationship between emodiversity scores and affective forecasting errors and biases. One hundred and thirty-five students rated their current positive and negative affect on seven consecutive days. On the first day, they also forecast what their affect would be on the seventh day. We estimated their emodiversity from their responses on the first six days; we used their ratings on the seventh day to assess the accuracy of their earlier forecasts. We also assessed and controlled for trait depression, and emotional intelligence. Inaccuracy of forecast negative affect's relationship with negative emodiversity remained significant with both depression and emotional intelligence controlled. Also, negative emodiversity was associated with the overestimation of future negative affect, and this relationship was independent of depression and emotional intelligence. This study demonstrated that not just the extent, but also the diversity of affect is linked to affective forecasting accuracy. In particular, negative emodiversity predicted pessimistic forecasts even when depression was controlled. Although this study is correlational, our results imply that we base our expectations regarding our feelings in the future on the richness and variety of our feelings now.

A10: Studying the connection between spatial navigation and mind reading in children by using virtual reality

Adrienn Réka Németh¹, Ágoston Török², Zoltán Nádasdy^{1,3,4}

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Spatial navigation relies on multiple cognitive skills and it shows a stereotypical development profile from early childhood to adult age (Bullens et al., 2010). With regards to the point of reference, we distinguish between egocentric reference frames, and allocentric reference frames (Klatzky, 1998). Some researchers claim that children are born with allocentric representations (Rieser, 1979; Kaufman & Needham, 1999; Bullens et al., 2010) but at a certain age, they develop egocentric representations, which might be influenced by the experimental manipulations (Rieser, 1979; Kaufman & Needham, 1999; Bullens et al., 2010). According to other theories, the viewpoint independent strategy requires a matured spatial cognition which appears later at the action level (Piaget & Inhelder, 1956; Huttenlocher & Presson, 1973; Accredolo, 1978; van den Brink & Janzen, 2013). Nardini et al (2006) explained the late emergence of viewpoint-independent navigation by the possibility that these tasks are contingent on the skill of taking others' viewpoints. Moreover, the emergence of "Theory of Mind" and the ability to switch to allocentric spatial reference frames has similar developmental milestones between the third and the fifth year. Therefore, we hypothesize a correlation between spatial perspective taking and the cognitive operations required by mentalization in the development. To investigate it, we implemented a navigation game for tablet computers where children had to locate and return lost space aliens to their spaceships. Different camera setups (1st person, 3rd person, and aerial views) enabled us to dissociate the effect of references (egocentric, allocentric) from the effect of different camera-views on the navigation performance. We also measured the Theory of mind with a digitalized Sally-Anne test (Baron-Cohen, Leslie, Frith, 1985) to correlate the mind reading ability with spatial navigation performance.

All: Emotional prospective memory in temporal lobe epilepsy

Anita Lencsés¹, Bernadett Mikula¹, Csaba Borbély², Gyula Demeter^{1,3}

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Emotional prospective memory (PM) refers to the phenomenon that compared to neutral stimuli emotional material affects the realization of future intentions. Despite the functional relevance of PM in temporal lobe epilepsy (TLE), e.g., remembering to take medications regularly, the possible role of emotional valence on PM performance remains unclear. The present study was the first to explore whether patients with TLE benefit from emotional stimuli on a laboratory PM task. The results of nine patients with TLE (five right-sided, mean IQ: 101.5) were compared to thirteen healthy undergraduate students. We used an event-based PM task with emotional facial expressions (neutral, happy and fearful). The ongoing task was a gender discrimination task. In the PM phase, when a previously learned face pair appeared, a different response was required. Then a recognition phase for the PM cues was administered where the previous PM cues and new faces appeared. In the emotion identification phase, participants matched the previously seen faces with six basic emotional or neutral labels. For the patients with TLE, we expected decreased memory performance on the PM and the recognition phase. We hypothesized that patients with TLE would perform below healthy controls in identifying fearful faces and would not benefit from negative emotional cues on the PM task. Our preliminary results suggest that compared to the healthy student group, patients with TLE showed reduced memory performance for positive cues on the PM and the recognition phase. Both groups performed better for the happy faces than the fearful and neutral ones on the emotion identification phase. Interestingly, despite the intact identification of happy faces, positive emotional valence does not seem to facilitate the memory performance of patients with TLE on an event-based PM task. Further work is needed to fully understand the implications of emotional cues on PM functioning in TLE.

A12: What to believe? The relevance of non-verbal consensual cues and dominance relationships in the evaluation of testimony

Thomas Ganzetti, Gökhan Gönül, Fabrice Clément

University of Neuchâtel, Switzerland

An evolutionary approach to the transmission of information suggests that humans possess some cognitive mechanisms for epistemic vigilance, to ensure that communication remains advantageous despite the risk of deception (Sperber et al., 2010). Previous research investigated this hypothesis by focusing on children's cognitive development (Clément, 2010), showing that children notably display early sensitivity to two relevant social cues for epistemic trust: dominance and consensus. Specifically, 3-year-olds seem to endorse the testimony of a dominant individual over the testimony of a subordinate, suggesting that dominance cues are used to assess informants' reliability (Bernard et al., 2016; but see Fonn et al., 2021). Furthermore, 4-year-olds already tend to endorse the claims of an informant receiving non-verbal approval from other individuals over those of a single dissenter (Fusaro & Harris, 2008). This pre-registered study investigates adults' and 3- to 5-year-olds' (expected n=76) sensitivity to dominance and non-verbal consensual cues, to determine which one is more relevant for epistemic trust when they are put in contrast. We also examine whether adults and children display differences in their attribution of trust. The experiment has two phases. In the induction phase, a dominance asymmetry between two characters is established based on physical power. The test-phase consists of two testimony tasks in which participants receive contrasting information from a dominant individual and a subordinate, while two bystanders either approve or disapprove their claims. Participants are then asked to judge which claim they think to be the correct one. We expect adults and children to rely more on non-verbal consensual cues, thus selecting the claims given by the informant receiving approval, regardless of him being the dominant or the subordinate. Data collection will take place in March-May 2022. This study can help to shed light on the cognitive and affective mechanisms employed by humans to evaluate communicated information.

