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TRENDS IN
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understanding social cognition

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Understanding Social Cognition

Within the social sciences, it is widely accepted that groups of people exhibit social properties and dynamics that emerge from, but cannot be reductively identified with the actions and properties of individual members. Nevertheless, psychology and cognitive science have only reluctantly embraced the idea that something similar might happen in the domain of mind and cognition.

Contemporary research on the distinctively social aspects of human cognition, which has become abundant over the past two decades, tends to fall somewhere along the following continuum. On the “conservative” side, the minds of individuals are currently being reconceived as socially situated, culturally scaffolded, and deeply transformed by our life-long immersion and participation in group contexts. According to more “liberal” multi-level approaches, the informational integration of functionally interdependent and socially distributed individual cognitive processes can enable the rise to emergent group-level cognitive phenomena. We invite participants to explore the full spectrum of social cognition, ranging from the elementary social-cognitive skills that allow people to think and act together, through embodied behavioral coupling and joint intentionality, mechanisms of mind reading and mutual understanding, all the way to group cognition.

Special Guests of the Conference

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Rafał Augustyn, Sylwia Wojtczak and Iwona Witczak-Plisiecka - CONCEPTUAL METAPHOR AS A MECHANISM OF LEGAL REASONING AND UNDERSTANDING LAW

Maria Curie-Skłodowska University (Poland)

The proposed paper aims at presenting some of the most important results of a larger interdisciplinary research project from the fields of legal science and cognitive linguistics carried out in the years 2015-2017 and financed by the Polish National Science Centre. The primary objective of the project was to analyse, based on the synchronic study of a wide body of both Polish language of law and legal language (acts regulating substantive and procedural law, judgements, theory and philosophy of law), the effect of specific metaphoricity of the language used by the Polish legislator on legal reasoning, including legal reasoning by analogy (cf. Gentner et al., 2001; Brożek, 2015).

As part of this broad research and, in particular, for the purpose of this paper, the Polish Penal Code, Civil Code, Code of Criminal Procedure and Code of Civil Procedure were submitted to an in-depth conceptual and linguistic analysis in search of the presence of conceptual metaphors. The adopted methodology was G. Lakoff and M. Johnson's (1980/2003) Conceptual Metaphor Theory with its subsequent improvements (cf., inter alia, Lakoff, 1993; Kövecses, 2010, 2015); in particular, we followed a revised version of Jäkel's (2003) onomasiological-cognitive approach for identifying specific legal metaphors. It is noticeable that the language of the Penal Code used by the legislator who claims the right to universality, i.e. universal accessibility for an average recipient in the given linguistic and cultural community, is, to a great extent, metaphorical just like natural, common language. Our hypothesis is that this often domain-specific metaphorical language is a tool used by the legislator on purpose to achieve coherent and uniform understanding of law in a given social group, i.e. not only by legal professionals, but also by all citizens that are subject to a particular legal system and its provisions. For instance, legal institutions described in the Penal Code are frequently conceptualized based on highly conventionalised metaphors whose source domain are inanimate material objects and autonomous organisms or their respective parts. Legal responsibilities and criminal offences are construed as physical forces acting on material objects and organisms in the spatial domain, while the judiciary itself and the adjudication of punishment are conceptualised as means of a wide range of social interactions (bringing up, treating, educating, weighing, preventing disasters).

The results of the linguistic analysis of the primary sources of law (codes) were subsequently used in the analysis of selected contemporary judicial decisions (judgements rendered by the Supreme Court and appellate courts) in order to demonstrate the impact of legal metaphors on legal argumentation, evaluation and interpretative decisions in legal discourse. Our comprehensive study showed that communicative succinctness of highly conventionalized metaphors increases conciseness and coherence of legal texts and thus facilitates cognitive processing of such texts by citizens. Furthermore, through their "chilling effect" metaphors help stabilise the understanding of key legal concepts from a diachronic perspective, which contributes to the coherence of law itself – such sense stability is important from the perspective of internal and external legal values. Finally, our research demonstrated that metaphors are major premises to and drive legal reasoning, often determining its outcome (albeit the process runs in the minds of conceptualisers mostly unconsciously) thus making them a powerful tool of social cognition and interaction in the domain of law.

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Marta Białecka-Pikul, Arkadiusz Białek, Magdalena Kosno - THE ROLE OF THE ABILITY TO POINT INFORMATIVELY IN FALSE BELIEF UNDERSTANDING IN 3 YEAR OLDS

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Social understanding or theory of mind (ToM) primarily emerges in interpersonal interactions with others and ToM ability is pragmatically or socially contextualized (for review: Froese & Gallagher, 2012; Liszkowski, 2013). Consequently, in young children their ability to use pointing gesture informatively might be a good predictor of their early false belief understanding. Additionally, false belief understanding as an expression of the ability to predict other's behaviors in false belief task might be spontaneous (with gazes only) or more reflective (with gestures and verbal answers) and thus developmental transition from spontaneous to reflective reactions is also expected.

Longitudinal design was used and 174 children were tested at three time points. At T1, 2-year-olds (44% girls) were tested using a protoinformative pointing task (Bialek et al., in review). At T2 and T3, a modified, interactive false belief task (based on Rubio-Fernandez & Guerts, 2014) was used with the same children at 3 and 3.5.

We found that the ability to use protoinformative pointing gestures at 2 years of age predicts later reflective false belief understanding but not spontaneous (gaze) reactions. Moreover, we confirmed the developmental transition from spontaneous to reflective false belief understanding between the ages of 3 and 3.5. We found that 3.5 years olds in comparison to 3 year olds more frequently correctly answered the test question by pointing or verbally, and less frequently used exclusively spontaneous gaze reaction. Generally, based on our results we might speculate that the ability to coordinate interaction with the use of informative gesture in toddlers renders the development of the ability to predict others' actions in 3.5 year olds.

Mikołaj Biesaga, Paweł Motyka and Andrzej Nowak - THE ROLE OF OBSERVED SYNCHRONIZATION WITH EMOTIONAL FACES IN DRAWING INFERENCES ABOUT A NEUTRAL PERSON

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Synchronization has been shown to play an important role in social life by impinging on the quality of interaction and interacting partners. While most of the studies in this field focus

on the effects occurring within the synchronizing partners, the behavioral synchronization can also be observed by third-parties and used to infer judgments about the interacting people. In real-life situations, we tend to spontaneously draw inferences about relations between people from the observed level of behavioral coordination between them. In the study by Lakens and Stel (2011) participants had to infer the degree to which observed individuals constituted a social unit and shared feelings of rapport depending on the observed level of synchrony in their bodily movements. The results showed that attributed rapport and perceived unity of the group were rated higher in the synchrony condition. Yet, the question remains whether the observed synchronization of individuals affects also the observer's perception of an individual depending on the characteristics of synchronized partners.

To address this question we develop a novel approach employing visualization of multiple persons that either synchronize or not. We expect that the observed synchronization would lead to the effects of biased perception of individuals in the direction of the characteristics of the group with which they are synchronized. Following the assumption that a first-glance evaluation of people in real-life situations takes place along the emotional valence dimension we narrow the scope of inquiry into the field of basic emotional expressions and their perception (Ekman, 1992). Therefore, in two studies, we aimed to examine how different forms of observed synchronization – via flashing rate (Study 1) and emergence of a common movement direction (Study 2) – influence the perception of neutral persons depending on emotional valence of faces synchronizing with them. We assume that the consequences of such observations can be principally twofold: first, an emotionally neutral face may become perceived as expressing positive or negative emotions more strongly, and second, the observer's attitude towards this person may be biased for higher or lower expressed willingness for interacting with them. Thus, we hypothesized that observed synchronization biases the perceived emotions expressed by neutral persons and the attitude towards them in the direction congruent with the valence of synchronizing faces.

The results showed a divergent pattern of effects for different forms of synchronization. In study 1, the flashing synchrony biased only the perceived emotions while in study 2, employing the movement synchrony, the attitude towards the observed person. Our interpretation of these results relies on the assumption that effects on the level of perception and attitude are naturally formed in different situational conditions. Therefore, we interpret them in the context of procedural differences between two studies – including: form of synchrony, total duration, repetitiveness of synchrony and desynchrony episodes – and suggest that particular parameters of synchronization may play important role in modulating perception of neutral faces and an attitude towards them. Nonetheless, our results suggest that it is not the mere spatial closeness that generates the effect of being associated with the group but rather the synchrony of its constituents. It seems that perceived synchrony may play the role of a cognitive heuristic that helps us to form inferences about individuals in a dynamically changing social environment.

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Łukasz Blechar - AI OR IA: MAXIMIZING TASK EFFICIENCY BY COMBINING THE CAPABILITIES OF ARTIFICIAL AND HUMAN INTELLIGENCE

Maria Curie-Skłodowska University (Poland)

I would like to reintroduce the concept of Intelligence Augmentation as a valid alternative to nowadays leading idea of an anthropocentric concept of Artificial Intelligence.

Last 50 years of AI development had been dictated by Marvin Minsky's vision. His belief was grounded on the notion that human minds work similarly to computers. The goal of Minsky's AI is to conceive and build machines that function like humans. But I would like to recall the alternative and show that we don't necessarily *need* to create new intelligence. Around the same time when Minsky has developed his vision there was also another idea, J.C.R. Licklider's human-computer symbiosis (Licklider, 1960), which may be better termed as Intelligence Augmentation (IA). His intention was to empower our capabilities such as our nonlinear approaches, creativity and iterative hypotheses. But with respect towards machines advantages such as speed of performing calculations and their unique capabilities, such as scalability or adapting the volumes.

The end goal in this approach is to maximize the efficiency of task execution in processes like making decisions or controlling complex situations by allowing people and machines to cooperate. Only recently has it become possible, by using technologies dealing with big data, network systems, open platforms and embedded technology.

Three examples showing possible implementations:

1. The freestyle chess tournament held in 2005 was won by two amateurs with three laptops with relatively low processing power.

These two players won because they were experts in cooperating with computers and, what's more, they knew when they should rely on their intuition, and when on the advice of the software, sometimes making a decision to use a move that was low rated by machines, if they thought they would be able to psychologically shake the opponent (Thompson, 2013).

2. Scientists increasingly often resort to using the help of unskilled people for tasks that even "supercomputers" are unable to cope with.

This has a wide range of applications. For example, in *Foldit* amateurs helped in researching the process of protein folding. Users rearranged the visualizations of proteins and computers evaluated these new configurations for plausibility. Another game, *EyeWire*, used similar methods to create complex, three-dimensional models of neurons in retina.

3. Designing the monument that commemorates the terrorist attack of 9/11. The idea here was to depict names of thousands of victims using the "meaningful adjacency" technique, which aimed to arrange their names next to each other based on the relationship between them. From a technical point of view, this is a huge challenge considering amount of victims, their relations, physical limitations and general aesthetics. The final shape was created by allowing machines to do calculations thus allowing humans to focus on choices regarding design and final composition (Matson, 2011).

To sum up, the more we look around, the more we can see Licklider's vision, but we are still not including it when developing new products or technologies. I intend to finish my presentation with a few pointers on minimizing friction between humans and computers and integrating the capabilities of both sorts of entities.

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Piotr Bystranowski, Bartosz Janik and Maciej Próchnicki - LEGAL NUMBERS: ANALYSIS OF EMPIRICAL AND THEORETICAL LITERATURE ON NUMERICAL DECISION-MAKING IN THE LAW

Jagiellonian University (Poland)

Numerical quantification and estimation play an important role in legal practice - law is filled with rules that provide judges and other legal decision-makers with the capacity to determine legally-important values, such as damage awards or length of prison terms. How do judges make decisions when deciding about them? We know that they should base their decisions solely on legal factors, but how do other factors (sociological, political, psychological) influence them? Do they rely mainly on intuition?

As shown by current research in empirical sciences, such as cognitive psychology or behavioural economics, human judgment and decision making are largely based on heuristics - simplified modes of reasoning that enable us to find solutions to complex and important problems within a very short period of time and in an effortless way. However, these solutions are based only on a limited amount of information, which may be useful in cases of excessive or insufficient information, but often leads to systematic deviations from the accurate judgment.

Heuristics are particularly prevalent when it comes to numeric reasoning. When people are asked to issue a numeric assessment of some magnitude, they rely on fallible modes of reasoning most of the time. One of the best known psychological phenomena within this domain is the anchoring effect - facing the task of eliciting a numerical value in a particular case, people "anchor" on some other number present in the environment, even if it is not connected to the question whatsoever. For last forty years, the research on anchoring has shown that it is one of the most robust and omnipresent heuristics, affecting human reasoning in many domains and across different groups of subjects.

Fallible modes of numeric reasoning may be particularly troublesome in the legal domain, especially in the case of judicial decisions making. Judges are often supposed to issue numerical judgments that affect rights and duties of individuals. Thus, from the legal -theoretic point of view, it is crucial to pose the following questions: Do judges anchor just like other people, or maybe the years of education and practice can prevent them from relying on unreliable reasoning? What are the "anchors" in adjudication, and what is their nature - are they legally relevant and admissible from a procedural point of view?

Within the last couple of years, cognitive psychologists and legal scholars have conducted some empirical research addressing specifically the mechanisms of judicial reasoning and attempting at giving answers to the questions presented above. Generally, these studies seem to show that judges and other legal decisionmakers are not immune from psychological effects that could make their numeric judgement fallible. However, this research is still in its infancy, studies are relatively scarce, and their results sometimes turn out to be contradictory. Moreover, they are often accompanied by legal-theoretical interpretation that is far from being flawless. Thus, in this paper we will discuss the existing empirical literature on judicial numeric reasoning, point at its shortcomings, and present some reflections from the legal -theoretical viewpoint.

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Shereen Chang - HOW DOES A PARROT LEARN TO SPEAK LIKE A HUMAN?

University of Pennsylvania (USA)

What is the significance of learning conditions for interspecific inferences about cognition? Consider Alex the grey parrot, who was trained by researcher Irene Pepperberg (2002) to use English words in their appropriate contexts. For example, when presented with an array of different objects, Alex could vocalize in English the correct answers to questions such as “How many green blocks?” He could also compare two objects and identify how they were similar or different (e.g., “color.”)

Alex learned to speak using different methods emphasizing social context. To introduce new words to Alex, Pepperberg (2002) primarily used a Model/Rival technique in which two human trainers demonstrate the reference and functionality of target words, while providing social interaction for the parrot. After Alex attempted to vocalize the new word in the presence of the referent object, trainers would repeat the word in different sentences to clarify its pronunciation, reminiscent of how human parents talk to young children. Pepperberg also used referential mapping techniques to take advantage of novel vocalizations. If Alex coincidentally vocalized an actual word, researchers tried to reward his utterance by presenting the corresponding object (2002, p. 29). Alex also engaged in self-directed learning; he learned the word “grey” after seeing his reflection in the mirror and asking his trainers, “What color?” In summary, Alex learned to communicate using components of a human-based code through techniques similar to how humans learn.

How do we make sense of the similarities between the ways in which Alex and human children learn to speak? According to Sandra Mitchell’s (2001) causal isomorphism approach, if the structure of functional components of both causal systems correspond, then we can infer that the mechanisms underlying the behavior are similar. If the learning conditions and other causes of Alex’s communicative behavior are isomorphic to the causes of similar human behavior, then we can justify a claim that the cognitive mechanisms are functionally equivalent.

On a causal isomorphism approach, it is critical that the components of each causal structure correspond in a one-to-one relation between the two cases. I argue that this approach overemphasizes the importance of having the same number of components in each situation. The approach leads to problems in application when it is not clear how functional components ought to be individuated and counted.

I argue for an approach that focuses more on functional relations. For this, I look to Dedre Gentner’s structure-mapping theory of analogical reasoning, by which we can map

knowledge from one domain to another based on similar systems of relations within each of the two domains (Gentner & Smith, 2012). While a one-to-one correspondence is optimal for a maximal structural match, it is not required for justifying a similarity inference. I argue that an approach that emphasizes the relevant relations between traits can help us make sense of the significance of the conditions by which exceptional learning occurs in animals like Alex.

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Tik-Sze Carrey SIU & Him CHEUNG - DEVELOPMENTAL CONTINUITY IN MENTAL STATE UNDERSTANDING

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Background and Objective. Mind understanding is traditionally thought to mature around 4 years of age when children give correct verbal responses to the theory-of-mind-scale tasks (Wellman & Liu, 2004). Recent looking-time paradigms, however, have revealed that infants and toddlers are not blind to others' minds. Soon after their first year, infants are able to represent intentional and epistemic states in interpreting behaviour (Baillargeon, Scott, & Bian, 2016). Are these early, nonverbal mental state understandings continuous with later, verbal theory-of-mind understandings? In this research, we studied infant understanding of others' intentional and knowledge states and examined its longitudinal connections with their theory-of-mind competencies at age 4.

Methodology. One hundred and twelve 16-month-olds ($M_{age} = 15$ months 24 days; 63 boys) participated in the intentional understanding test. We used Phillips et al. (2002) paradigm to measure infants' ability to use an actress's facial-vocal expression to infer her intention towards a target object. Sixty-two of them were retested at age 4 ($M_{age} = 48$ months 24 days; 28 boys) with a theory-of-mind scale (Wellman & Liu, 2004). The scale includes five items, testing young children's understandings of diverse desires, knowledge access, diverse beliefs, false belief, and hidden emotion. Another group of 58 16-month-olds ($M_{age} = 15$ months 25 days; 27 boys) participated in the epistemic understanding test. We used Luo & Baillargeon (2007) paradigm to assess infants' ability to consider an actress's knowledge about the scene to predict her subsequent action. Thirty-two of them ($M_{age} = 47$ months 26 days; 15 boys) were retested on the same five-item theory-of-mind scale.

Results and Discussion. In the intentional understanding test, the infants looked reliably longer in the inconsistent than consistent test events. We took the looking time difference between inconsistent and consistent test events as infants' intentional understanding and correlated it with later theory-of-mind performances. Results indicated that infant intentional understanding significantly predicted later understanding of diverse desires ($r = .42, p < .01$), but not the overall theory-of-mind score. This longitudinal association remained significant even when non-verbal IQ, language ability, and executive function were accounted for. In the epistemic understanding test, the infants looked equally at the new and old goal test events. Infant representation of others' knowledge state significantly predicted performances in the knowledge-access item in the theory-of-mind scale at 4 years ($r = .47, p < .01$), but not its overall score. Again, this longitudinal relationship remained significant after the effects of IQ, verbal

competence, and executive function were controlled. Taken together, our findings suggest a social-cognitive continuity of representing mental states.

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Franciszek Chwałczyk – MENTAL PROCESS OUTSIDE THE BODY: INFRASTRUCTURE AS A MEDIUM OF AUTOMATION. THE CASE OF SEWERS AND RELATIONS WITH ENVIRONMENTS

Adam Mickiewicz University (Poland)

In my presentation I would like to explore relation between extended cognition and infrastructure. In the first part, I'd like to show – coming from social cognition field (with it's formulation of mind as engagement with the world – Gallagher 2013) – how infrastructure (characterized by its eight properties – Star 1999) can be understood as material (but not only) medium, realization of cognitive processes outside the skull/body. Also taking into consideration parity principle, even in its strengthen version (infrastructure is usually (1) reliably available and typically invoked, (2) automatically endorsed and (3) easily accessible). The particular mental process I would like to briefly examine as the one extended by infrastructure is automation.

On the other axis, and coming from infrastructure research, I'd like to tell how it is not technologically vs socially, but technologically AND socially extended cognition (technological 'hardware' needs social 'software', as some examples of built but failed infrastructures show us). In the second part, I'd like to consider one (not first coming to mind in this context) example of infrastructure – sewers – and how they might relate to (extended) cognition. After Rowlands Gallagher mentions that for external process to count as cognitive it must be owned (in the sense of ownership constituted by the work invested), engaging. Here situation seems more complex – sewers, and other such infrastructures allow agents to disengage. Even if they do not realize cognitive functions per se, they allow to automate some functions – tasks of providing, of meeting some basic needs – releasing this way power/resources for other mental tasks. Especially, when, together with other infrastructures, they create ecological/epistemic niche (city) that becomes new, inner, direct environment (and provider of affordances) for humans. And those infrastructures seem to mediate, deal on our behalf with the primary, outer environment and govern the affordances sent by it – doing all that automatically, the way they were built and infused with postures – saving us trouble. Similarly to development of automated processes, sewers also were given much attention and resources during epoch of its development, implementation, internalization, later to be hidden (Kaika, Swyngedouw 2000).

Finally, Gallagher writes, that the sense-making or meaning-producing are properties of cognition. And those deeply changed through moving into sewers-based ecological niche. Among private/public and inside/outside divides, the main change is how 'nature' from a partner in a cycle became a background for leisure (for individual agents, living in the inner) and all-embracing outside/periphery – for an emerged cognitive, collective agent: the city, dealing with the outer (Gandy 1999).

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Monika Chylińska – HOW DO CHILDREN RECOGNIZE PRETENDING?

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The ability to recognize pretending is observed in children already at age of 15 or 16 months (Onishi, Baillargeon, & Leslie, 2007), and it is around three months later that they themselves engage in first object-substitution pretense (Weisberg, 2015). Whereas researchers have been focused so far on the performance of pretense, comparatively less attention has been paid to the recognition of make-believe play in children. Nevertheless, there are already some strong statements and disagreements in the discussion about representing and recognizing pretense in children. In this paper, I aim at joining critically this discussion, starting with an overview of the two dominant approaches in the debate, which are (1) behavioral, and (2) mentalist account. The first one shows that children identify in others some distinctive forms of non-representational behaviour (e.g., Nichols & Stich, 2002), while the latter argues that children having 2 years of age or less are already able to infer the mental states of someone engaged in make-believe game (e.g., Leslie, 1994).

The proponents of the behavioral account have pointed out several manner indicators of pretense, such as: longer gaze durations (Lillard & Witherington, 2004), exaggerated movements (Richert & Lillard, 2004), or special sound effects (Friedman et al., 2010). Their main argument is that children younger than four years of age lack propositional attitude mental states. The most influential experiments in favor of this approach are Moe and troll experiments, where children age four and five appear to claim that Moe the troll pretends to be a kangaroo, even while admitting that he does not know what a kangaroo is (Lillard, 1993). Therefore, children are oblivious to the mental states underlying pretend play behaviour and they are not mentalists about pretense. On the other hand, according to the mentalist account, pretend truly is a propositional attitude mental state. As the supporters of this claim show, the behavioral account is too broad with predicting that children will see many non-pretend behaviours just as they see genuine instances of make-believe games (Friedman & Leslie, 2007). In this view the specific manner indicators will not be much helpful, since the more of them are incorporated into the behaviour of pretense, the less this behaviour resembles the 'real' state of affairs (e.g., when Max slurps very loudly while pretending to drink, he does not really behave in a way that would be adequate if he were drinking; Friedman, 2013). Additionally, the behavioral account is not regarded as convincing here, because it faces serious difficulty when an object used in the pretence episodes serves as the agent (Friedman & Leslie, 2007).

In my paper, I will bring up all the main arguments in this debate, as well as I will complement them critically with the help of some other approaches to pretense, such as: enactivist account (Rucinska, 2016), counterfactual account (Harris, 2000), or communicative account (Friedman, 2013). At last, the importance of the studies on the recognition of pretense will be firmly highlighted.

Monika Chylinska, Arkadiusz Gut, Oleg Gorbaniuk, Zhenxu Fan, Miachał Wilczewski - UNDERSTANDING THE IMPLICIT CONCEPT OF CREATIVE PERSON – CROSS-CULTURAL STUDIES

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The main purpose of the conducted research is to explore a number of folk intuitions about what creativity is and what it is to be a creative person. The authors' central interest lies here in studying the ways of understanding of the concept of creativity by laypeople from different cultures and countries (Chinese and Polish for this specific study), and comparing them with the concepts of creativity proposed by theoreticians and experts in the field of cognitive skills diagnostics in creativity. Therefore, our focus is different from the approach that studies the various ways in which creative skills are performed. Rather, we investigate and present a study on the implicit understandings on creativity, which are reflected and expressed by people across different cultures.

The novel character of the undertaken analyzes is to be found mostly in the chosen methodology, which was partly constructed by the authors themselves. Firstly, the authors collected and classified the twenty sketches, which had been drawn by different persons, into four sets. The originality level of the drawings was previously described by some experts in the field. The method of evaluation used by experts was taken from K. K. Urban and H. G. Jellen (1986), who generated the well-known Test for Creative Thinking - Drawing Production (TCT-DP), which is broadly used in the psychological diagnostics. Secondly, the corresponding questionnaires for the assessment of attitudes towards creativity and towards the self and the others have been selected: [a] the Creative Mindset Scale (CMS; Karwowski, 2014), [b] the Creative Behaviour Questionnaire (CBQ III; Bernacka et al., 2016), [c] the Short Scale of Creative Self (SSCS; Karwowski, 2012) and [d] the Cultural Orientation Scale (COS; Triandis, & Gelfand, 1998). Having prepared these tools, the authors conducted the research with the participation from around 100 Polish and 100 Chinese students, respectively. The questionnaire respondents were given a certain time to look and think about the drawings. In each of the four sets, they were asked to choose two representative drawings to explain the reasons why one author of one of the drawings was the most creative author, but the other the least. Afterwards, they were asked to fill in the mentioned questionnaires.

The general survey into the gathered data has shown a number of differentiating tendencies concerning the ways of understanding creativity. The precise qualitative and quantitative multidimensional analysis is recently in preparation. The authors present the most appealing and inspiring results of their study in this paper, which analyzes the different understandings of the implicit concept of creative person, given by people from different cultural groups.

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Francesco Consiglio - SPACE, GROUP AND SELF. SOCIAL NICHE AND THE CONSTRUCTION OF A COLLECTIVE MIND

University of Granada (Spain)

The aim of this proposal is to analyse the relationship among the three elements of space, group and self, in order to argue for the emergence of a collective mind in a group, through the reciprocal actions of the members of the same group of agents who contribute to construct the shared social niche (Laland & O'Brien, 2012) they live in. I shall focus on the ontological status of the agent in relation to the one of the group, then I shall analyse the problem of responsibility in social action, considering the agent as a part of an extended cognitive system. In this sense, I shall argue for a strong collective mentality theory (Huebner, 2014) in order to shape a collective concept of agency.

With the words social niche I mean the ecological space where these agents need to find appropriate solutions to the cognitive challenges implied in an evolutionary social context. In the social niche, the subject is not passive in respect to natural selection, but it actively modifies the niche to improve its fitness (Ryan, Powers & Watson, 2015). The idea I am proposing here consists, specifically, in trying to apply the conceptual framework of stigmergy [from stigma → sign and ergon → work] (Heylighen, 2015a, 2015b), that is the mutual interaction between two (or more) agents mediated by the space in which they act, to the construction of the social niche (so including its social ontology) where these agents live, underlining the emergence of rules for both cooperation and competition in the group that make possible a collective construction of the space and, in an ecological perspective, of the very collective mind.

Stigmergy is generally defined as «an indirect, mediated mechanism of coordination between actions, in which the trace of an action left on a medium stimulates the performance of a subsequent action» [Heylighen, 2015a; 6]. Every time an agent completes a task, he produces changes in the structure of the workspace shared with other agents; that is, he is changing the affordances of the work environment, its practical meanings. A different structure of the environment produces therefore a different perceptual stimulus, a cue for the other agents which modify their behaviour, moulding their behavioural algorithms in terms of evolutionary efficiency of their responses.

Starting from the point of view of the extended mind theory and distributed cognition, I intend to move a further theoretical step, focusing my proposal on the structures of information shared by the agents and external memory technologies emerging in the social niche, thanks to the collective work of a group. Agents not only perceive and use affordances in their own environment, instead they construct them, structuring in this way the social niche where they act through feedback dynamics between the space and each agent (Sterelny, 2007).

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Artur Czeszumski, Chiara Carrera, Basil Wahn and Peter König – DOES THE SOCIAL SITUATION AFFECT HOW WE PROCESS FEEDBACK ABOUT OUR ACTIONS?

Universität Osnabrück (Germany)

People performing joint actions usually cooperate or compete to achieve their joint or individual goals. Little research has investigated the neural processes underpinning error and reward processing in these situations. In the present study, we focused on developing a new paradigm investigating interactions between neurophysiological signals as measured by EEG and monetary rewards in cooperative and competitive situations. We investigated the feedback-related negativity (FRN) and the f-P300 event-related potentials elicited by feedback. The comparison of the FRN and the f-P300 in cooperative and competitive situations for own and joint performance allows the investigation of the neurophysiological basis for understanding interactions in these social situations.

Twenty pairs (N=40) of participants performed a joint four-alternative forced choice (4AFC) memory task. At the end of each trial, participants received visual feedback related to both their individual performances and the resulting monetary rewards. The feedback included individual and joint errors as well as the resulting positive, negative or neutral monetary rewards. Note, the schema of monetary rewards were dependent on the social situation, i.e., cooperative or competitive.

Our preliminary results suggest that the FRN is a generic component evaluating the outcome of an action but it is not modulated by the social situation. However, f-P300, component following FRN is strongly affected by the social situation. Namely, the feedback about our actions in competitive situation elicits significantly more positive ERP responses than in cooperative situation. Moreover, response times in competitive situation are faster than in cooperative situation. Taken together, our results suggest that the behavioral (response times) and neurophysiological (f-P300) measures are modulated by social situations. Furthermore, the FRN component is strictly dependent on the action outcome but it is not modulated by social situations.

These results can shed new light on the neural process underpinning error and reward processing in cooperative and competitive situations. Specifically, the behavioral results of the task analysis suggested that newly designed experiment is suitable to investigate both the FRN and the f-P300.