A13: The interplay between emotion recognition and social functioning in preterm and full-term children

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The ability to decode emotional signals from faces represents a crucial prerequisite for socio-affective development and the formation of social bounds, allowing children to understand others' feeling and intentions and therefore regulate social behavior. Children who were born preterm (<37 weeks' gestation) have been shown to face specific impairments in the ability to recognize emotional expressions. Moreover, they are at risk for the emergence of early cognitive and emotional difficulties, which may lead to behavioral and psychiatric problems in adolescence and adulthood. The present study aims to examine possible differences between preterm and full-term children in the ability to recognize emotional signals from faces and the possible relationship with socio-emotional functioning and problem behaviors during everyday activities. 55 school-age children (N=34 preterm, N=21 full-term) were presented with a cognitive assessment that ensured comparable cognitive abilities between the two groups (Raven's Progressive Matrices, Digit Span, Attention Network Task, Berg Card Sorting Test). Moreover, children were asked to identify emotional expressions from pictures of peer's faces (Emotion Recognition Task). Finally, children's socio-emotional and behavioral functioning was evaluated by using parent-reported questionnaires (Strengths and Difficulties Questionnaire, Emotion Regulation Checklist, Temperament in Middle Childhood Questionnaire, Behavioral Rating Inventory of Executive Function). Results revealed that preterm children were less accurate than full-term children in detecting positive emotional expressions and they showed an increased risk for social and behavioral problems. Notably, correlational analyses indicated a relationship between the ability to recognize emotional expressions and socio-emotional functioning. The present study points out that the ability to recognize facial emotional expressions represent a core developmental precursor of socio-emotional functioning. In particular, preterm children present a specific vulnerability in decoding emotional signals from faces, which may be critically link to emotional and behavioral regulation problems with cascading effects on the development of social skills and effective interpersonal interactions.

A14: Exploring the impact of social interaction on children's innovation rates

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Children have often been described as poor innovators, being more prone to learn new solutions socially than by inventing them on their own. This conclusion might be premature: many existing studies investigated children's innovation in artificial contexts, potentially underestimating children's abilities: First, there are only limited interactions between the child and the experimenter, including situations in which the child asks for help, making the testing context unusual or even odd. Second, while we know that innovations are often the product of cooperation between two or more individuals rather than the produce of "lone geniuses", children are often tested asocially. We hypothesize that children's innovation rates increase if the testing context allows for more social interactions between child and experimenter and if children are allowed to work in pairs. This study investigated 4- to 6-year-olds in a modified version of the hook task. Children were randomly assigned to one of four conditions: asocial baseline condition (experimenter distanced, only general encouragement); adult-child interactive condition without pedagogical cues (experimenter sits with child, only general encouragement); adult-child interactive condition with pedagogical cues (experimenter sits with child, pedagogical questions and comments to support child in thinking through the problem and limit perseverative behavior without giving away the solution to the task); peer interactive condition (working in pairs; experimenter distanced, only general encouragement). We measure different aspects of success, latency, and innovation. While data analysis has not started yet, we will discuss the design and measurements. Please see preregistration for details: https://osf.io/rvs4y/?view_only=c7ba68fa9d4d4cf3a1fc1703378ca525

A15: Facial prosodic features of infant- and dog-directed communication

Anna Gergely¹, Édua Koós-Hutás^{1,2}, Lőrinc András Filep³, József Topál¹

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Parent-infant interactions in general and baby-talk (motherese, fatherese, parentese) in more particular is a well-studied research topic in developmental psychology. Although it has been long known that prosody includes both visual and acoustic components, the characteristics of parental facial expressions and their contribution to the healthy development of children remained unexplored. The aim of the present study was to investigate, characterize and compare visual prosody (i.e. facial movements) in infant-, dog- and adult-directed communications in female and male speakers during naturalistic everyday life situations. In these scenarios, speakers (22 female, 20 male) were interacting with their own child (IDS), their own family dog (DDS) and an adult experimenter (ADS). In addition to the already described ‘famous faces’ during infant-directed communication that are conveying a mixture of positive emotions, we have described three visually distinguishable facial expressions. We found evidence that ‘famous faces’ and these newly described facial expressions were not only typical in both fathers and mothers but in dog-directed communication as well. Furthermore, we found that visual prosody, similarly to acoustic prosody, is affected by context, situation and gender of the speaker. In conclusion, our research has the potential to significantly advance our understanding of the species-, gender- and context-specific functions as well as the emotional valence of facial prosodic cues and their role in healthy infant development.

Poster session B

Friday, 20 May, 15:30–17:00

B01: Is prospective memory performance related to anxiety and depression in traumatic brain injury?

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Previous research has found that a common cognitive impairment after traumatic brain injury (TBI) is prospective memory (PM) deficit. Several factors can influence the patients' PM performance, e.g., cognitive functioning, task regularity, cue type, recognition of task content, or psychological wellbeing. Despite the evidence for PM impairment in TBI, relatively few research has focused on how this memory system works and which factors contribute to its deficits. Our aim was to investigate the patients' performance on regular, irregular, event-based and time-based PM tasks and to assess the possible relationship with their neuropsychological profile and levels of anxiety and depression. We expected an impaired PM performance and higher anxiety and depression levels in the TBI group. A negative correlation between PM accuracy and levels of affective states were hypothesized. To measure PM performance, we used a naturalistic laboratory measure, the Hungarian version of Virtual Week. Different neuropsychological tests, the State-Trait Anxiety Inventory, and the Beck Depression Inventory were administered to explore the factors that may determine PM performance. Fifteen patients with TBI and fifteen healthy matched controls took part in the study. Our preliminary data show that an impairment is present at all PM tasks related to the prospective component. Patients showed lower performance not only on the irregular and time-based but also on the easier regular and event-based tasks. They were significantly better at recognizing the task content (retrospective component). TBI patients showed impairment on the neuropsychological tests of attention, processing speed, episodic memory, and executive functions. Contrary to our expectations, the groups did not differ in levels of anxiety and depression. Neither state nor trait anxiety and depression were related to either component of PM. Problems with PM cue detection may be explained by the injury characteristics and the neuropsychological profile of the patient group.

B02: Intentional Binding Paradigm in a Social Context

Sandra Stojić¹, Axel Lindner², Birgit Derntl²

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The sense of agency (SoA), or subjective experience of governing one's own actions, can be implicitly assessed through the intentional binding paradigm, where the compression of a time interval between the volitional action and outcome serves as a quantitative measure. In the present study, we investigated whether the SoA can be modified in a postdictive model of binding paradigm by incorporating social and non-social cues as auditory outcomes, potentially interpreted as cues conveying the piece of relevant information. Healthy participants ($N = 80$, $M = 22.71$, $SD = 3.59$) were required to temporally estimate the onset of the auditory effects in three different conditions: when the sensory event was caused by the participant themselves ("self"); another social agent ("other"); or an inanimate source ("nature"). The statistical analysis revealed that the estimation error between physical and perceived sound onset, the outcome shift, was the greatest in the operant "self" condition ($p < .001$), replicating the robust effect between the voluntary executed versus the passively observed conditions ("other" and "nature"). The temporal estimates were shifted earlier in women ($p < .05$) as compared to men in all the experimental conditions. Despite the effects of social and non-social sounds did not manifest in the low-level parameters of the binding paradigm and its perceptual shifts, the reflective parameters, i.e., ratings of the auditory outcomes on valence ($p < .001$) and arousal ($p < .001$) scales were estimated as the highest for the "self" condition. Both arousal and valence estimates were higher for the category of social sounds than non-social. The results of this study are in line with the previous work on SoA, offering a better in-depth inspection of the social effect of a discussed phenomenon.