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Sven Delarivière - CHANGING THE SUBJECT. CONSIDERATIONS ON WHEN GROUPS SHOULD BE REGARDED AS EPISTEMIC AGENTS

Vrije Universiteit Brussel (Belgium)

The epistemic concept of “understanding” has only recently started to gain ground in epistemology and philosophy of science. What has not received an equal amount of attention is how to conceive of who understands. The aim of this presentation is to contribute to a fruitful explicitation on the notion of an epistemic (in particular, an understanding) subject with a special focus on group understanding.

Traditionally, epistemologists have taken for granted that individual humans should be the relevant epistemic subjects under consideration. However, if we start from an ability-oriented conception of understanding and demarcate the understanding subject according to the system that implements the abilities then epistemic subjects can extend beyond, or be entirely different from, human individuals. The issue is a little controversial because understanding is a cognitive ability which we want to ascribe to an epistemic agent. What warrants being an epistemic agent? My contention is that such an agent is essentially a successful target of what I call the epistemic stance. The epistemic stance (in line with Dennett's intentional stance) is successful if ascribing an entity with epistemic properties (e.g. beliefs, goals, problem-solving tactics) has explanatory or predictive power. This brings up the question of whether groups are a useful target of the epistemic stance or whether we should keep our focus on its members only.

To explore this, I consider what I think are the least convincing and the most convincing cases of group understanding: From the mere aggregation of random individual abilities, in which case changing the subject is redundant, to the complex, but well-organised dynamics of individual interaction (e.g. "The Chinese Nation" being the most extreme example) in which case abilities cannot be reduced to (even the summation) of those of its members (though they'll supervene on them) and changing the subject becomes crucial. Using these two extremes, I extract what I believe are the subject-changing factors that differentiates them: First, a degree of complexity of the group's working parts, which in itself would only make employing the epistemic stance a matter of convenience. Second, the possibility to discern epistemic regularities in the behaviour of the group, which makes employing an epistemic stance towards the group an efficient thing to do. And third, the possibility of these higher-level regularities/properties to be realised through the complex interaction between members such that group properties are emergent properties. This makes changing the subject to the group a necessary thing to do because the group properties are not reducible to (even the sum) of its member properties. Using these three factors, I then showcase their value in considering (more plausible and thus more interesting) intermediate cases of groups in determining whether or not it is useful to change the subject to the group.

Michał Denkiewicz— MULTI-AGENT SIMULATIONS OF LINGUISTIC CATEGORIZATION

University of Warsaw (Poland)

Phenomena such as language evolution or cultural transmission act and can be investigated on multiple scales and time frames: from the individual cognitive processes such language production, to processes that unfolding in entire societies over many years. Multi-agent simulations allow to study how simple properties of individuals and the relationships between them induce and influence global processes.

Our research (Zubek et al., 2017) focuses on the evolution of linguistic categories in groups of agents organized into a network (graph), which determines which agents can communicate. We explore how properties of a network affect the formation of categories shared between individuals, and how the emerging category systems react to changes in network topology and environment.

Specifically, we were interested in the relationship between topological centrality - a graph property that can be understood as the existence of nodes of large importance, that mediate communication between the rest of the network. The networks we studied were constructed to either maximize or minimize certain centrality measures (Mason & Watts, 2012). In total, we tested 4 highly centralized networks, 4 networks of low centrality, and the clique. We also assessed the role of the direction information flow, by testing the star topology with the flow central node either symmetric or directed inwards or outwards.

The foundation of our study is an agent-based model of categorization created by Steels and Belpaeme (2005). In their communication artificial agents refer to and categorize stimuli from their “environment”, namely colors (but in principle they could be any multidimensional real vectors and could represent many types of complex stimuli). During the simulation pairs of agents randomly engage in a language game called “guessing game”. In this game a set of stimuli is presented to the agents. One of the agents - the “speaker” - has to name a selected stimulus from a set, and the other - the “hearer” - has to correctly point it out. After the game the knowledge of the agents is updated, depending on the result of the game. The category names are arbitrary and not predefined in any way - a new label is created when the speaker lacks a word to describe a stimulus.

We found that, while high centrality leads to increased global sharing of categories, locally more restricted topologies create highly functioning communication systems, without forming global agreement about category names. Additionally, while most topologies adapt to a new environment, some networks retain the ability to function in the old one. Our results reinforce confidence in the usefulness of the language games model in studying language phenomena, also in more realistic, dynamic context.

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Chris Drain— CONTENT AND ACTIVITY: RADICAL ENACTIVISM AND A.N. LEONTIEV’S SEMIOTIC ANTI-REPRESENTATIONALISM

Villanova University (USA)

In this talk I aim to present my current research on Leontiev’s anti-representationalist account of meaning and its relevance for radical enactivist accounts of the development of content-involving cognition. Radical enactivists Hutto and Myin (2017) argue that cognition “is always interactive and dynamic in character” and that “Content involving cognition need not ... be grounded in cognitive processes that involve the manipulation of contentful tokens” (135). They further propose that human cognition, when it is content-involving, is of a special kind not found elsewhere in nature (136) and that “contentless minds might become content-involving through a process of sociocultural scaffolding” (128). This decidedly invokes a Vygotskian account of the cognitive development, which maintains that complex cognition is achieved and enacted through the transformation of more basic mental functions by means of social and artefactual mediation. Central here is the treatment of ‘activity systems’ as an indispensable unit of cognitive analysis, where the main explanatory target is neither a ‘subject’ in contradistinction

to an 'object,' but instead the network of relations among subjects, objects, artifacts and tools, which themselves emerge and find meaning against a variable social and historical background.

Vygotsky's pupil, A.N. Leontiev further develops this approach, writing of the development of meaning from an anti-representationalist platform that seems to presage Hutto and Myin's account. What to traditional philosophers remains an immutable split between an individual's inner subjective and outer objective life for Leontiev is it is the result of historical development in itself, insofar as labor (objective activity) is the 'epiphylogenetic' catalyst that generates the meaningful world as such. What come to be called subjective representations result from the transition from a primitive apparatus of reflection in which "image-consciousness" is immediately directed to the external object (and in which activity is external to the organism), to a one which is socially mediated and in which activity itself is taken as "the object of consciousness" (Leontiev 2009b, 406). For Leontiev, then, the 'mental image' for the being endowed with 'activity-consciousness' is something apprehended through a process of assimilating "the objective world in its ideal form" (ibid., 405). And the precondition for such assimilation is the apprehension of meanings from their origin in the social system of activity:

Meanings refract the world in man's consciousness. The vehicle of meaning is language, but language is not the demiurge of meaning. Concealed behind linguistic meanings (values) are socially evolved modes of action (operations), in the process of which people change and cognize objective reality. (ibid., 409)

While not denying the importance of language for human consciousness, Leontiev emphasizes the over-all system of activity responsible for the generation of meaning in the first place: "Meanings and the operations enfolded in them do not in themselves ... form any part of the subject-matter of psychology. They do so only when they are considered within these relations, in the dynamics of their system" (ibid.). As socially evolved modes of actions, meaningful 'sensuous images' (which traditionally get described as subjective representations) are taken to inherently "retain their initial objective reference" (ibid., 408). The content of cognition, then, is seemingly always external for Leontiev, and if representations at all enter the picture, then these must be external representations of values and norms of the kind proposed by Hutto and Myin as the "public symbol systems through which ... biologically inherited cognitive capacities can be scaffolded in particular ways" (2017, 415).

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Vilius Dranseika—OMISSIONS AND NORMATIVE EXPECTATIONS

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Omission, by definition, is something that was not done. How do we single out those not-doings for which we can be held accountable from countless other things that we, in fact, do not do? How is it possible to meaningfully ascribe omissions – not-doings – to agents? Our claim in this paper is that identification of omissions is not divorced from our thinking about

obligations – salient normative expectations about how the agent ought to behave in particular situations influence the process of identifying omissions. If, as we argue, identification of omissions presupposes identification of obligations – if omissions can be said to exist only within the normative context – then any blame judgment model that introduces obligations only at later stages of cognitive processing (e.g. Sloman, Fernbach & Ewing 2008; Guglielmo et al., 2009, Malle et al., 2014) faces a difficulty. Malle and his colleagues even call the stages of negative event and agent detection ‘uncontroversial’ and based on simple judgments of causal involvement. Indeed, it may be so when actions are involved. However, causal information cannot be divorced so easily from normative considerations when ‘negative event’ is an omission (see Haldane 2011; Paprzycka 2015; Williams 1995). As noted by Asscher (2008), omissions arise as something for which a person can be blamed only in the context of ‘surrounding responsibility’.

Though there are certain limitations in the current research (for instance, the notion of ability is somewhat under-defined and under-explored), but we hope to have shed some light on the general blame attribution model that would depict a more accurate conceptual structure, at least in the context of omissions. If omissions indeed can only be defined in the context of normative expectations, this has implications not only for moral psychology, but also for research in social ontology. The latter point bears some similarity to literature that discusses how normative expectations influence judgments about responsibility for side-effects of our actions (e.g. Knobe 2010; Pettit & Knobe 2009) – a growing body of research suggests that side-effects of our actions are more likely to be perceived as something done by us intentionally if there are normative expectations to the effect that such side-effects ought to be prevented.

In relation to moral psychology, close connection between obligations and blameworthy omissions puts some constraints on general models of moral evaluation and judgment – it is difficult to identify omissions as ‘negative events’ if we refuse to think about obligations that an agent in question ought to follow as being processed very early in the overall moral evaluation process. There are systematic relations between actions and omissions in moral psychology. As it was mentioned, omissions receive less blame than commissions with the same outcomes. Furthermore, when behavior is morally wrong, people are more likely to characterize this behavior as an action rather than as an omission (Cushman, Knobe & Sinnott-Armstrong 2008). That being said, assigning blame for omissions is an important part of our normative practices and therefore it should be studied.

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Hannah Drayson - BEING FOOLED ON PURPOSE; HISTORICAL REFLECTIONS ON THE VOLUNTARY AND INVOLUNTARY IN EXPERIMENTAL MANIPULATIONS OF EMBODIMENT AND AGENCY

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Since the 1880s, a variety of technological apparatuses and techniques have been used to manipulate experiences of embodiment and agency in scientific experiments. Many devices and experimental set-ups that have been used to transform perceptions of agency and embodiment have centered on the human hand; for example Cheverul's pendulum, the Ouija board planchette, hypnotic experiments, the rubber hand illusion. This paper considers an exemplary device of this kind, American psychologist Joseph Jastrow's 'automatograph'. By focusing on two sets of experiments, this paper will draw out a discussion about the distinctions between themes of voluntary and involuntariness in the mediation of agency. Adapted from the Ouija board planchette, on which a hand or hands are placed and allowed to move around involuntarily, the automatograph lends itself to a variety of readings. It was used by Jastrow to produce what he considered to be inscriptions of thought from the resting hands of experimental subjects, and was particularly intended by him to offer a counterexample for claims of psychic ability and muscle reading (mind reading). The device was later implicated in the development of lie-detection technologies and connected to the phenomena of ideomotor movement, in which ideas are expressed involuntarily through the body. Contrasting with these accounts were the way that similar devices were used in Hugo Münsterberg's laboratory, by Leon Solomons and Gertrude Stein, in rather different experiments intended to explore the voluntary regulation of attention and action, in order to understand the alleged existence of 'double-personality' in normal individuals. While in some cases the defining characteristic of an illusion would be that it was perceptually involuntary, 'cultivated' involuntariness as Stein developed it, can be seen as a neglected but important aspect of the discussion around instrumental embodiment. Nascent within both of these discussions was the role of the imagination as an embodied property and its evocation through suggestion, which in debates and experiments in mesmerism and hypnosis also drew on the question of the involuntary.

As the discussion of the automatograph shows, from the 1850s to the turn of the century, relations between soul, mind, body and world were explored through a variety of interconnected practices; including spiritualism, conjuring, and the emerging science of psychology. In a broad sense this discussion serves to draw attention to elements of other experimental practices that may otherwise be overlooked, and foreground the interconnections between experimental set-ups and entertainment technologies. Through popular engagement with psychology, such as explained in Alder's work on lie detection, many 'experiments' and their instruments had an audience, for whom the availability, meaning, and framing of the apparatus involved was influenced by processes of negotiation between audiences, instrument makers, technologists and researchers. The different ways in which experiences of embodiment might be voluntarily or involuntarily modified draws attention to the technological affordances of the media used in these experiments as they are understood by the people who are subjects of the experiments as much as those who use them in other contexts. This suggests that contemporary examples of similar patterns may be seen in the use of media such as immersive virtual reality, in experiments, which raise questions over the way in which they also allow – or prevent – subjects from employing the embodied imagination as a property and skill.

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Anna Dutkowska & Zbigniew Wróblewski – MINDREADING IN NON-HUMAN ANIMALS

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Mindreading, which can be described as an ability of the agent to attribute mental states (such as intentions, desires, beliefs, expectations) to others, is a set of cognitive and social capacities which help to predict (and explain) conspecific's behavior. An example of basic taxonomy for thinking about mindreading of non-human animals was provided by José Luis Bermúdez. He distinguishes between minimal mindreading and substantive mindreading which has two types: perceptual mindreading and propositional attitude mindreading.

The taxonomy presented by Bermúdez can be useful for systematization of experimental and ethological studies of mindreading in non-human animals. Moreover, Bermúdez's taxonomy indicates evolutionary background of cognitive and social capacities.

Innocent Ezewoko – FROM SHARED INTENTIONALITY TO SOCIAL NORMATIVITY: TOMASELLO'S ACCOUNT OF ALTRUISM AND THE PROBLEM OF AMBIVALENCE

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Across various publications, Michael Tomasello attempts to give a coherent account of the phenomenon of altruism in humans. In *Why We Cooperate* (2009), he explains altruistic motivation as originating in the context of mutual cooperation which in turn is ultimately made possible by shared intentionality. Shared intentionality, a concept freely borrowed from Bratman (1999), Gilbert (1989), and Searle (1995), thus becomes a central theme for his philosophical analysis of relevant experimental data. The explanation, simply described, takes off from shared intentionality and leads towards social norms and institutions that become the pointers as well as guarantors of cooperative – and altruistic – exchanges within the society. Strong as Tomasello's argument is, it becomes complicated when his more elaborate treatment of 'shared intentionality' in *Origins of Human Communication* (2008) is taken into account. A careful study of the text shows a kind of ambivalence in the conception of shared intentionality in terms of its place and role in the development of the social scheme in which the complex exchanges that make communication possible. On the one hand, shared intentionality is presented as the very basis upon which the possibility of specifically human social interactions is founded. On the other hand, shared intentionality itself is conceived in terms of some sort of socially normative or conventional basis on which the 'sharing' of 'intentions' becomes possible, meaningful, and effective. In this paper, I raise the question of what exactly the role of altruistic disposition in shared intentionality is. Is it antecedent or consequent? Without arguing for any specific alternative explanation, I show how the ambivalence in Tomasello's apparently linear evolutionary account reflects the complexities involved in philosophical discussions on altruism. I also contend that the concept of shared intentionality, if refined, can become a key to unlocking the intimate connection between empathy and altruistic motivation.