B03: Longitudinal associations between children's behavioural symptoms and mobile device use

Veronika Konok

Eötvös Loránd University, Hungary

Mobile devices (mobiles and tablets) may serve as tools to regulate emotions, get stimulation / reward, or compensate for the lack of social interaction. Therefore, children with emotional, behavioural or relationship problems may be more inclined to use these devices, which, in turn, may affect (attenuate or intensify) their symptoms. We investigated the bi-directional longitudinal associations between behavioural symptoms and mobile device use during pre-school and school years. Parents of children aged 4-7 years old at first data collection (N=173), and 7-10 years old at second data collection (N=100) participated. They reported on their child's mobile use (Digital Kids Questionnaire) and behavioural symptoms (Strength and Difficulties Questionnaire: hyperactivity/inattention, conduct problems, emotional symptoms, peer relationship problems, prosocial behaviour) at both time points (T1 and T2). We analysed whether T1 mobile use predicts T2 behavioural symptoms (controlling for demographics and T1 behavioural symptoms); and whether T1 behavioural symptoms predict T2 mobile use (controlling for demographics and T1 mobile use). We found that children's T1 hyperactivity/inattention score positively associated with T2 mobile use, and that peer relationship problems and mobile use were positively associated in T2, but not in T1. While mobile use increased from T1 to T2, hyperactivity/inattention decreased, and peer relationship problems remained the same. Pre-schoolers with more hyperactive symptoms may use the mobile device more to regulate their emotions, to stimulate/reward themselves or their parents may use the mobile device to engage their children. While hyperactive symptoms decrease with age, mobile use will not, as it becomes a habit (hyperactivity and mobile use is no longer associated in T2). The association between peer relationship problems and mobile use (in T2) is in accordance with poorer socio-cognitive skills found in mobile users, and may be bi-directional. In younger children (T1), however, parental restriction of mobile use may obscure the manifestation of children's own interest.

B04: Understanding mental states in intergroup situations

Rebeka Zsoldos, Krisztina Andrási, Schvajda Réka, Pető Réka, Katalin Oláh, Ildikó Király
Eötvös Loránd University, Hungary

Social interactions require focusing on the intentions and beliefs of others, however, this process might be dependent on whether the partner represents one's own or another cultural group. Coming from another cultural group could alter the accessibility of shared knowledge in social interactions. In order to test the role of shared knowledge in mentalization processes, we used a modified version of the Faux-Pas Task. Adults read different stories, where a protagonist, who was from the same or different country as the participants, unintentionally committed norm violation. In the test phase, participants answered questions about the situations. Results showed that they were more likely to recognize faux pas situations, identify the protagonist as the norm violator, and treat their knowledge about the norms as applicable to the protagonist when they belonged to the same cultural group. The intention of the protagonist was interpreted similarly regardless of cultural background. These findings suggest that mentalization and social categorization processes interplay. Categorizing someone as a member of one's group can indicate whether one's cultural knowledge can be considered as relevant and applicable to that individual and consequently contributes fundamentally to mental state attribution.

B05: Investigating the influence of the cultural group membership of a model on preschoolers' long term learning

Krisztina Andrásj, Katalin Oláh, Rebeka Zsoldos, Ildikó Király

Eötvös Loránd University, Hungary

In this current study, we investigate whether the long term retention of novel information is influenced by the cultural group membership of a demonstrator. Upon arriving at the lab, the 4 year old participants are acquainted with an experimenter, who accompanies them to the testing room, and leaves for a brief period of time. In her absence, another experimenter enters whom the children witness either speaking their native language (Hungarian) or a different one (German). Following this, children see the model attaining three goals during three short events; in all cases, with the help of a target object and a supplementary object which is always hidden in one of two possible locations. Children are reinvited to the lab a week later, and the first experimenter allows them to play with the object sets previously shown to them, one by one. We measure how accurately participants recreate the events demonstrated to them. The prediction is that after one week's delay, children will more accurately recall the previously demonstrated events in case it was presented to them by an in-group model, compared to an out-group model. Data collection is still ongoing (planned sample size = 56, current sample size = 37). Currently it seems that children are slightly better at recalling the events more accurately following an in group demonstration, both when it comes to content (IG average = 0.62, OG average = 0.52) and order of steps (IG average = 0.53, OG average = 0.42).

B06: Speaking ironically: intentions, emotions and empathy behind verbal irony use and understanding

Katarzyna Branowska

University of Warsaw, Poland

As Gibbs (2000) stated, around eight percent of everyday speech between friends contain ironic statements. It is not just saying something indirectly – verbal irony, depending on its type, has different (very often opposite) functions. Verbal irony may be used to criticize or to compliment, to strengthen the bonds between people or build the distance. However, the important question is: what are the exact intentions behind verbal irony use? In other words: why people use irony, what are their intentions? From another perspective: what intentions behind verbal irony are perceived by its addressees? Another significant question is: What is the emotional load of ironic speech? And: is empathy an important factor in verbal irony use and comprehension? The main aim of this study is to answer these questions. There are no specific hypotheses related to intentions and emotions – the questions are exploratory, and it is planned to conduct qualitative analysis of the data. The hypotheses related to empathy are: 1) Higher level of empathy is related to lower declared irony use. 2) Higher level of empathy is related to better irony understanding. The study will be conducted on-line with the participation of Polish-speaking adults aged 20-60. Following materials will be used: 1) questionnaire measuring irony use and understanding containing 12 short vignettes (3 conditions containing 4 stories each: irony user, irony addressee, literal statements) and a few open questions, e.g., why someone use irony or what someone felt being speaker/addressee of irony. 2) The Empathy Quotient Short (EQ-Short) in the polish adaptation by Jankowiak-Siuda et. al (2017). The methodology of the study and preliminary results will be presented during the conference.