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Nikolaus Fogle and Georg Theiner - UNEVENLY DISTRIBUTED COGNITION: AN EXTERNALIST TAKE ON BOURDIEU'S THEORY OF SOCIAL REPRODUCTION

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The sociological work of Pierre Bourdieu is notable in emphasizing practice as a key explanatory concept for social organization, in place of mechanistic notions of structure or intellectualist renderings of agency (1977, 1981, 1984, 1990). Central among the phenomena that practice is meant to account for is the stability of social formations over protracted time spans, which Bourdieu, betraying his Marxian intellectual heritage, terms reproduction. In his spatialized model of the social world, reproduction amounts to the persistence of specific distributions of status and power between agents, groups, cultural categories, and institutions, across successive social generations. Social reproduction would be not be possible, on Bourdieu's account, were it not for the incorporation of social structures into the perception- and behavior-guiding cognitive schemes of individual agents, along with the structuring effects of social activity at multiple scales.

The centrality of practice to human social existence challenges conventional divisions between knowledge and behavior, reason and reflex. For Bourdieu, the primary vehicle of practical knowledge is the habitus, which is best understood in interaction with its social and physical environment. Habitus is a "tacit" form of intelligence which, though inhering primarily in the body and functioning to a large extent "automatically," is nonetheless a sophisticated and flexible adaptation to the world and to life, with strong links to "higher" and "lower" functions and faculties, but reducible to neither. Wacquant (2004) aptly describes its role this way:

"Habitus is a mediating notion that helps us revoke the commonsense duality between the individual and the social by capturing 'the internalization of externality and the externalization of internality', that is, the way society becomes deposited in persons in the form of lasting dispositions, or trained capacities and structured propensities to think, feel, and act in determinate ways, which then guide them in their creative responses to the constraints and solicitations of their extant milieu." (Wacquant 2004, p. 316)

The habitus is thus a "social" faculty par excellence--the social in the individual, which also becomes the individual's contribution to the social. As a capacity for generating practices that anticipate an agent's likely social environment and harmonize with the practices of others, the habitus effectively preserves and stabilizes social structure, making it available for acquisition by future agents. Importantly, the implicit logic of Bourdieu's habitus is predicated on a corporeal, tacit, largely unconscious, and sub-symbolic model of socialization and acculturation through practice.

In this paper, we seek to infuse and refine the psychological foundations of Bourdieu's conception of practice with emerging work on embodied, extended and distributed cognition, a family of views known as "cognitive externalism" in the philosophy of mind and cognitive science. Borrowing the words of Andy Clark, a key proponent of the "extended mind" thesis (Clark & Chalmers 1998, Clark 2008), cognitive externalists claim that "the actual local operations that realize certain forms of human cognizing include inextricable tangles of feedback, feedforward, and feed-around loops: loops that promiscuously criss-cross the boundaries of brain, body, and world" (Clark 2008, p. xxviii). Moving beyond Clark's emphasis on technologically enhanced solitary cognition, we propose that Bourdieu's account of social reproduction describes a cognitive process that is socially and environmentally distributed.

Habitus, we argue, can be seen as a cognitive faculty that is not only embodied but fundamentally environment-dependent. The habitus' social environment—the field—functions both as a repository of social knowledge and as a template for individual schemes of perception and action. Reproduction, for Bourdieu, is the dialectical process by means of which systems of

social cognition are transmitted and the fundamental social order is preserved. It entails both the reception of specialized perceptual and cognitive schemes by agents (through exposure to positions in a pre-structured field), and the (re)articulation of the field's relations and hierarchies through the action of agents guided by complementary habitus. Practice, in this context, depends equally on possession of the right schemes, and placement in the right socio-physical surroundings; it is a convergence of agent-internal and agent-external social structure. It makes sense, therefore, to interpret Bourdieu's account as a species of externalism, hinging as it does on a notion of practice as incorporating, crucially, elements of the social and physical environment beyond the agent.

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Rasmus Gahrn-Andersen - SEEMINGLY AUTONOMOUS TECHNOLOGIES AS MEDIATORS OF SOCIAL COGNITION

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Advanced technologies such as drones and robots are not just performing tasks in isolated. The occurrences of android receptionists (Hashimoto & Kobayashi, 2005) and drones with personal attitudes (Kim et al., 2016) underline that these advanced technologies are increasingly becoming an integral part of human social life where they function as social mediators. So far, however, researchers have predominantly engaged with this social dimension by considering different technologies in terms of what they mechanically afford (and their suitability for solving specific problems) rather than taking into account the rich phenomenology of human users. In so doing, researchers tend to apply common sense typologies by assuming a clear-cut distinction between various kinds of technologies.

This paper counters the tendency in that it brings together robotics and drone research while considering phenomenology as the enabling condition of human engagements with technology. By investigating the phenomenon of 'appearing autonomy', the paper challenges the widespread assumption in robotics and technology studies that autonomy is an intrinsic trait which objectively pertains to machines (see, for instance, Brooks, 1991; Pfeifer, 1996; Ziemke, 2008). Crucially, this view is also found in Masahiro Mori's (1970) famous 'uncanny valley'-hypothesis that states that human-robot engagements are somewhat inhibited once a robot's human-like traits are set aside by its mechanistic characteristics (for an extensive literature review, see Kättsyri et al., 2015). Drawing on empirical data and theoretical insights on human phenomenology and autonomy/heteronomy (i.e. Cowley & Gahrn-Andersen, 2015; Gahrn-

Andersen, in press), I pursue the uncanny valley as a general phenomenon that, given certain circumstances, might also be triggered by machines that lack human-like features. Specifically, I connect empirical observations on human-drone interaction with not only Mori's uncanny valley-hypothesis but also phenomenological research and Heidegger's (1977) undeveloped idea that modern technology poses "a challenging" to human individuals. In so doing, I use data to show how individuals given certain circumstances come to consider machines that do not have human-like traits (i.e. drones) as autonomous entities. Moreover, I show how changes in the actual perception of drones as either autonomous or heteronomous shape the way individuals come to relate to them.

The purpose in so doing is to set aside the common sensible distinction between drones and robots by showing that different kinds of advanced technologies can be subsumed under a more general category. Furthermore, I aim at formulating a phenomenological basis for future exploration of, not only the interconnectedness of these technologies but also their relativity to human phenomenology and sociality.

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Adam Gies - OVERIMITATION AND THE SOCIAL NATURE OF THE HUMAN MIND

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Young children's ability to imitate other people plays a fundamental role in their developing distinctively human social cognition. But there is a puzzle about this ability: children imitate behavior in apparently contradictory ways. On some occasions, they 'selectively imitate' by getting to the point, copying a model's goal while omitting inefficient aspects of the model's means. For example, when 18-month-olds observe an adult fail to pull a toy dumbbell apart because her fingers slip off, they respond by actually pulling the dumbbell apart rather than

simply mimicking the adult's failed action (Meltzoff 1995). On other occasions, however, children do the opposite. They 'overimitate', faithfully copying aspects of a model's behavior that are plainly irrelevant or counterproductive to its goal. In one study (Horner & Whiten 2005), 3- to 5-year-old children watched an adult perform the arbitrary action of tapping the top of a transparent toy box with a stick before opening a door on the side of the box to retrieve a reward. Children reliably copied the stick tapping even though it clearly did not contribute to the goal of getting the reward. By contrast, chimps presented with the same demonstration ignored the stick tapping and simply opened the door, i.e., they selectively imitated.

Why do children overimitate? And what explains their apparently conflicting tendencies for selectivity and fidelity?

Standard approaches tend to explain overimitation reductively, in terms of a single learning or social goal. These approaches differ over whether overimitation is specialized for mastering instrumental skills (e.g., Lyons et al. 2011), learning conventions (e.g., Keupp, Behne, & Rakoczy 2013), or facilitating social interactions (e.g., Nielsen & Blank 2011). In this talk, I argue against such approaches and outline an alternative framework. I argue that overimitation is not narrowly specialized for any specific learning or social goal. On the contrary, faithfully copying a competent model makes it possible for children to acquire practical competence in a range of skills--including artifact use, conventions, and social interaction--without their needing to understand *what* kind of skill they are copying. A key implication of this account is that the knowledge and skills children learn through imitation are not only socially transmitted but essentially social in nature.

In the first part of my talk, I argue that no single reductive approach can simultaneously explain the main empirical findings on overimitation and the fact that children engage in both selective- and over-imitation.

In the second, I introduce my own account of overimitation, which I call the 'normative-model account'. The normative-model account holds that overimitating children treat a competent demonstrator's behavior as exhibiting a normative model for how a given behavior *ought* to be performed. On this account, overimitation facilitates social understanding and knowledge-transmission by making both imitator and model more alike through their mutual conformity to socially shared routines. Overimitation enables children to learn the norms governing instrumental skills, conventions, and social interactions, without being narrowly specialized for any of them (e.g., Kenward 2012).

Third, I show how my approach to overimitation can address why children engage in both selective- and over-imitation. Children are overimitate behaviors that are accompanied by cues that highlight their normative salience, such as social engagement or habitual fluency. By contrast, when children encounter cues for error, awkwardness, or a lack of social engagement by the demonstrator, the normative-model predicts that children will be disposed to selectively imitate.

Finally, I highlight a key philosophical implication of my account. Standard views of imitation have an overly narrow and individualistic conception of imitation because they present children as using imitation to internalize or represent specific knowledge-domains. Against these views, I argue that imitation is best conceived as a broad-spectrum strategy that enables children to master a range of skills with little insight into why they work. On this alternative, knowledge is not only socially transmitted but essentially social in nature. The reliability of the information and skills children learn through imitation is socially-maintained, without explicit knowledge of why these are reliable needing to be explicitly represented in any individual's head.

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Paweł Grabarczyk - ARE MEMES MEANINGS?

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On the face of it, the notion of „memes” plays an important role in the argumentation presented in Daniel Dennett’s „From Bacteria to Bach and back”. And yet, once we look at this notion with scrutiny we may discover that its explanatory power is minimal. I argue that the notion of „memes” functions like an umbrella term for many notoriously problematic philosophical notions such as „ideas”, „concepts” or „meanings”. I focus on the last of these examples (meanings) and show that questions which plagued existing theories of meaning can be easily reformulated in the context of memes and that Dennett’s account does not seem to have a satisfactory answer to them.

Hajo Greif - LANGUAGE, TOOLS, PICTURES, AND THE EVOLUTION OF COGNITION

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This paper presents a comparative view of an array of artefacts that have been claimed to be essential to human cognition in either or both of two ways: language, tools, and pictures. First, these artefacts are often seen as constitutive, in terms of making a necessary contribution, to the evolution of human cognitive capacities. Second, they are frequently deemed to be essentially social, in terms of both enabling and depending on shared use and tradition. Rather than adjudicating which of the artefacts considered is the true source of human cognitive capacities, possible relations between them are explored.

Language has the intriguing property of essentially involving both artefacts and internal mechanisms in order to perform its functions. It is at once rooted in evolution and in the history of artefact use. It has been argued, most prominently by Terrence Deacon (1997), that language co-evolved with the human brain and its capability of symbolic reference. On this view, language is a structure whose properties and reproduction within language communities are in a straightforwardly evolutionary way interdependent with the properties particular to the human brain. The complexity and the adaptive functions of the human mind have as one of the necessary conditions of their emergence and present functioning the development and use of linguistic structures. The intra- and extra-somatic mechanisms for the production of linguistic items are tightly integrated with each other. Neither mechanism would be present nor could it function in absence of the other. Individually, they contribute to shaping their counterpart and

its functions, historically and at present. Jointly, they enable speakers to create concrete artefactual structures on which their further interaction relies.

Complementary to the hypothesis of language-brain co-evolution, there are arguments for a co-evolution of tool use in general and human cognitive capacities. Above all, any continued use of tools within a population depends on modes of transmission by observational learning or instruction (Tomasello 1999, 2014). It also has been suggested that there is some covariance between an animal's brain size and structure on the one hand and his skills in using or manufacturing objects to manipulate other objects in their environments on the other. Although the claim that there is a direct and necessary correlation between tool use and general intelligence remains contested (e.g. McGrew 2013; Shumaker et al. 2011; Teschke et al. 2013), theories of this kind may enjoy somewhat more substantial empirical support in terms of paleontological evidence than the language-brain co-evolution hypothesis: early human tools have been preserved and can be classified into stages of development that accord with stages of human evolution, and closer comparisons are possible between tool use in humans and other species than between human language and animal signals.

These observations about language and tools as constitutive elements of human cognition, however, do not imply an either/or decision between them: the most plausible suggestion is that both tool use and language co-evolved with the establishment of modes of cultural transmission and complex social behaviours in such a way that only the combination of all these elements, rather than merely one or a few of them, sufficiently explains the complexity and function of human cognitive traits. In this vein, pictures will be considered as a third, *prima facie* less obvious, candidate constituent in the evolution of human cognition. They are introduced as a type of artefact with partly intermediate characteristics, in terms of being cognitive artefacts of a concrete material kind and having representational characteristics at the same instance. Both characteristics depend on cultural transmission and enable modes of shared use that serve the cognitive coupling between human agents.

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Andrzej Kapusta - SOCIAL COGNITION AND DECISION MAKING (SPECIAL SYMPOSIUM)

Maria Curie-Skłodowska University (Poland)

The main theme of panel discussion is Social Cognition and Decision Making. We invite presentations and papers from researchers and practitioners which address the broad spectrum of challenges and opportunities in this area. We will cover basic models and strategies of DM in different fields, including health care, behavioral economics, law, computer science, education, politics, organizational behaviour, etc. Successful judgment depends on ability to understand other people beliefs, emotions, interests, values. Mindreading, learning, valuation, and feedback

processing have social dimensions in different types of DM: decisions about other people, decisions influenced by other people, collaborative decision-making. We especially concentrate on social decision-making and the way social information is incorporated into DM process.

Topics for panel discussion:

Judgment and decision making from an evolutionary, cultural-historical, and ontogenetic perspective;

Psychological underpinnings of decision-making;

Cognitive bases for decision-making

Social vs non-social perspectives on decision-making;

Expert knowledge and decision making (health care, economy, law, computer science, education, politics, organizational behaviour, etc);

Strategic decision making;

Individual vs collaborative decision-making;

Experimentation and research in decision-making theory (game theory, computer simulations, quality research);

Values based practice and decision making;

Neurosociology and decision-making.