B07: The Role of Guided Affective Episodic Future Thinking for Proactive Behavior in 5-Year Olds

Felix Schreiber, Albert Newen, Silvia Schneider, Babett Voigt

Ruhr-Universität Bochum, Germany

Episodic future thinking (EFT) denotes humans' ability to mentally project one's self into a specific future situation. It has been suggested that EFT has tremendous adaptive value, e.g., by facilitating the preparation for challenges and opportunities that will only occur in the future (proactive behavior). Some evidence in adults supports this assumption and suggests that anticipated affect plays a crucial role for this relationship (Kotabe et al., 2019). Respective research with children is still missing. We want to close this gap by investigating whether guided EFT about anticipated affect fosters proactive behavior in 5-year-old children. We aim to examine a total of $N=90$ children (age in months: 60-71) in an interactive online experiment until March 2022. Children are randomly assigned to one of three EFT conditions (no guided EFT, guided EFT about positive affect, guided EFT about negative affect). Children visit two rooms. In the first room, the experimenter presents three games. The experimenter announces that children will come back to the room later and that they will have the opportunity to win stickers when mastering a test in one of the games then. In a second room, EFT about the upcoming test is manipulated depending on condition. Afterwards, children have the opportunity to play one of the three games including the test game. We hypothesize that children in both guided EFT conditions choose the test game more often in preparation for the test compared to children in the control group (proactive behavior). In addition, we explore possible differences between the guided EFT conditions about positive vs. negative affect. We are planning to provide our final results for the conference.

B08: Searching for Ithaca: A systematic, geographic investigation of the homeostatic functions of nostalgia

Elisabeta Militaru¹, Wijnand Van Tilburg², Jason Rentfrow¹

¹ *University of Cambridge, UK;* ² *University of Essex, UK*

Nostalgia has been positioned at the crossroads between positive and negative emotions. Whilst it has been described as predominantly positive, nostalgia comes to ameliorate discomfoting states, such as loneliness and seclusion, lack of meaning and even distress associated with adverse weather, such as wind, thunder and rain. Against this backdrop, we seek to investigate whether nostalgia fulfils a homeostatic function across two, large-scale studies. In Study 1, we used a dataset collected from participants across 12 countries (N = 1523) to test whether geographical variation in nostalgia can be explained by a process of adaptation to the surrounding climate. Results uncover an interaction between nostalgia and outdoor temperature: those who prefer lower temperatures are more likely to be nostalgic in the context of higher outdoor temperatures. Conversely, those who prefer higher temperatures reported higher levels of nostalgia in the context of lower outdoor temperatures, suggesting that nostalgia could remedy negative emotions experienced during adverse weather. Study 2 will seek to replicate and expand on those findings. Using approximately 5 million tweets from US-based users, we will test whether nostalgia is higher in regions with lower historical temperature or higher precipitation levels. Further, we predict that regional nostalgia is negatively associated with levels of seclusion and physical inactivity. Overall, these findings will help ascertain if variations in emotional states can be explained by a process of adaptation to surrounding environments.

B09: Reconciling Emotional Consciousness in 4E Cognition

Salah Mekhalalati

Carleton University, Canada

One of the most pressing questions that arises in theorizing about the emotions is how to capture their phenomenal aspect, or the distinctive ‘what it is like’ character. As of yet there is no consensus on how to do so. Concurrently, recent proposals investigating emotion reflect the view that cognition occurs by way of extra-cranial processes and is shaped and structured by dynamic interactions amongst the brain, body, and the environment. This is known as the 4E (embodied, embedded, enacted, and extended) approach to cognition. Some 4E theorists adopt a radical position that questions the fundamental assumptions of cognitive science. Radical enactivism is one such framework, which aims to replace all representational explanations of cognition with embodied and interactive explanations (Varela et al., 1991; Hutto & Myin 2013; Gallagher 2017). There has not been any forthright empirical or philosophical investigation as to how emotional consciousness, a central component of emotions, can fare within such frameworks. In this paper, I examine how emotional consciousness can be reconciled in the 4E camps under a non-representationalist strategy. To make this argument, I first outline the desiderata of a theory of emotional consciousness, making it clear that although there is no established consensus for how to approach it, there are general theoretical objectives that emotion researchers share. Secondly, I expose how anti-representationalist accounts fail to furnish an adequate explanation of emotional consciousness because such accounts are dubious as to their explanatory value as to how to incorporate qualitative experience and activity with the environment, as well as failing to account for phenomena that are central to emotional consciousness, such as the distinction between unconscious and conscious emotion in high order theories of consciousness (LeDoux & Brown 2017).

B10: Young children's underlying drivers for persistence and compliance in a coordinated joint activity

Melissa Perring, Sotaro Kita

University Of Warwick, England

Coordination, persistence, and compliance together can aid task performance and completion, but how can coordination influence persistence and compliance? In this study, we look at how young children behave in three different levels of coordinated joint activity. A previous study failed to show that increased coordination resulted in increased persistence (Perring et al., in prep). However, this may be due to increased coordination resulting in higher non-compliance. This current study will explore this possibility. In a between-subjects design with three conditions (N=72): A) low coordination; B) high coordination; or C) high coordination with ostensive cues, we will compare how persistent and compliant 4-year-olds were with their adult play partner. There are two possible outcomes. Firstly, if we find a positive correlation between persistence and compliance, it may suggest that the underlying driver for persistence and compliance is the same. Children may be more persistent and compliant because they want to gain and maintain a social connection (Wilthermuth, 2012) with their play partner. Alternatively, if we find a negative correlation between persistence and compliance, this will suggest that there are different underlying drivers. Children may find increased coordination restrictive, and they may be non-compliant to gain and maintain a sense of autonomy, which may be particularly important to children at this age due to an increased understanding of freedom of choice (Chernyak and Kushnir, 2018). So, it is feasible that coordinated joint activity presents children with a conflict between their desire for social connection and their desire for autonomy. The results will provide insight into the ability of young children to balance competing demands to play an effective role within a joint activity.

BI1: The effects of semantic combinatorics on the emotional dimensions of language

Márton Munding, Bálint Forgács, Alex Ilyés

Eötvös Loránd University, Hungary

Figurative speech is frequently used in everyday language, however the neurocognitive mechanisms behind the semantic processing of metaphors is still unclear. One possible reason for contradictory findings is the role of numerous uncontrolled psycholinguistic factors. Not only these factors influence semantic processing, but they often interact with each other, making the investigation of the processing of figurative meaning especially complex. Our study aims to examine how emotional factors (valence and arousal), interact with concreteness and imageability on three levels of linguistic complexity (words, two-word expressions and sentences). The relation of concreteness and imageability is especially interesting since metaphors often use perceptual expressions to convey abstract ideas vividly. Concreteness and imageability were thought to be interchangeable, but recent findings suggest that they may diverge: emotional expressions receive high imageability but low concreteness ratings (Dellantonio et al., 2014). We constructed a large set of novel Hungarian sentences with high vs. low contextual constraint, ending on literal or metaphorical adjective-noun expressions that employed concrete, perceptual words (in a perceptual or in a figurative sense). The material will be normed for concreteness, imageability, and emotional arousal on three linguistic levels: individual words constituting sentence ending two-word expressions, the expressions as wholes and entire sentences. Data gathering is still ongoing. We expect metaphoric expressions and sentences to behave similarly to abstract ones (Kousta et al., 2011) and their divergence of concreteness and imageability ratings to be increased by emotional arousal. Furthermore, we predict non-linear semantic combinatorial effects for figurative expressions and sentences only, not for literal expressions, where we expect a simple additive effect of the characteristics of the constituents. Finding such non-linearity would support Fónagy's (1999) idea that metaphors fly in the face of de Saussure's idea of the linearity of linguistic meaning.