Adam Klewenhagen– DIVISIONS OF LINGUISTIC LABOUR AND SOCIALISATION ON KNOWLEDGE

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In my paper I discuss several notions concerning well known but, not so well developed “socio-linguistic hypothesis” by Hilary Putnam (Putnam, 1975, pp. 215 – 272). According to the hypothesis, the common usage of some terms is possible due to what Putnam calls the “division of linguistic labour” (hereafter DLL). What DLL entails in this concept can be summarised in the following list:

1. We could not use certain terms (especially natural terms like “elm”, “aluminium” or “gold”) if no one could recognize elms, aluminium or gold. The meaning of these terms is fixed regardless of the speaker’s ability to recognize them due to abilities and knowledge of the ‘experts’.

2. DLL depends on the social division of labour in general. 3. Especially: DLL occurs only when some (natural) goods (stocks) become of adequate importance for the society, and it does not occur when (a) recognition of applicability conditions of a term does require specialist knowledge but its designates are objects of no public interest or (b) recognition of those conditions is an element of universal knowledge. 4. During the development of the social division of labour DLL extends on increasing terms. 5. Methods and criteria held by the experts’ community are a “public property” of the society as a whole. But this depends on the existence of a mechanism which guarantees that professional knowledge effectively serves as if each speaker used it as her own. This mechanism demands certain expert opinions to be available to each member of the community.

Although it seems obvious that in modern societies knowledge is unequally distributed between “experts” and “laymen” and that this fact is at least partially linked with specialisation within the division of labour in general, Putnam’s claim turns out to be more controversial and problematic than that. It says not only about this expert-layman division but also about its semantic significance affecting speakers’ competence. And if this is to be true, conditions mentioned in point (5) must be satisfied. And their fulfillment by no means follows from the phenomenon of division of labour itself, but is a historical and geographical variable. Further

controversies concern points (3) and (4) and notions like adequate social importance of goods or widening the range of DLL that are not to be explained by simple and cumulative growth of mundane division of labour. Finally the very figure of an expert is far from univocal. Those who recognise members of an extension of a term are not necessarily professional scientists – it can be a parent in a family, a teacher in a high school or a well-read fellow in a bunch of friends. Furthermore if one abandon the naïve essentialism (as Putnam finally did) the role of an expert is no longer based on reduction of her abilities to knowledge-that of the essential features of natural kinds but becomes socially established itself. Having that in mind I argue for the historical and intra-social multiplicity of DLLs that fulfil their role in communication depending on the level of “socialisation of knowledge” i.e. satisfaction of.

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Zsuzsanna Kondor - NEURONAL-BASED VS. ENACTIVE APPROACHES TO CONSCIOUSNESS AND SOCIAL COGNITION

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In the present paper I will investigate how consciousness studies and theories of social cognition relate to each other, and suggest that despite the results of scientific research, both social cognition and consciousness can be understood within a wider horizon, i.e., not exclusively in terms of intra-cranial processes. I will examine how the idea and different conceptions of social cognition and that of the social brain relate to consciousness, and the extent to which we need to extend the scope of investigation when its function and evolution are in question.

Social cognitive neuroscience successfully relates neuronal activation patterns to social capabilities. In cases of brain lesions, certain areas (such as the prefrontal cortex, superior temporal sulcus, temporo-parietal junction, and amygdala) show the lack of conscious perception (as in case of neglect) and hinder skills which are morally and socially related. (Graziano & Kastner 2011) There is also scientific evidence that peoples’ behaviour, specifically their gaze and certain movement cues, can generate attributions of intention, awareness, and emotion even in young infants. (Adolphs 2007)

Graziano’s attention schema theory defines consciousness on the basis of social perception. According to his theory, “consciousness is not an emergent property, or a metaphysical emanation, but is itself information computed by an expert system” (Graziano & Kastner 2011:99), and importantly, a consequence/product of social perception. The capability of modelling one’s own attention can evolve on the basis of selective signal enhancement and the control of attention: “Awareness is a perceptual model of attention.” (Ibid. 100) This schema suggests that while attention selects among signals (as the brain is applying its “data-handling method”), the brain decides whether the selected signal will or will not entail awareness. This modelling capability makes it possible to predict behaviour, not just one’s own but also that of our companions. Monitoring one’s own attention and social perception both provide ground for monitoring others’ attention, hence, when awareness is attached to them, the schematic model of their attention enables the prediction of their behaviour.

Although, attention schema and social neurology can be considered as further evidence that even social capacities are based in the brain, I propose that without external relations with the environment, the brain-based infrastructure of sociability is not possible; therefore, we need

to consider higher cognitive capacities, such as consciousness and complex communicative capabilities, in a wider context.

Taking into account attempts that seek the neuronal basis of linguistic skills, such as Ramachandran's synesthetic bootstrapping theory (2004), the theory of cognitive evolution, as e.g., Merlin Donald (1991) reconstructed it on the basis of Dunbar's (1998) social brain hypothesis, or just considering whether a hard wired capacity for social perception as Graziano understood it, or Humphrey's attempt at reconciling science and phenomenality from a functionalist perspective, we can ask how these capabilities could have evolved exclusively on an intra-cranial basis.

Ralph Adolphs accepts Noë's and O'Regan's suggestion that our brain would be overloaded if we could not recline upon our environment, and suggests considering the body as emulator when we need to model other people's behaviour. It is not only economical, but "[t]he body might be thought of as a 'somatic scratchpad' that we can probe with efferent signals in order to reconstruct knowledge about the details of an emotional state." (Adolphs 2007:875) The idea of the body as a somatic scratchpad proposes incorporating the body when cognitive processes are described.

Dunbar's social brain hypothesis extends the scope of investigation. He suggests that everchanging social relations entail an increasing computational burden proportional to the group size, i.e., group size and the relative volume of the neocortex correlate. The neocortical increase is supposed to have an external, environmental cause. Similarly, Donald's cognitive evolutionary model can be understood in the wider context of changing environmental needs, and moreover, the idea of the symbolic external storage (Donald 1991) considers the environment as a scaffold for further development. Along these lines, cognitive archaeology (Malafouris 2013) – in line with the enactive approach and extended mind hypothesis – considers cognition and material culture as being constitutively intertwined. These latter theories suggest that when examining sociability as it relates to cognitive skills, extra-cranial components are hardly avoidable.

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Piotr Kozak - THE SHAREABILITY OF MENTAL REPRESENTATIONS

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It is universally held that other human beings are mostly very like ourselves. We usually do not doubt that they have an inner life, that they experience the physical world much as we do, rejoice, suffer, have thoughts, beliefs, feelings, emotions, and so on. But what, if anything, justifies our certainty?

The core of the problem lies in the asymmetry between private nature of mental representations we have a direct access to, and public nature of mental concepts. The question

is that If each of us has the kind of direct knowledge we have of our own experience, by what means could we acquire the concepts we have of mental states belonging to human beings other than ourselves? The problem is not that we cannot observe mental states of others. What would be needed for the problem not to arise would be observing such mental states, experiencing such states of others, etc. To sum up, private nature of representation means that the content of mental representations is determined in part by my inner experience which only I myself can understand, thus, mental representations cannot be shared, and other minds are inaccessible by nature.

The aim of the talk is to establish the view on the nature of mental representations that avoids the rocks of privacy of inner experience and leaves the shareability of mental representations untouched. In order to do that, I will present the operational view on mental representations. In short, I will propose to think about mental representations in terms of operations of measurement, where the mental representation, such as beliefs, or feelings, is an outcome of a measurement performed on a represented situation. In the talk, I will present and defend the view, as well as try to show how operational view helps to preserve the shareability feature of mental representations.

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Adam Kubiak - COGNITIVE AND SOCIETAL JUSTIFICATION OF NEYMAN'S "INDUCTIVE BEHAVIOR" CONCEPTION OF THE OBJECTIVE OF SCIENCE

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Jerzy Neyman, a co-founder of frequentist paradigm in statistics, dismissed any type of philosophical school which maintained that scientific inference forms a basis for establishing what we should believe: "(...) the conviction of the possibility of a universal normative regulator of beliefs is common to the writers on inductive reasoning and may serve as a definition of this particular school of thought" (Neyman, 1957, 15). Neyman stated that "The beliefs of particular scientists are a very personal matter and it is useless to attempt to norm them by any dogmatic formula" (Neyman, 1957, 16). That's why he insisted that "(...) to accept a hypothesis H means only to decide to take action A rather than action B" (Neyman, 1950, 259). This interpretation of the process of forming an outcome by frequentist technique of inference was, due to Neyman, a consequence of the logical-mathematical structure of the method and the way it can be applied. A scientist cannot conclude that a hypothesis is probably (or certainly) true or false when she cannot ascribe probability to it. One of the main reasons for such constrain was that hypotheses were understood by Neyman not as random variables, which has probability distributions, but as unknown constants (Neyman, 1937, 340-345).

Neyman justified frequentist statistics and his interpretation of it by referring to metamathematical considerations about the meaning and applicability of certain statistical concepts. But apart from mathematics, when we shift to a cognitive and societal perspective, the question remains: is it really pointless to use science as a belief regulator and is the principal role of science really to guide actions rather than beliefs? The aim of my paper is to support

Neyman's views by providing non-metamathematical arguments for positive answers to both of these questions.

In reference to psychological (Nęcka et al., 2006, 563) and epistemological (Alston, 1988) findings along with contemporary scientific policy (ICSU, 2004), it can be argued that the postulate that scientific outcomes should be guiding beliefs seems to be unrealistic and unnecessary. Socio-economic utility appears to be the crucial goal of applied as well as basic research, which means that scientific inferences are expected to guide actions which should be practically advantageous to the society. Beliefs are hardly explicable (Skyrms 2000, 130), difficult to control, and regulating them is not necessary to control actions. Actions in turn are fully empirically tangible and far more tractable than beliefs. Scientific inferences can fruitfully serve as standards for making decisions and performing actions relative to specified evidence and risk preferences. Therefore Neyman's "inductive behavior" philosophy is supported not only by his arguments that could be classified as belonging to metamathematics, but it is also fairly well-grounded from the societal and cognitive perspectives.

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Piotr Litwin - BLURRING SELF-OTHER BOUNDARIES: BODILY ILLUSIONS AND SOCIAL COGNITION

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Rubber Hand Illusion paradigm and virtual reality may be used to induce ownership over body parts or whole bodies having different properties than one's own body – e.g. hands of different skin color or bodies of different sizes or gender [Maister et al., 2015]. Importantly, such changes in online body representation consequently influence higher order psychological processes and behavior. For example, ownership over a hand belonging to a different race was repeatedly shown to skew attitudes towards members of that race – owning a dark-skinned rubber hand leads to an increase in positive attitudes towards black people; the effect is particularly pronounced for white people who initially had more negative attitudes, as measured by Implicit Association Test [Farmer et al., 2013]. Analogous results were obtained for whole bodies in virtual reality conditions [Peck et al., 2013]. Moreover, when dyads are interacting as avatars in virtual reality, they express more mimicry behavior if colors of their bodies are coincident and this effect is independent from actual racial group affiliation [Hasler et al., 2017]. These results suggest that the sense of group affiliation is highly flexible. It seems that the self-

attribution to the group may change as a result of changes in perceived physical similarity and, as a consequence, positive attitude towards former outgroup members is developed – since they become ingroup members on a basis of shared body properties [Maister et al., 2015]. In the first part of my talk, I will present the results and methodologies of abovementioned studies in more detail. Then, I will discuss perspectives on how “putting someone in someone’s else shoes” afforded by VR technology may be used in practice to counteract racial and gender prejudices. Particularly, I will focus on “The Machine to Be Another” technology (<http://www.themachinetobeanother.org>) that allows people to swap perspectives. Two people wear virtual reality headsets and the image from the camera installed above the headset of the first person is viewed via the second person’s headset [and vice versa]. As they both follow simple rules [e.g. look on “your” hand; move very slowly] and act in accordance with instructions on movements they should perform, their movements and gaze focus loci are closely synchronized. As a result, a robust illusion of owning another person’s body is elicited. In my talk, I’ll shortly discuss projects that have already been carried out with the use of The Machine To Be Another [e.g. Gender Swap; Embodied Narratives] and I’ll outline how the machine could be used in the future – e.g. in research on how swapping a body or listening to a narration in other person’s body may influence attitudes towards others.

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Jakub Matyja - MECHANISMS OF PERCEPTUAL MUSICAL IMAGINATION

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In my talk, I will discuss the contemporary state of research on musical processing, with a particular focus on perceptual musical imagination (PMI). By PMI, I understand a musical hypothesis testing engine that enables us to pre-select possible actions and reactions to perceived music. Traditionally, models of PMI are extrapolated from general cognitive science, yielding a field of hypotheses what PMI actually does (e.g., generate embodied musical metaphors). Following recent works in philosophy of science, I will argue that those extrapolations themselves do not provide means for model validation and justification in music cognition research. As an alternative, I propose a constitutive mechanistic explanation of perceptual musical imagination. This account conceptualizes PMI in terms of underlying causal organization of the components and provides norms for assessing the explanatory value of PMI models.

Klara Łuczniak, Jon May, Emma Redding - SYNC TO THE OTHERS NOT TO THE MOVEMENT - THE INVESTIGATION INTO SHARED PHYSIOLOGICAL DYNAMICS IN DANCE IMPROVISATION.

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A growing number of studies suggest that there is a crucial role for shared physiological dynamics in social coordination, rapport, empathy and even team performance. It has been found that during social activities people tend to spontaneously coordinate their physiological processes such as heart rate (Konvalinka et al., 2011), breathing patterns (Bachrach, Fontbonne, Joufflineau, & Ulloa, 2015) or brain activity (Friston & Frith, 2015). This paper investigates the presence and temporal development of shared interpersonal physiological dynamics of heart rate and breathing rate during dance improvisation, a free, unplanned movement practice. Dance improvisation has the potential for dancers' physiological coordination to appear, both through spontaneous synchronised movement, as well as empathic relation within the group. Further, it examines whether coordination of physiological state is an underlying component of the group flow experience (Sawyer, 2003). Group flow experience appears in a successful, effortless collaboration where coordination of actions proceeds smoothly in an empathic way. Therefore, it was hypothesised that higher levels of group flow experience during improvisation will be related to a higher level of dancers' coordination on the physiological level (measured by heart-rate and breathing) than low-flow improvisations.

In the following study, eight groups of four dancers were invited to perform, first, solo improvisation task (scores), followed by two group tasks. The scores, based on sense awareness and imagery, were chosen to give dancers a starting point of creative process and enable free, unscripted exploration of movement. Each score lasted approximately five minutes and was called to the end by the experimenter. Dancers' physiological dynamics (heart-rate, breathing rate and activity level) were recorded and coordination levels were estimated using an adaptation of cross-recurrence analysis (Coco & Dale, 2014), where the group coordination and predictability levels were understood as averages of coordination (or predictability) between each pair of dancers within the group. The solo score was treated as a base line for dancers activity level (as well as coordination and predictability levels), while two group tasks were designed the collaborative versions of the solo task. The group flow experience was captured by video-recall stimulated method (Łuczniak, Loesche, 2017), that asked dancers to annotate their internal state of flow during a creative process of improvisation by watching a recording of improvisation in dedicated tablet application just after finishing the score.

As expected, group improvisation score led to higher coordination on a physiological level in the group, measured by heart and breathing rate, in comparison to the solo score. Further investigation into the coordination of activity level showed that shared activity patterns do not cause this physiological entrainment. Dancers were not in the higher movement (activity level) synchrony in the group tasks than in solo task. In conclusion, these findings suggest that 'empathic projection' (Konvalinka et al., 2011), the alignment of physiological states by aligning the emotional reaction to the situation, facilitates the shared heart-rate and breathing-rate dynamics in the group dance improvisation. This results will be discussed in the context of kinaesthetic empathy, a communication mode in dance suggested by Ribeiro and Fonseca (2011).

The investigation of group flow experience and shared physiological dynamics did not show any significant links. However, the collected data revealed an insufficient presence of group flow experience. The group flow experience, understood as those moments when three or more dancers experienced flow simultaneously, usually lasted no longer than one minute. Moreover, some groups have never reached it. The effect of flow could not be found due to limited data.

Summarizing, the following study showed that group movement creative task in dancer leads to higher entrainment of physiological dynamics within the group that is caused by the alignment of dancers' emotional arousal and it is not related to the synchronised movement patterns.

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Marcin Miłkowski, Mateusz Hohol, Rucińska Zuzanna, Clowes Robert, Tad Zawidzki, Przegalińska Aleksandra, Joel Krueger, Adam Gies, Marek McGann, Witold Wachowski, Łukasz Afeltowicz, Fredrik Stjernberg and Victor Loughlin - THE RELEVANCE OF WIDE COGNITION TO SOCIAL INTELLIGENCE

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In this talk, we argue that several recent 'wide' perspectives on cognition, embodied and grounded cognition, extended and scaffolded mind, enactivism and distributed cognition are relevant to the study of social intelligence, or the capacity to engage in social interaction flexibly and skillfully. In particular, they override traditional methodological individualism, typical for cognitivism. The study of social intelligence requires us to go beyond the study of individuals and to include interactions with others, groups, cognitive artifacts, and their environment. The claim is illustrated with recent developments in the study of embodied joint action, mind-reading, and social emotions.

Traditionally cognitive science has been methodologically individualist and has treated cognition as the capacity of individuals. Usually, it has framed intelligent behavior in terms of the processing of internal representations of individual minds. Recently, embodied and grounded cognition, the extended and scaffolded mind, enactivism as well as distributed cognition, offer challenges to the traditional approach in different ways. Social intelligence is accounted for in terms of embodied interactions supported and extended by actively built cognitive niches. By social intelligence we understand the capacity to engage in social interaction flexibly and skillfully. These variety of approaches, which we jointly dub "wide cognition," offer a new,

coherent picture of cognition, in particular social intelligence, as well as make it possible to integrate and unify interdisciplinary research. Wide approaches are part of the recent social turn in cognitive science and cognitive neuroscience (Lindblom, 2015). The cognitive underpinnings of social interaction have come into focus in recent years and for this reason, the boundaries between cognitive science and other social sciences have become blurred and the gap between them easier to close.

In practice, however, representatives of various social sciences work in different paradigms, and communication between them is consequently limited. Even within contemporary cognitive science, there are different approaches to social cognition. The aim of this paper is to build bridges between these approaches and to exhibit the latest trends in the study of social intelligence. In this brief report, we introduce basic frameworks of wide cognition and illustrate them with promising developments in research on child development and mind-reading. We argue that wide cognition offers novel insights relevant to the study of social phenomena, which are not available in the individualist approaches. These approaches presuppose that social cognition is reducible to individual cognitive capacities, even if human beings are born with capacities that enable them to acquire cultural competence. Even the recent work on the “social brain hypothesis,” which claims that selection pressures from social interaction, rather than from interaction with the physical environment, led to the continuous refinement of human behavior, focuses its attention on the structure of individual brains. However, as recent research suggests, social cognition may rely also on culturally evolved and culturally scaffolded structures and processes (Heyes, 2012). For this reason, the study of social intelligence requires researchers to go beyond the study of individuals and to include interactions with others, groups, cognitive artifacts, and their environment. Wide cognition prizes this sort of inclusive approach.

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Marcin Miłkowski - WHEN IS INFORMATION SEMANTIC INFORMATION?

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By appealing to Daniel Dennett's philosophical hero, Donald MacKay, I argue that the claim that there is no measure of semantic information is wrongheaded. I also point out some problems with the generic claim that semantic information is design worth getting.

Robert Mirski - FOUNDATIONAL PROBLEMS WITH BAYESIAN INFERENCE MODELS OF THE DEVELOPMENT OF SOCIAL COGNITION

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Recent years have seen a proliferation of Bayesian inference modeling in research on cognitive development (e.g. Gopnik and Bonawitz 2015). Its proponents conceive of it as an abstract theory at the computational level of analysis that models learning as a process of probabilistic hypothesis selection given the new data. Understandably, the way that the approach frames the computational problem at hand imposes certain constraints on possible ways of its mechanistic implementation. Namely, the Bayesian framework assumes representational mechanisms that enable hypotheses to be formed and over which probabilities are then calculated given the new data; probability distribution over hypothesis cannot set off without a preexisting ability to formulate hypotheses representing the world to be in a certain way to begin with (Bickhard 2016). That is a computational-level constraint that must be necessarily inherited by any particular implementation at lower levels.

In this paper, my central interest is the question of to what extent Bayesian framework is illuminating in research on social cognition, particularly when we consider cross-cultural variance in skills associated with it. Much of the current debate in the field oscillates around the nature-nurture issue brought out by observed variance in performance on mindreading tests across different cultures (e.g. Gut and Wilczewski 2015). That is, the question is whether socio-cultural interaction is a necessary component in development of mindreading, and if so, to what extent a given culture determines the nature of that ability. The Bayesian framework does not enable us to address that question.

The main line of criticism extended towards nativist accounts of mindreading development is that an assumption of an inborn representational base that enables the child to mindread is a poor explanation of this ability – it merely restates the question in the form of an answer. This applies equally well to approaches dubbed “empiricist” which are still foundational in their formulation (Allen and Bickhard 2013). The Bayesian framework seems to be a case of such an approach, neatly formalized, to be sure, but still foundational in its logic. The Bayesian approach necessarily assumes initial representational capacities and so their ontogeny is unexplainable within the theory. For the mindreading research that means that the Bayesian modeling cannot tell us much about the basic understanding of others as rational subjects, which forms the assumed foundation for further learning, and the extent to which the development of it is culturally implicated and in what ways it is so.

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Mara Neijzen - POSSIBLE SCAFFOLDINGS OF THE DEPRESSED AGENT'S FIELD OF SOCIAL AFFORDANCES

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Within the 4E cognition framework, changes in affective states allow one to perceive affordances, experiencing them as solicitations. It thereby seems evident that depression affects the field of affordances (FoA), including affordances for social interaction. The FoA comprises all affordances an agent is engaged with. It can furthermore be specified in terms of three axes: the width (scope), depth (temporal depth) and height (relevance) of the field. It shall firstly be argued that the FoA is decreased on all three axes, causing a decrease in the depressed agent's daily social competence. Secondly, scaffolding to reduce this negative effect will be suggested. Relating to the height, possibilities for action are experienced as less inviting, and one's emotional responses to the environment seem stifled. Secondly, an agent's perception biases a narrow scope and localised attention when experiencing a negative emotion or mood. Multiple studies support that the perceptual field itself is narrowed when agents experience anxiety or depressive moods. This can cause the agent to be less open to affordances which are relevant to her concerns, pointing to a decreased scope of the FoA.

The depth of the FoA is also affected. This is supported by studies on the medical decision-making competence (DMC) of patients, suggesting that depressed patients can lack the competence to interpret future possibilities accurately. The depressed agent has highly restricted access to imagining a future state of happiness, experiencing a disconnect from both joyous experiences in the past and possible positive experiences in the future. Therefore, affordances that the agent does not experience as attractive are difficult to imagine to be attractive in the future, such as socialising with friends.

Following this decrease in the FoA, the agent's social competence is lessened in three ways: 1) The agent is less likely to respond to affordances for social interaction as she feels alienated from others. 2) The agent's attentional scope is narrowed, causing her to perceive less possibilities for social or empathetic behaviour. 3) Competent decision-making about future possibilities is decreased. For these three problems, a well-known example from extended cognition can help: A notebook. 1) By writing stories about what and who she cares about, relating to positive feelings she would experience when she is not in a depressed mood, she could increase motivation to respond to social affordances. 2) By writing a list of social affordances that deserve her attention, such as asking about someone's day when she perceives this person to be in a bad mood, the agent can consciously direct her attention to these affordances. 3) Making a list of future plans relating to her social life, she can refer to the notebook in making decisions affecting her future. These three ways may not always lead the agent towards more social behaviour, yet it could deter her from making harmful decisions such as isolating herself and ignoring social cues.

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Albert Newen - PERSON MODEL THEORY OF UNDERSTANDING OTHERS: AN ALTERNATIVE ACCOUNT

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We have still not settled the debate on which theory best accounts for our central ability to understand others. There are at least three candidates on the table, namely Theory Theory (TT), Simulation Theory (ST) and Interaction Theory (IT). But all of them have essential shortcomings. Thus we need a new account which could be the person model theory (PMT).

A joint defect of TT and ST is that they both focused on a third-personal observation of the other and forgot about the relevance of social interaction in understanding others. This led to the development of the interaction theory of understanding. Despite its merits to account for basic understanding of babies it underestimates our progress based on understanding by observation and by building rich models of other humans. Thus we still do not have an adequate theory accounting for the large varieties of types of social understanding. I argue that the person model theory is a fruitful alternative. I suggest that we develop "person models" of ourselves, of other individuals and of groups of persons. These person models are the basis for the registration and evaluation of persons as having mental as well as physical properties. Since there are two ways of understanding other minds (implicit and explicit mindreading), we propose that there are two kinds of person models: Very early in life we already develop implicit person schemata: A person schema is an implicit unity of sensory-motor abilities and basic mental phenomena related to one human being (or a group of humans). In normal ontogeny we also develop explicit person images: A person image is a unity of explicitly registered mental and physical phenomena related to one human being (or a group).

It is argued that the person model theory has more explanatory power than the alternative candidates by unfolding two main claims: (i) Concerning the epistemic strategy of understanding others, PMT defends the multiplicity view: we do not rely on one epistemic strategy, as is suggested by most proposals in the literature (e.g. ST claims that simulation is the only or at least the absolute dominant strategy), but rather we rely on a multiplicity of strategies which, for the most part, are implicitly activated by contextual cues. These strategies include at least simulation strategies, theory-based inferences, and direct perception, as well as understanding based on social interaction and by relying on narratives. (ii) Concerning the organization of the relevant background information, the central claim is that information about other humans as individuals or types of persons is stored and organized in person models.

The person model theory can account for several important aspects which are highlighted as defects of at least one of the competitors: 1. The person model theory can convincingly account for the difference between understanding a complete stranger by relying on a group model only, and understanding a well-known family member by relying on a rich explicit person image of the individual which can contain very specific information. No other theory can account for the systematic understanding of individual idiosyncrasies of others which are different from one's own dispositions: but individual person models can do the job. 2. By appealing to the distinction between implicit and explicit person models, PMT can account for the difference between basic or intuitive understanding and complex or theory-based understanding of others which is underdeveloped in TT. 3. With the difference between a person model of oneself and person models of others, PMT can account for an understanding of others which goes beyond the own-self model as the sole source of understanding others, contrary to ST. 4. By including the multiplicity view concerning the epistemic strategies, PMT can account for the fact that we actually use different strategies of understanding, which clearly distinguishes it from TT and ST. 5. PMT can be distinguished from its competitors: it is especially different from TT because PMT can account for a very early intuitive understanding by implicit person schemata. It is different from ST because it can account for an understanding of others based on

person models of others. It is different from IT since it addresses not only basic online but also offline understanding. 6. Finally, there is recent evidence from neuroscience that we actually construct and rely on person models (Hassabis et al. 2013).

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Marek Nieznański and Michał Obidziński - RETRIEVAL FORM EPISODIC MEMORY AND INDIVIDUAL DIFFERENCES IN INHIBITION, SUSTAINED ATTENTION, AND WORKING MEMORY CAPACITY

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The purpose of this study was to explore the relationship between individual differences in several resource-dependent executive abilities and episodic-memory processes defined in terms of the Fuzzy Trace Theory (FTT, e.g., Brainerd, Reyna, Wright, & Mojardin, 2003). We used tests of inhibitory abilities (the Stroop task and the Flanker task), a test of working memory capacity (the Rotation Span Task) and the Sustained Attention to Response Task. On the basis of achievements in these tests the participants were split into high- and low-performing groups. As an episodic memory task we used a recognition memory task in which participants studied a list of words and, during the recognition phase, they were presented with targets, unrelated distracters as well as orthographically related distracters (e.g., sofa when soda was target) (Obidziński & Nieznański, 2017). For recognition memory data analysis we used the multinomial model developed by Stahl and Klauer (2009) for the simplified conjoint recognition paradigm. This method allows to estimate memory processes defined according to FTT— these are: a) retrieval of the verbatim trace when a target is presented at test, b) retrieval of the verbatim trace when a related distracter is presented at test (i.e., recollection rejection), c) retrieval of the gist trace when a target is presented at test, d) retrieval of the gist trace when related distracter is presented at test, and finally, e) phantom recollection which occurs for related distracters in the absence of recollection rejection and leads to a false “target” response. We showed several significant differences in memory parameter estimates between groups of participants. For example, recollection rejection was significantly higher for the high- than low- working memory capacity participants; whereas phantom recollection was significantly higher for the group of participants scoring worse in the sustained attention test. Groups differing in inhibitory abilities tasks differed in the verbatim trace recollection parameters. However, gist trace retrieval parameters did not differ high- and low-performing participants. It seems that among processes engaged in a recognition memory task some are more automatic whereas others are more controlled and resources-demanding.

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Przemysław Nowakowski - SENSE OF OWNERSHIP, SOMATOPARAPHRENIA AND SOCIAL COGNITION: COMPUTATIONAL CONSIDERATIONS

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The self-referential processing can be related to (a) action or (b) social interaction. The first one is based on the integration and coordination of multisensory and sensorimotor information, mostly for some sensorimotor tasks, without any need of identification processes. In the second case, however, it is important to differentiate and track oneself in the social situation and ongoing interaction with others, so this kind of self-referential processing should be based on the identification.

In this presentation, I argue, that there is highly unlikely that the sense of ownership is anchored only to action related processing. Therefore, phenomena described as the sense of ownership should be cognitive processing based, and related to social tasks. Therefore, we need to describe the self-referential processing in the social context and relate it to contemporary research about the sense of ownership.