B12: Emotions in Conceptual Spaces

Michał Sikorski¹, Olan Hominis²

¹ *Warsaw University of Technology, Poland;* ² *Boğaziçi University, Turkey*

We will demonstrate how the conceptual space framework can be used to formalize psychological theories. The conceptual space framework was presented in Gärdenfors (2000). The main idea is that scientific concepts are not represented by logical or syntactical formulas but rather by means of geometrical concepts such as dimensions or regions. We will use a three-dimensional theory of emotions presented in Wundt (1897) as an example. The main claim of the theory is that all emotions are composed of mixtures of three pairs of opposite basic emotions: pleasure and displeasure, excitement and inhibition, tension and relaxation. The theory was developed with a spatial metaphor in mind: all emotional states are composed out of basic emotions just as all colors can be obtained by mixing basic colors, and because of that it is a perfect target for formalization in the conceptual space framework. The theory has other advantages, for example, it can easily represent the intensity of emotional states, and is representative of a wider class of dimensional theories of emotions (see e.g., Russell, 2003). The formalization will be constituted by dimensions representing basic emotions, points representing emotional states, and areas of space representing concepts describing different emotions. We will describe the advantages of the conceptual space framework over a traditional structuralist approach used to formalize Wundt's theory by Reisenzein (2000). We will discuss the empirical predictions of the theory. Some of them, like predictions concerning the similarity of emotional states, are generated by the new formalization. Additionally, we will describe how the tools developed in the conceptual space framework can be used to formulate a theory of emotion, based purely on empirical observation.

B13: Testing memory strength with pupil dilation as a function of strategic and automatic memory retrieval

Péter Pajkossy¹, Ádám Albi²

¹ Institute of Cognitive Neuroscience and Psychology, Research Centre for Natural Sciences, Eötvös Loránd Research Network, Hungary; ² Budapest University of Technology and Economics, Hungary

Pupillometry has been used in the past to investigate cognitive and associated neurobiological processes that provide the foundations of episodic memory. Regarding these underlying processes it is assumed that there are general differences between recognition memory and cue-driven recollection. Based on pupillary old-new effect we hypothesized that as the strength of the memory trace increases, we will get an increasing trend in pupillary responses during recognition. It is based on the assumption that pupil response in recognition reflects the aggregate strength of the memory trace as the activation of the trace at the onset of the to-be recognized stimuli considers to be relatively effortless. By cued-recall on the other hand, we assumed that the retrieval process is predominantly reliant on strategic processes as an active searching strategy is needed for successful retrieval. Thus, we expected that as the memory strength increases, fewer mental effort is needed for the retrieval resulting in a downward trend in pupil responses. In our paired-associate learning paradigm, participants learned word pairs and were tested thereafter. Memory strength was manipulated by showing them either twice (20 word pairs), four times (15 word pairs) or eight times (10 word pairs). In the subsequent test, participants had to recognize words initially presented on the right side or recollect it at the onset of its pair on the left side of the screen. We could not find statistically significant effect of memory strength on pupillary responses in either test. However, on a trend level our expectations were confirmed in cued-recall, which was further supported by significantly decreasing response latencies. In order to make firm conclusions about the previously formulated hypotheses, further investigation is warranted in the future with special attention paid on the relationship between reaction time and pupil data.

BI4: The associations of earworms, schizotypy and subclinical obsessive-compulsive disorder

Flóra Fülöp¹, Ferenc Honbolygó²

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Earworms are a form of involuntary musical imagery which are in many ways similar to musical hallucinations and obsessions present in clinical disorders, such as schizophrenia and OCD. Previous research has shown relationships between earworms and schizotypy as well as subclinical obsessive-compulsive disorder. The aim of the present study was to investigate these associations in a Hungarian sample. Participants (N = 4301) filled out the Involuntary Musical Imagery Scale (IMIS), Schizotypal Personality Questionnaire-Brief Revised (SPQ-BR) and the Obsessive-Compulsive Inventory-Revised (OCI-R). We hypothesized that (1) there would be significant correlations between aspects of schizotypy, subclinical OCD and earworms; (2) a higher score on either the OCI-R or the SPQ-BR would be associated with more negative attitudes towards earworm experiences, as measured with the Negative valence factor of the IMIS, and (3) longer and more frequent earworm episodes. Spearman correlations showed weak relationships between several aspects of both schizotypy and subclinical OCD, and introspection related to earworms and earworm-related movement. Mann-Whitney tests showed that on their own, neither schizotypy nor subclinical OCD have an effect on negative attitudes towards earworms, however, there was a significant difference in negative attitudes in the case of those who scored high on either or both of the questionnaires. Both the high schizotypy and high OCD group reported generally longer and more frequent earworm episodes, as shown by Chi-square tests. These results partially support previous findings, provide new, relevant information about the associations of personality traits and earworms in a large sample, and could be the basis of future phenomenological and electrophysiological studies concerning earworms.

Poster session C

Saturday, 21 May, 10:00–11:30

C01: Theory of Mind in teachers – Preliminary result from a neuroimaging study

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In all social interactions, we rely on our exceptional ability to understand the minds of others. This ability is the theory of mind (TOM), which allows understanding emotions, beliefs, desires, goals, and intentions of others. Most studies concerning TOM focus on children or clinical populations. The teacher-child relationship is thought to be crucial in education and it is related to students' academic achievements and classroom behavior. Thus, here we focused on TOM abilities in a group of primary school teachers. We tested differences between teachers (TC) and a control group (HC) in TOM abilities in relation to children and adults. We designed a task based on the Saxelab TOM localizer with false-belief stories regarding adults and children respectively. In the control conditions we used stories, which required representation of outdated or false content, but did not refer to mental states - false photos. The task comprised three conditions: adult beliefs, child beliefs and false photos. We recruited TC (n=24) and HC (n=11) who did not differ in years of education and the number of kids. At the behavioral level there were no between-group differences in accuracy. At the neuronal level, in adult beliefs + child beliefs > false photos contrast, we observed an increased activation in the right middle frontal gyrus and the right precuneus in the TC group, in comparison with the HC group. This difference was independent of the adult/child conditions. Increased engagement of the precuneus might correspond to increased mental imagery of beliefs of others. The middle frontal gyrus activity is engaged in working memory processes necessary for TOM. Thus, the observed between-group difference might reflect processes of maintaining information and representation of the protagonist's beliefs required for TOM imagining.