At the end of my talk, I will discuss the main argument against my view, the argument based on analysis of peculiar delusion: somatoparaphrenia. This delusion is often explained in terms of a lack of primitive sense of own limb ownership. I will show that referring only to the loss of sense of ownership is not sufficient to explain somatoparaphrenia and we are in need of the cognitive, computational model of this delusion

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Michał Obidziński - VERBATIM AND GIST MEMORY TRACES AND THEIR IMPORTANCE IN SOCIAL INTERACTIONS. FUZZY-TRACE THEORY APPROACH

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Fuzzy-Trace Theory (Brainerd & Reyna, 1990), described in this paper is cognitive psychology theory of memory which assume that there are two independent memory traces for every given stimulus. First of them—verbatim trace—stores information about surface properties of given stimulus. Second—gist trace—is responsible for storage of deep information (meaning of particular stimulus). Described theory turns to be very useful in field of psychology, other than cognitive psychology (e.g. developmental, educational, forensic). Moreover, Fuzzy-Trace Theory is closely related to subject of reasoning processes. In terms of described theory analytical reasoning is connected with verbatim level of information, while gist trace is connected with intuition (Reyna, 2012).

Processing of verbatim and gist information is crucial in everyday life. Reliance on the information fitted to given situation is the key to achieve success. Sometimes, when success of given action is rely on precise information (e.g. in situation of court case or solving math problem) reference to verbatim information memory is necessary. In this situations depending only on gist trace can lead to mistakes and errors (Brainerd & Reyna, 2005) which can have serious social consequences (especially in situation when eyewitness will make mistake). From the other hand, there are situations when relying on verbatim lead to misunderstandings and errors, and use of gist information is essential in order to succeed (Reyna & Brainerd, 2011). Thus functioning of verbatim and gist memory traces have great impact on everyday activities, including social interactions and perception.

In the first part of this presentation the basic and assumptions of Fuzzy-Trace Theory are described. Second part, consists of presentation of chosen experimental methods used in studies on verbatim and gist memory traces in terms of Fuzzy-Trace Theory. In last part of presentation, the assumptions about importance of gist and verbatim memory in social interactions (expected based on described theory) and results of conducted experiments which show connections between social interactions and memory traces are presented.

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Jacek Olender - SOCIAL AESTHETIC EXPERIENCE: ART AS EXTENSION AND ANCHORING OF SOCIAL SELF

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Art historians and museums' theoreticians widely accept the idea that presenting original artworks in particular context can shape society's approach to matters presented on the display. Culture, in that situation can be influenced by adequately chosen and contextualised physical objects with symbolic connotations. Such approach is called 'politics of display' and it is based on critical cultural analysis of the 'stories' told in museums when confronting the public with particular problems of the world and society. It is generally accepted among culture theorists that such practices can either uphold and strengthen or change opinions and presumptions widely-held in society (Macdonald, 1998).

Visual arts have often been granted a special status in western culture, where in different aspects its exceptional role for culture and social life has been suggested. For example, art was believed to hold power to amend moral failings of people or bring interest to “higher ideals” (for example in philosophy of Shafetsbury, see: Gill, 2016). This exceptionalist stance usually is accompanied by several additional claims, often denoting beliefs about art that could be regarded as consequences of such approach: for example the belief that personal contact with original, physical artwork is irreplaceable for true aesthetic experience and for fully benefiting from contact with art. The exceptionalist approach is still quite popular claim among people studying art history or working in culture studies, even if the stance remains rarely expressed verbatim in their work.

I accept the idea behind the politics of display – that art can shape culture – as being generally true and I take it as a premise for further studies. In that case, the question for naturalist-oriented philosophers is what causes this to be true? From the perspective of human culturally-embedded cognition there must be a factor behind accessible to naturalised explanation. Such question is non-trivial, when the premise of cognition being prior-knowledge-influenced and presumption-influenced is taken into account (as in: Nanay, 2016). If we accept the premise of top-down influences to sensory experience, aesthetics automatically becomes social phenomenon.

This is my approach towards this question of is as follows: in my paper I claim that (1) art and other symbolically charged objects of culture serve as extensions and anchors objects of our social self and (2) that those objects are entangled in reflexive relation of influencing and being influenced by the culture and social reality. Additionally, I claim that current research in naturalised aesthetics gives us only side hints towards the reality behind those questions, but do not take these questions head on. I believe that art, in fact, serves as physical extension of our social selves and help us establish our social connections.

I think that there is a need to reformulate some of the questions currently being asked in naturalised aesthetics, in order to take the problems of social cognition into account and help to relate current culture studies and art history to naturalised research. Popular trends in those fields that come closer to naturalised aesthetics are evolutionary/ethological aesthetics, e.g. works of Ellen Dissanayake (Dissanayake, 2015) or neuroarthistory, e.g. works of John Onians (Onians, 2008).

In my opinion, the fact that neuroaesthetic research does not answer the problems of social importance of art at the current stage. We need to add some and reformulate some other of the approaches in naturalised research, in order to start conversation about the importance of culturally grounded symbolism in our perception of art and about the role that symbolically charged objects play in establishing social relations among us.

In my paper I would like to present few theoretical frameworks that can be incorporated into the naturalised aesthetics research in order to help answering those questions and solving aforementioned problems. I believe that adapting tools from (1) extended mind theory framework (Clark, 2008), (2) shared representations framework (Decety & Sommerville, 2003), (3) sociological symbolic exchange framework, and (4) philosophy of perception framework (Nanay, 2016) will help expanding naturalised aesthetics towards social cognition. I will offer short summaries of the important aspects of those frameworks and what they offer for naturalised aesthetics and to what extent they allow for incorporation of naturalised aesthetics into the contemporary culture studies. I will also point out the important limitations in adapting those perspectives into the naturalised aesthetics field.

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Michał Piekarski - DECISION-MAKING AND ACTION-ORIENTED PREDICTIVE PROCESSING

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According to the hypothesis of predictive processing, the basic function of the brain is to minimise the predictive error which occurs between hypotheses developed on the basis of an internal world model espoused by a given organism and the information coming from the world which is supplied by the senses (specific sets of data). In line with the view presented here, cognition is a process of inference aimed at estimating the probability of a given event happening based on uncertain information coming from the environment. Proponents of predictive processing approach (e.g. Harkness, Keshava 2017; Hohwy 2013, 2016) have adopted the Bayesian Brain hypothesis according to which the central nervous system constructs and tests internal models of the external world by running cognitive processes which approximate Bayesian reasoning.

Presented analyses have an important meaning for the theory of decision. If brain, according to thesis of predictive processing, implements the Bayesian inference, then explanation of the process of decision-making is the part of the theory of perception. Cognitive system needs to make a decision, to act in the dynamic environment. We can analyse processes of decision-making on many levels of generative model. Some researchers (Burr 2017; Cisek 2005, 2007; Cisek, Pastor-Bernier, 2014) claim that on the neural level decisions are not determined by any specific instance in the brain but by the area of the brain which first commits to a specific action in such a way that it influences other areas. This results in the so-called distributed consensus. The right decision is selected through interactions of specific actions undertaken by relevant areas in the brain. We can explain these perceptive decision-making processes using ACH model (Affordance Competition Hypothesis).

In this presentation I would like to show the possibility of explanation of the decision-making processes on the higher levels of the generative model. To do that I am going to use the concept of prediction in its normative formulation. The concept of prediction is particularly important in the conceptions of predictive processing. Predictions serve specific cognitive and non-cognitive aims pursued by organisms. It seems, therefore, that predictions serve a vital normative function in the theory of perception. According to the theory of predictive coding, these individual levels are consolidated by predictions organising our experience of the world throughout the model – from neural processes to conscious experience and decision-making.

I would like to show that the existence of a multi-level generative model postulated by predictionists may guarantee that decisions made at lower levels of the model depend on the content of decisions made at higher levels. From the perspective of the problem of decision-

making, we can interpret the process of minimising the predictive error in the terms of the minimising the normative uncertainty.

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Michał Piekarski and Michał Obidziński – IS THERE AN INTUITION OF NORMATIVITY? AN EMPIRICAL APPROACH.

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The aim of our investigations is to examine the following thesis: people distinguish situations with different normative qualifications. What does it mean? We would like to prove that there is a specific intuition of normativity which helps people to make a decision, differentiate actions and attitudes. In his famous article *Intentional Action and Side Effects in Ordinary Language* (2003) Joshua Knobe claims that there is a specific asymmetry which is related to the human tendency for blaming the agent for negative side effects of her actions

rather than praising her for the positive ones. He believes that people are more likely to link intentional actions to side effects when they consider a side effect to be bad than when they regard it as good. We would like to demonstrate that the asymmetry identified by Knobe is founded in a more basic asymmetry between recognition what is moral primarily and what is moral secondary. Our investigations have an empirical character.

Study 1: Goal of this experiment was to examine hypothesis, which state that reaction time (RT), in task of answering if given situation have moral character or not, when stimulus is originally moral is shorter then in situation of secondary moral items.

Method: First, of described study was conducted with use of experimental procedure, designed for its purpose. Participants task was to judge whether presented stimulus is moral or not. Forty sentences or names describing some actions were used as the stimuli. Half of them were labeled as originally moral – which means that its moral character is easy to notice, is connected to the core moral values of majority moral systems (e.g. do not kill). Another half were labeled as secondary moral actions – which means that its moral character is not so clear and perception of it is determined by process of connecting this action with some more general, and moral motivation.

Study 2: Goal of this study was to examine structure in set of items judge by us as originally moral, secondary moral and not moral. We made the assumption that there will be differences in connections between items from these groups that are cause by different variables that affect these judgments.

Method: Material was consists of 55 statements presented to participants in form of questionnaire. Participants task was to evaluate these items on scale from 1 (definitely not moral) to 6 (definitely moral). After collecting enough data we will conduct factor analysis, statistical method used to found structure (overriding dimensions) in set of items. These dimensions describe some variables that underlying differences in evaluation of statements judgments results. We assume that we will find factor/factors that will be specifically connected with originally moral, secondary moral and non-moral items.

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Marek Pokropski - MENTAL CONCEPTS IN SOCIAL COGNITION

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In my paper I will discuss the conceptual problem of other minds (Wittgenstein 1968, Avramides 2001), which is relevant for contemporary psychological discussions concerning social cognition and the so called theory of mind debate in cognitive sciences. I will consider two opposite positions: Theory Theory (Carruthers 1996, Stich 1983), which argues that mental concepts are theoretical terms, and Direct Perception Account (Cassam 2007), according to which mental states are observable and thus mental concepts can be considered as observational terms. I will argue that neither of these positions are plausible. I will argue that mental concepts are neither theoretical terms nor observational terms but, following existential phenomenologist M. Merleau-Ponty (2005/1945), they can be called existential terms.

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Paulius Rimkevičius - DOES DELIBERATION REVEAL ONE'S BELIEFS?

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Traditionally, it has been held that there is an essential asymmetry between the way we know and control our own minds and the way we know and control the minds of other people. Several prominent contemporary philosophers and psychologists have challenged this view. It has been proposed that we acquire knowledge of our own minds by turning our mindreading capacities onto ourselves and that we control our own minds by broadly behavioural means only. A leading opponent of such symmetry views, Richard Moran, has argued that we do have a special way of knowing and controlling our own mind as deliberators. I concentrate here on the case of beliefs. An argument against Moran's proposal is that deliberation, if it is understood as a careful discussion with oneself or others, often changes beliefs and so, does not reveal them as they were prior to it. Moran has replied that there must be a response, in between a mindless reaction and an extended explicit answer, that directly expresses one's beliefs and aligns them with one's reasons. According to him, this is presupposed by our treating ourselves as rational agents; reverting to third-personal means of acquiring knowledge about one's mind and controlling it are signs of abnormal conditions.

In contrast to this, I argue that deliberation does not provide special access or control of one's own beliefs and that third-personal ways of acquiring knowledge and control of one's mind are not signs of abnormal conditions. I proceed by presenting theoretical considerations and examining empirical data relevant to deliberation, response timing and rationality.

As regards response timing, the view under consideration faces a dilemma. It is known from dual-processing literature how often different response timing systematically leads to different answers. There is reason to think that this applies to answers about one's own beliefs as well. Deliberative answers will either fall to the category of mostly fast and intuitive answers or to the category of mostly slow and reflective answers. Both types of answers conform to Moran's criterion of responsiveness to reasons. But, on the one hand, if they are of the intuitive type, then they are likely to be biased and to rely on heuristics, as is common for this type of responses. In particular, they will tend to express a positive bias towards oneself and to rely on a

heuristic rule that takes one from a belief that something is to be believed to a belief that one believes it. Responses of the intuitive type are only adaptive in environments which are familiar or have helpful cues to the right answer ('benign' environments). Their adaptiveness can be explained in other ways than that of reliably leading to truth. On the other hand, if deliberative responses are responses of the reflective type, then, first, reflection sometimes changes beliefs, and second, reflective answers acquire the role of belief only with sufficient understanding, commitment and motivation from the subject. This means that one could not know one's belief by knowing the reflective answer alone.

As regards rationality, the view under consideration seems to be of limited applicability. In the present state of debate on whether cognitive science has shown human beings to be irrational, both sides agree that we possess, at best, only bounded rationality. There are always people who get the right answers, who are overall more intelligent and disposed to reflect. But most people's rationality is limited to a significant extent and they tend to get the right answers in 'benign' environments only, in general as well as answering questions about their own beliefs. Third-personal methods of acquiring knowledge of one's own mind and controlling it are certainly encouraged in pathological conditions by the most successful psychotherapeutic interventions. That is because these methods are more reliable in uncovering one's temporally extended beliefs and aligning one's actions with them. But the use of these methods is also encouraged in the final stages of recovery as well as afterwards, to prevent relapse. In addition to this, the methods of self-control that are proposed as effective by the 'strength' model of self-control, which is, after debate and revision, still the most prominent today, are all broadly behavioural. This too seems to imply that, in normal as well as abnormal conditions, it is best to treat one's own mind as if deliberation did not reliably reveal one's belief or made an effect on them that one could be certain of.

Zuzanna Rucinska - ON THE EXPLANATORY ROLE OF AFFORDANCES IN DENNETT'S PROJECT

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In 'From Bacteria to Bach', the concept of affordances features many times, making even the section titles such as 'Animals designed to deal with affordances' in chapter 5 or 'How do brains pick up affordances?' in chapter 8. Because of the variety of topics the book deals with, and because of the variety of the way 'affordances' have been conceptualised in the literature, this talk aims to discuss in more detail how the notion of affordances has been used by Prof Dennett in his book. I will ask two questions: 'What is meant by affordances?', and 'Do they play a useful (if any) explanatory role in the proposed evolutionary account of cognition?'

Zuzanna Rucinska - SOCIAL AFFORDANCES IN PRETENCE AND IMAGINATION

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Pretending and imaginative play are activities in which young children (between 2-8 years old) engage in on a daily basis. In developmental and clinical psychology, they are one of the benchmarks of a healthy development of social cognition; for example, we see underdeveloped spontaneous pretend play in children with Autism Spectrum Disorder. In the philosophical tradition, pretence is often identified with an individual, imaginative capacity, which is associated with being a representational state of mind.