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C02: Are episodic representations in non-human animals hedonically valenced?

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The debate about whether non-human animals can engage in ‘mental time travel’ has primarily centered on controversies regarding conceptual capacities and the experiential character of their event representations. From the perspective of animal welfare, however, these issues are secondary to the question of whether such representations are hedonically valenced: do other animals experience remembered and imagined pains as painful? Over the last 15 years, a plethora of findings from comparative neuroscience – primarily in rats – have emerged that are highly relevant to this question but have so far been largely ignored in the debate on animal mental time travel. Hippocampal place cells in rats instantiate so-called re- and preplay of experiences. These replay events have been shown to be sensitive to reward and punishment information, to be involved in deliberative decision-making, to predict choice behavior, to be highly conserved across mammals, and to be associated with conscious mental imagery in humans. Here, I will argue that evidence from hippocampal simulation in rats together with some evolutionary considerations about the origins of the hippocampal memory system puts the burden of proof on those skeptical about hedonically valenced episodic thoughts in non-human animals. In light of this evidence, we should therefore assume that all animals with a homologous hippocampal architecture to rats (i.e., all mammals) can experience the hedonic valence of previous and anticipated pains and pleasures. On the one hand, this conclusion has consequences for questions surrounding the emergence of various metacognitive capacities such as reality monitoring. On the other hand, it has important implications for animal welfare: if animals can experience imagined and remembered pains and pleasures, the determination of welfare outcomes cannot solely be based on present stimuli but needs to consider past and future environments as well.

C03: Decoding ostension: the metacommunicative file

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Over the last decades, several studies brought attention to children's early involvement in ostensive communication, i.e., a form of communication relying on capacities to express and recognize communicative intentions. According to Csibra (2010), communicative intentions can be expressed through specific behavioural cues that are easily decoded by infants. Empirical studies suggest that preverbal infants are sensitive to such "ostensive cues", thus displaying an early ability to track others' communicative intentions. Furthermore, existing data support the hypothesis that ostensive behaviours generate interpretative bias in children, such as referential expectations (Senju et al., 2008), generalization of newly-acquired information (Egyed et al., 2013), and attitudes of epistemic trust towards communicators (Mascaro & Kovács, 2022). From a theoretical perspective, these findings raise the question of how to conceptualize the representational apparatus which underlies early recognition of communicative intentions. Here, I propose that this process can be described through the notion of metacommunicative file. My proposal draws upon a recent hypothesis in developmental research, according to which children's disposition to be biased by others' mental states might be underpinned by flexible structures admitting placeholders for underspecified propositional contents (Kovács, 2016). Analogously, I describe metacommunicative files as representational structures made up of two variables, one for the agent acting with communicative intent, the other for the content conveyed through an ostensive act of communication. Crucially, the computation of these variables can be procedurally and temporally distinguished, thus allowing for the content variable to be provisionally tagged by a placeholder and to be filled afterwards. By providing some scenarios that exemplify the dynamic functioning of this new theoretical construct, I propose to describe infants' decoding of ostensive cues as the setting up of a metacommunicative file that is bonded to the communicator, and whose informative content is left underspecified or is computed later by further cognitive effort.

C04: Role of emotions in motivating climate action – Insights from a qualitative study in Poland

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Emotions can function as powerful drivers of many pro-social behaviors, including climate action. Numerous studies investigated whether particular emotions - such as anger, anxiety, sadness or hope - predict pro-environmental intentions and behaviors. However, there is still not enough clarity regarding conditions under which confrontation with climate-related emotions results in long-term behavioral change. Thus, one of the aims of our study was to investigate how various emotions motivate individuals towards the adoption of a climate-friendly lifestyle and engagement in climate action. We conducted 40 semi-structured interviews with Polish residents, who self-identified as concerned about climate change. The majority of them adjusted their lifestyles to their pro-environmental values and participated in individual or collective efforts to mitigate climate change. Interviewees reported experiencing shame, guilt, pride, and hope among the emotions that motivated their lifestyle change the most. Emotions that inspired their collective climate action were anger and joy of working together towards a common goal. In general, participants' emotional responses to various aspects of climate change were predominantly negative but they were also described as complex, alienating, intense, conflicting or intertwined. Participants spoke about the need to regulate these overwhelming emotions, which discouraged action and led to apathy. They also used various coping strategies to break through the initial shock and hopelessness resulting from the realization of the inevitable dangers of climate change. In summary, based on thick data on the emotional experience of climate change collected in this study, we analyzed the complex links between climate change emotions and pro-climate behaviors. In addition, we discuss coping strategies people use to regulate the intensity of experienced emotions and the focus of related cognitions, in order to sustain motivation for climate-friendly behaviors. Results from this qualitative, exploratory study can inspire further quantitative research on how emotions experienced in "real life" impact pro-environmental behavior. Furthermore, insights regarding successful coping strategies can inform therapeutic practice on how to effectively support climate activists.

C05: Blending into the Crowd: Electrophysiological Evidence of Gestalt Perception of a Human Dyad – a replication study

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Human faces and bodies are environmental stimuli of special importance that the brain processes with selective attention and a highly specialized visual system. Studies showed that the human brain also has dedicated networks for perception of pluralities of human bodies in synchronous motion or in face-to-face interaction. Here sought to replicate, with different stimuli, our recent finding revealing that two human bodies that are merely in close spatial proximity are automatically integrated into a coherent perceptual unit (Mersad & Caristan, 2021). As in the initial experiment, we used an EEG frequency tagging technique allowing the dissociation of the brain activity related to the component parts of an image from the activity related to the global image configuration. We presented to participants images of two silhouettes flickering at different frequencies (5.88 vs. 7.14 Hz). In our preliminary results (10 participants), clear response at these stimulation frequencies reflected response to each part of the dyad. An emerging intermodulation component ($7.14 + 5.88 = 13.02$ Hz), a nonlinear response regarded as an objective signature of holistic representation, was significantly enhanced in the (typical) upright relative to an (altered) inverted position. The inversion effect was higher for the intermodulation component than for the stimulation frequencies (although the difference did not reach significance), suggesting the presence, in the current replication experiment, of the trade-off initially observed between the processing of the global dyad configuration and that of the structural properties of the dyad elements. Hence the perception of the human form might be of a fundamentally different nature when it is part of a plurality.

C06: The effect of face masks on emotion recognition, and its relation to negative affections and interpersonal reactivity

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Introduction In addition to the positive health effects, wearing different types of masks can pose several problems such as difficulties on emotion recognition and elevated anxiety. Thus, we conducted a pilot study in which we investigated the effects of face masks on emotion recognition mediated by emphatic skills on negative and positive emotional content. We also investigated the relationship between anxiety, depression, stress, and the degree to which the mask-wearing individual is disturbed by wearing the mask.

Methods Data was collected in within-subject design using an online questionnaire. Our study consisted of two parts, with one month between each part. A total of 71 participants completed both questionnaires. The study used a total of 21 images of emotional states presented by actors, selected with the help of an independent group of experts. The respondents were asked to identify faces expressing different emotional states, on which masks were constructed in the first round, while in the second round the same faces were presented without masks. In addition, we asked the respondents to complete the 21-item Depression Anxiety and Stress Scale (DASS-21) and the Interpersonal Reactivity Index (IRI).

Results A significant difference was found in the number of correct matches between masked and unmasked condition and between images with positive and negative meanings: respondents gave more accurate matches for images without a mask and images with a positive connotation. In addition, only the fantasy factor of IRI showed a positive significant correlation with the hits of masked faces. DASS-21 showed strong positive correlations with the subjectively perceived distracting nature of the mask. Finally, no relationship was found between DASS-21 and the ability to recognize emotions in masked and unmasked images. Based on the results of our pilot study, we are planning to continue our research by measuring emotion recognition through reaction time.

C07: “Emma locked the door, dropped the luggage and looked at the big pile of dirty dishes on the kitchen table...” Personal and Cultural Impact on a Reader’s Emotional Situation Model

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Stories invite readers to experience their own emotions in a new setting. Therefore, a reader’s situation model on the story most likely includes atmosphere of the story and the main character’s emotions as a record of what happened before and as a prediction of what might happen next. This study investigated the interaction between a reader’s emotional attitudes and their cultural stereotypes when listening to very short stories, for example for happy holidays and boring waiting time in governmental offices. Twenty German and twenty Kuwaiti participants listened to 21 narratives with different topics (family and friends; Christmas; Ramadan; work duties; hectic situations; visits to governmental offices) with their electrodermal activity (EDA) recorded and their experienced emotion and attitudes reported after processing all stories. As expected, we found stronger emotions recorded and reported for own holidays (Christmas in Germany and Ramadan in Kuwait) than for unfamiliar holidays. More interestingly, for homogenous cultural stereotypes, readers seem to override their personal attitude – their (hated) family gatherings are perceived as happy as everybody else’s. In contrast, with more ambivalent cultural perceptions, readers’ personal attitudes have a stronger impact – waiting rooms become even more awful than everybody else’s. This illustrates that readers integrate both general public perceptions and their own experience when reading narratives. Therefore, the same story can activate very different emotions depending on the reader’s personal experience and their general knowledge of emotional settings reported in the narrative.

C08: Auto-noetic Consciousness: a novel method of capturing the subjective experience of memory recall and future thinking

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Auto-noetic Consciousness (AC) allows us to represent our 'self' during mental time travel and to re-experience past events and pre-experience our future. There has been much variability in the measurement of AC, with researchers using various methods to tap into this higher-order process. We developed a new methodology to capture AC during memory recall and future thinking by a) comprehensively compiling all the previously used questions and scales to measure AC, together with new items measuring effort, event meaning & valence, and b) using natural language processing. In Study 1, after piloting, 202 neurotypicals (age 18–35) narrated autobiographical childhood & recent memories and near & far future events online. After each event, they completed our novel AC questionnaire (ACQ) to identify and quantify their experience when remembering and imagining these events (e.g., How vivid was the event you remembered/imagined?). Factor analysis revealed informative differences between the type of event re- or pre-experienced. For example, the vividness item emerged while imagining future events but not while remembering past events. We could demonstrate that the language participants use to describe the past and future events correlate with ACQ scores using Natural Language Processing. In Study 2, 123 participants encoded a day out in a London video event. We were able to link AC with objective memory performance, at recall, only in the group of participants informed this was their event– as opposed to the other group who were told it was someone else's event. As the subjective sense of recall is impaired in clinical groups and healthy ageing, our novel measure is of potentially broad interest to accompany memory questionnaires to tap into auto-noetic consciousness.

C09: The relationship between burnout, empathy, cognitive emotion regulation strategies and mental wellbeing among emergency department workers

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Introduction Healthcare workers are exposed to high physical, mental and emotional stress, a leading cause of burnout. Occupational stress has a direct, negative impact on healthcare workers, the healthcare system, as well as on the patients. The aim of this study is to explore the relationship of burnout with empathy, occupational stress, emotion regulation and wellbeing among ER workers.

Methods A cross-sectional research was conducted with the participation of 159 ER workers. Emotion regulation was assessed with the Cognitive Emotion Regulation Questionnaire (CERQ). Burnout and wellbeing were measured with the Maslach Burnout Inventory (MBI-HSS) and the WHO-5 Well-being Index (WBI-5). Depressive symptoms, anxiety, stress and empathy were examined with the Depression, Anxiety and Stress Scale (DASS-21) and the Empathy Quotient-10 (EQ-10) questionnaire. Linear regression was used to analyse the data.

Results Mild symptoms of depression, anxiety and stress are present (DASS-21) with moderate levels of emotional exhaustion and depersonalisation (MBI-HSS) among the participants. The overall wellbeing (WBI-5) is better compared to the Hungarian average. Empathy shows significant negative correlations with depersonalisation and personal accomplishment. Rumination, blaming others and catastrophising are associated with depersonalisation and emotional exhaustion. Results indicate that rumination and catastrophizing increase the risk of burnout, while positive reconstructing and empathic skills appear to be protective factors against burnout.

Conclusions Organisational interventions to reduce stress and burnout of healthcare workers, targeting cognitive emotion regulation strategies and empathic skills are vital for building an enhanced patient care system.

C10: Recipe for a Good Meme: Cognitive and Emotional Effects on Internet Meme Evaluation

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What are the ingredients that make a good internet meme? Internet memes are user-generated digital artifacts that permeate through social media platforms. Every day, millions of people are viewing, creating, liking, and sharing these powerful communication vehicles. However, these emotional stimuli have gone largely unnoticed in the cognitive sciences. Our goal is to validate a large database of internet memes and operationalize them in a way that is useful for emotional researchers. We have collected 300 user-generated internet memes including text-only, visual-only, and multimodal memes from social media platforms. To investigate what determines the aesthetic evaluation of internet memes, each participant will be presented an online survey with 15 memes. First, they will evaluate each meme from one to five stars, including half-steps. Then, they will judge features like humor, aptness, incongruity, prototypicality, truthiness, ease of processing, and level of understanding using a slider scale. A similar scale will be used to measure the intensity of elicited emotions from 15 categorical emotions (e.g., amusement and confusion). Finally, we will ask participants to write their understanding of the meme and if they would like/share it on social media. In a preliminary study using mixed effect modeling on 15 randomly rated memes (N=49 Americans sampled online, 13 M, 30 F, 6 NB), we observed that humor ($F(1,668.53)=46.7$; $p<0.001$), aptness ($F(1,668.53)=429.2$; $p<0.001$), and prototypicality ($F(1,669.53)=25.2$; $p<0.001$) had positive effects on overall liking. We also found that aptness ($F(1,663.55)=59.2$; $p<0.001$) and humor ($F(1,665.76)=102.1$; $p<0.001$) had positive effects on understanding. While amusement ($F(1,656.1)=129.3$; $p<0.001$) had a positive effect on overall liking, anger ($F(1,651.4)=10.5$; $p<0.01$), confusion ($F(1,656.30)=35.7$; $p<0.001$) and frustration ($F(1,636.35)=8.3$; $p<0.01$) had a negative effect on evaluations. This validated database will serve as the foundation for future emotional research on internet memes, including psychophysical measures of understanding and affect.

C11: The effect of emotions on counterfactual thinking in 5 to 7-year-old Children

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Counterfactual thinking (CFT) refers to mental processes which simulate a reality that is counterfactual to the real world. Classic examples for these kinds of thoughts are “what-if” scenarios. CFT has been shown to be closely related to causal thinking and Theory of Mind, but also to emotional evaluation of events. Recent studies found that children perform better at CFT-tasks if these were connected to negative emotions. For example, if children were presented with a story involving negative emotions of the protagonist, they performed better at a following CFT task than if they were presented with a neutral version of the story (Nakamichi et al., 2019). It remains unclear whether counterfactual thinking in young children is particularly supported by negative emotions or by emotions in general. Building on paradigms used by Nakamichi et al. (2019) and Rafetseder & Perner (2018), we examine whether this effect of emotions on CFT shows only in connection to negative emotions or if positive emotions have a similar effect. We present 5 to 7-year-old children with three stories containing different emotions and a following CFT-task related to the events in the story. First results will be discussed.

C12: Automated recognition of emotions based on images of facial expressions

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Personal computers are involved in various cognitive science studies, e.g. to measure human subjects' preferences or response times quantitatively. While the subjects' emotions may be essential to explain the observations, objective assessment of emotions in such studies is inherently difficult. However, state-of-the-art computers are equipped with cameras that could be used to capture an image of the subject's face based on which her/his emotions may be recognized automatically which may provide objective assessment of emotions in large-scale studies. In order to take the first steps into this direction, we considered a publicly available image dataset (<https://www.kaggle.com/debanga/facial-expression-recognition-challenge>) and compared distance-based machine learning techniques for the automated recognition of the emotions. In the dataset, each image shows the face of a human subject and it is annotated with one of the following emotions: angry, disgust, fear, happy, sad, surprise and neutral. Besides considering well-known distance measures, such as Euclidean distance, Manhattan distance or cosine distance, we used dynamic time warping (DTW) in a genuine way to compare the images of facial expressions and to recognize emotions. In all the cases, we obtained promising results that are significantly better than random guessing.

C13: Epistemic Emotions and the Exploration of Belief Popularity

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Epistemic emotions, such as surprise and curiosity, affect learning and exploration. Specifically, beliefs held with high confidence elicit high levels of surprise and curiosity when proven wrong. In turn, these emotions lead to searching for more elaborative details about the belief topic. Yet, curiosity is a multifaceted individual trait, with people varying in their propensity to orient towards the pleasure of discovery (I-Type, Litman 2008) and the alleviation of information gaps (D-type). The present research examined the contribution of situationally triggered epistemic emotions and trait-level curiosity to the gathering of information about how widely a belief is held in the population. Belief popularity is important because of its implications for social affiliation and learning. After answering a trivia question and indicating how confident they were, participants were shown an answer submitted by another participant, reported their surprise and curiosity, and then were given the option of seeing up to three responses from different participants. Participants also completed Litman's (2008) Interest/Deprivation curiosity scale. The results supported serial mediation, with certainty predicting surprise, surprise predicting curiosity, and curiosity predicting the number of additional sources explored. However, unlike prior findings, high-certainty errors did not result in stronger emotions or more exploration than low-certainty errors. In addition, I-type but not D-type curiosity affected opinion exploration. Thus, epistemic emotions motivate not just elaborative exploration but also exploration of belief popularity - two complementary ways to justify beliefs. Furthermore, while orientation toward uncertainty reduction (D-type curiosity) has been associated with elaborative exploration, we demonstrate that other types of exploration may be propelled by intrinsically, discovery driven curiosity.

C14: Explaining gendered theory of mind with gender equality and socioeconomic development

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Hypothesis Perhaps paradoxically, some psychological differences between men and women appear to be larger in countries with smaller gender inequality and greater socioeconomic development. We hypothesize that a female advantage in theory of mind (ToM) relates to human progress as well across the 20 regions of Italy.

Methods We ran a pilot study in 465 men (age=41±13 years) and 785 women (age=38±12 years) using the “Reading the Mind in the Eyes” Test (Eyes Test) to evaluate ToM alongside other psychological measures and regional human-progress indices. With machine learning (bootstrap-enhanced LASSO regression) and traditional statistics (robust linear regression and Spearman’s correlation; $P < 0.05$, Bonferroni-corrected), we investigated performance on the Eyes Test in relation to: (1) gender and potential covariates; (2) experience of and attitude toward gender equality; (3) regional gender-related (e.g. gender employment gap) and gender-unrelated (e.g. GDP) socioeconomic indices.

Results The pilot study confirmed: (1) six unique predictors of ToM selected in a data-driven manner: attitude toward gender equality of opportunity, empathy, fluid intelligence, interest in the Eyes Test, gender, and regional social development; (2) female advantage in ToM independent of age, education years, or the above five covariates (Cohen’s $D_s = 0.19-0.29$); (3) better performance in ToM among women who reported having experienced greater gender-related disadvantage in professional opportunity and among men who reported the opposite; (4) positive effect of regional income on ToM independent of regional education and health; (5) relationships between the female advantage in ToM and regional social development (negative) and gender employment gap (positive).

Conclusions Both men and women performed better in ToM in wealthier regions of Italy. Contrary to the gender-equality-paradox hypothesis, the female advantage in ToM was smaller in less gender-unequal and more socially developed regions. A larger registered study is needed to verify these effects.

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