Many think pretending and imagination are too complex and inherently representational capacities, which make them a non-starter for enactivists. For example, Spaulding (2010) does not think that the embodied and enactive accounts of cognition can give an appropriate explanation of pretending: “(The) developed capacities for (pretence) require a developed capacity for mindreading. To fully understand these kinds of behaviors, one must be able to appreciate aspects of interactions that become apparent only after developing mindreading abilities...” (p.14). In similar spirit, Foglia and Grush (2011) claim that “the enactive approach to imagery is unworkable unless it makes appeal to representations, understood in a particular way” (p. 36). A case in point is a phenomenon of role-playing and playing with an ‘absent’ imaginary friend. The assumed absence implies that the pretenders minimally require the capacity to represent or simulate an alternative scenario.

Accounting for these phenomena is therefore a clear challenge for enactivists. Can enactivist theories explain imagination, including imaginary pretend play? The talk will argue that enactivists can give an account of imaginary play, but first, it must be reconceptualised as mainly a social form of interaction. To show that pretence can be understood as a collective act, one must first go ‘outside the brain’, or look beyond individualistic explanations of cognition that focus on mentally representing the world. This talk will propose an enactive account of pretence, borrowing from the core ideas behind two modern approaches to philosophy of mind; Lambros Malafouris’ ‘Material Engagement Theory’ (2013) highlighting the importance of the objects and action in shaping cognition, and Anthony Chemero’s (2009) ‘Radical Embodied Cognitive Science’, arguing for non-representational model of cognition with the involvement of affordances. The enactive account of cognition has implications for understanding pretend and creative acts as situated in a dynamical world, where objects and other people serve as affordances for new, creative actions.

For example, a first possible solution of dealing with the phenomenon of an ‘imaginary friend’ is inspired by the novel approach to communication which sees fictional entities as occupants of the social space between the writer and the reader (Geurts, 2017), with the notion of ‘absence’ re-evaluated. The enactivist take on playing with imaginary friends proposes that the imagining of an exchange with an ‘absent friend’ can be conceived of as having of an internal dialogue (as a form of a self-talk), thereby focusing on the social and linguistic aspects of our history of interactions to better understand the phenomenon. It re-characterises imaginary play as a form of a social pretend play, based on a narrative competence. The role of social affordances in imaginary play is thus evaluated for its merits (Gleason 2013).

Ultimately, this paper will stress the importance of environmental affordances of game props (stressing the role of embodiment) and social affordances of play participants (stressing the role of intersubjectivity) and narrative engagements as key features of the agent’s environment that shape the development of his/her imaginative capacities, and by extension, social cognition. This is the first step to understanding pretence and imagination as social phenomena.

The talk will conclude with an analysis of the type of explanations given by enactivists when relying on the notion of affordances. Do affordances have a place in explanatory frameworks? Daniel Dennett (2017) suggests that there is room for brains to ‘pick up affordances’ (p. 165) via the predictive coding mechanism. The talk will end with a discussion on the following topics: 1) whether ‘picking up affordances’ (p. 165), ‘picking up available semantic information’ (p. 167), or ‘creating new affordances’ (p. 168) should be thought of interchangeably, and as capacities of the brain, and 2) whether indeed enactivism can integrate the predictive coding mechanism in an affordance-based model of cognition successfully (Bruineberg & Rietveld, 2014), thereby giving ground for incorporating affordances in explanatory stories.

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Joanna Rutkowska - THE EFFECT OF HEAD TILT ON PERCEPTIONS OF DOMINANCE, MASCULINITY, AND HEIGHT

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Social cognition, such as perception of people's dominance, masculinity, and height, is linked to real-life outcomes like social status and reproductive success, and thus can affect social interactions (Burton & Rule, 2013; Perrett et al., 1998; Watkins, DeBruine, Feinberg, & Jones, 2013). People adjust their behaviour to create different impressions of themselves in the eyes of others, and may use head tilt (tilting head upwards or downwards) to do that (Hehman, Leitner, & Gaertner, 2013). This study was aimed to examine how the head tilt affects perceptions of dominance, masculinity, and height from faces. It also investigated if this influence can be explained by human sexual size dimorphism and selection pressure, or dominance and appeasement displays within social hierarchies. Up-tilt was predicted to increase all three perceptions, while down-tilt to decrease them.

The experiment used a within-subjects design, and was completed online by 172 opportunity-sampled adults (115 female). The participants were presented with 36 faces in each task, created from 12 original face composites (computer-generated averages of photographs of faces; 6 female and 6 male) tilted at three levels (down-tilt, baseline level, up-tilt). Participants completed three tasks in random order, where they rated the faces' (supposed) owners on dominance, masculinity, and height on 7-point Likert scales. The main effects of head tilt and face's sex were analysed with two-way repeated measures analyses of variance, while planned comparisons were utilised to analyse the interactions between those variables.

The head tilt and face's sex significantly affected perceptions of dominance, masculinity and height. Faces tilted downwards and upwards had higher ratings of masculinity and dominance. The opposite pattern emerged for height, as the ratings were the highest for up-tilted faces, and the lowest for down-tilted ones. Overall, females were rated as less dominant, less masculine, and shorter than males. The extent of head tilt influence also differed between the sexes. Tilting head up had a greater influence on female faces, and tilting head down on male faces. The results stand in contradiction with the findings of previous studies, and cannot be accounted for by the sexual size dimorphism, or the usage of head tilt in a dominance display. New explanation of the data was proposed, suggesting that familiarity of different head tilts in various contexts played a role.

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Joanna Rutkowska - THE INFLUENCE OF FACIAL HEALTH CUES OF A DEFENDANT ON DECISIONS ABOUT THE SEVERITY OF PUNISHMENT

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Defendant's facial characteristics, for example attractiveness, influence the severity of punishment they receive for their crimes (Abwender & Hough, 2001). Body mass index (BMI) changes face shape, while fruit and vegetable intake changes skin colour, thus creating facial health cues and affecting perceived health and attractiveness (Coetzee, Re, Perrett, Tiddeman, & Xiao, 2011; Whitehead, Ozakinci, & Perrett, 2012). This research project examined the influence of facial health cues of defendants on the severity of punishment they receive. As people with low socioeconomic status eat fewer fruit and vegetables than people with high status (Irala-Estévez et al., 2000), they can be perceived as less healthy. Therefore, any effect of perceived health on the severity of punishment could indicate a systematic bias in the legal system. The influence of participant's own health on their judgments was also investigated.

The study used a within-subjects design, and was conducted online, on the University of St Andrews Perception Lab's platform. 53 adults (31 female) were recruited through online advertisements. Participants firstly filled in a demography and health questionnaire, and then completed the experimental part. They were separately shown 12 sets of stimuli, each consisting of defendant's face, and a brief crime description. They were asked to ascribe appropriate severity of punishment to each defendant. Similarity to real-life legal proceedings was achieved through providing participants with crime contexts in the descriptions. Defendant's faces were computer-generated averages of three real female faces, transformed in two dimensions (face shape and skin colour), and had either high (healthy BMI, increase in fruit and vegetable intake), or low (high BMI, decrease in fruit and vegetable intake) perceived health. To minimise the risk participants recognise the face transformations used in the study, each participant saw only one variant (high or low perceived health) of defendant's face.

The results revealed that there was a main effect of crime type on the severity of punishment, and an interaction between defendant's perceived health and participant's BMI (health indicator). Theft was ascribed the most severe punishment, and speeding and vandalism did not differ between each other. Participants with healthy BMI punished the unhealthy-looking defendants more, whereas participants with unhealthy BMI punished the healthy-looking defendants more. It was concluded that although defendant's perceived health has no influence on the severity of punishment for the crime, there is a positive bias towards defendants showing similar level of perceived health to our actual health. This may indicate a systematic bias in our legal system working against people from lower socio-economic background, and thus of worse health. As judges and other law practitioners are likely to have a high socio-economic status, and thus good health, they may favour defendants appearing healthy and give more severe sentences to defendants of lower socio-economic background.

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Marcin Rządeczka - AN EVOLUTIONARY PERSPECTIVE ON BIASES IN DECISION-MAKING STRATEGIES

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Recent studies in the psychological underpinning of decision-making strategies have clearly demonstrated an astonishing variety of biases involved in nearly every stage of thought process leading to making and executing decisions. Starting from the precontemplation phase, where possible results of a decision are perceived as purely hypothetical, via the contemplation phase, where an individual usually considers the effect of a decision in a specific and highly personal context, through to the preparation, action and maintenance phases, where a commitment to an action is declared, the action is executed, and, if necessary, maintained through a successive repetition founded upon a sufficient level of motivation. Undoubtedly, both cognitive and decision-making biases are ubiquitous in human, but, until recently, little was known about their counterparts in other primates. However, due to the collaborative research in primatology and evolutionary psychology, several notable scientists have partially unraveled seemingly ancient origin of several decision-making biases, which were thought to be uniquely human.

The framing effect is a well-researched phenomenon affecting the likelihood of choosing a particular outcome with regard to whether or not it was shown in the positive light. The general tendency described by the framing effect proved to be based upon the preference of a certain positive outcome over the just probable positive outcome and the preference of probable negative outcome over the certain negative outcome. Moreover, there is a measurable bias towards risk-taking in circumstances involving the possibility of a negative rather than a positive outcome. Surprisingly, other primates, both apes and monkeys, seems to exhibit a similar tendency, when facing a decision about economical exchange, irregardless of it being based on some kind of artificial tokens, food items, or providing services, such as grooming or protection. A tufted capuchin monkeys (*Cebus apella*) trading tokens for food with human experimenters appear to be influenced by a framing effect similarly to people making everyday business decisions.

In a similar fashion, the peak-end effect affects the emotional evaluation of past events and, by that, indirectly influences the willingness to engage in similar action in the future. As the name suggests, the peak-end effect ignores the duration of an unpleasant event and redirects attention towards the peak intensity of a stimulus and the overall outcome of a situation. As a matter of fact, it seems to be rather useful heuristic, but, clearly, ignorance of temporal clues has also some serious drawbacks. Like in the previous case, there is a compelling body of evidence supporting the hypothesis that *Homo sapiens sapiens* is not the only primate species subjected to this effect. One of the most striking non-human example is Rhesus monkey (*Macaca mulatta*), which, similarly to people playing economic games, exhibited a tendency to overweight the final and the peak result of a gaming sequence and to ignore both the duration and the sum value of other non-peak rewards.

Without a doubt, the counterfactual reasoning about the possible outcomes of a certain gamble appears to be one of the most complex aspects of everyday economic decision-making. After all, deriving emotional distress from the fact of not choosing the most profitable option requires at least some ability to imagine the possible sequence of events. Are non-human primates able to reason about counterfactuals? It is too early to know for sure, but some preliminary evidence suggests that both the common chimpanzee (*Pan troglodytes*) and the bonobo (*Pan paniscus*) exhibit visible behavioral markers of regret after making a suboptimal decision and often tends to switch their choices in the last moment, as if they were performing mental simulations of possible outcomes – a kind of situation we are quite familiar with when watching television game shows or simply playing decision-based board games.

These and many others cognitive biases affecting decision-making strategies seem to be widely shared among many primate species, but a sole comparison, however interesting and thought provoking it may be, avoids some ultimate questions about the shared nature of decision-making heuristics. If complex heuristics, such as peak-end effect or counterfactual reasoning, are, indeed, a shared primate heritage then some in-depth comparative studies could possibly provide an interesting perspective on biological rationale for the superficially irrational economic decision-making strategies in humans. The main purpose of the presentation is to demonstrate some arguments for analyzing chosen decision-making strategies as if they were universal heuristics exhibited, in varying complexity, by different primate species. An approach possibly worth pursuing if one seeks to understand rather than describe human decision-making biases.

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Wojciech Sady - ON THE SOCIAL NATURE OF SCIENTIFIC DISCOVERIES

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An empty mind neither perceives nor thinks (Fleck, 1935). Every scientist has been subjected to the process of social training, in the course of which s/he was equipped with a system of forms of sensuality and thinking. Acquired forms of sensuality allow her/him to name and describe in a particular way what s/he perceives. And when the right form is absent, even if one observes something, s/he either does not notice it or classifies it as something known. In the years 1882-1895 a number of physicists during cathode rays studies observed the effects – as we would say today – of the presence of X-rays but nobody has “discovered” them. Why it was Röntgen who realized that he had to do with “a new kind of rays” (1896)? My answer is that this happened, paradoxically, because Röntgen was not looking for anything new: he was repeating Lenard's experiments, so he knew in advance what he should have measured and what he would have seen. Although physically he was in the laboratory alone, Lenard's ghost, one would like to say, was standing behind his back.

Analogical remarks can be made about the discovery of electron, that was officially made by J. J. Thomson in 1897 (Dahl, 1997). But one year earlier Zeeman and Lorentz, Wichert and others already published correct values of the ratio of mass and electric charge of corpuscles emitting light or of corpuscles of cathode rays. But they either did not noticed or ignored the fact that the ratio was two thousand times bigger than in the case of hydrogen ions.

New forms of sensuality and thinking are introduced and developed not by (brilliant) individuals, but are products of interchange of thoughts between members of scientific community.

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Krzysztof Sękowski - PROBLEMS WITH CONTENT VALIDITY AND LANGUAGE IN CROSS-CULTURAL EXPERIMENTAL PHILOSOPHY

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Experimental philosophy is still a new current in modern analytic philosophy. Cross-cultural differences in reported or owned philosophical intuitions are interesting for all project carried out under the rubric of “experimental philosophy” - Experimental Analysis, Experimental Descriptivism and Experimental Restrictionism. According to the first project, the aim is to explore what intuitions ordinary people tend to express in particular situations. According to the second one, the most important thing is to find out how the intuitions are generated. Finally the primary goal for Experimental Restrictionism is to argue against the use of intuition in philosophy by pointing out some philosophically relevant influences in reported or owned intuitions like socioeconomic status, or culture background (Nadelhoffer, Nahmias 2007). Especially the last one focus on cross-cultural differences in owned or reported intuitions. According to experimental restrictionists these differences are by themselves arguments against the use of intuition in philosophy.

There are two methodological approaches in cross-cultural experimental philosophy. The first possibility is research, in which participants speak in one language. Moreover they often live in one country. With the help of different types of indicators (language, place of birth, self-identification), the subjects are divided into different cultural groups, including immigrants, their children or their grandchildren. In this approach materials are presented in one language. These are usually scenarios in which the participants must decide whether or not an agent knows something. Research in this approach was conducted, among others by Weinberg, Nichols and Stich (WNS) in 2001 and more than ten years later by three teams replicating the study (Nagel, San Juan, Mar 2013, Kim, Yuan 2015, Seyedsayamdost 2014,). None of the replications have confirmed the outcome of the WNS's study, however they are representative examples of current cross-cultural studies taking the basic methodological assumptions of the WNS's study.

In the second approach, the respondents are recruited in their home countries and the materials are presented to them in their mother tongue. An example of this type of research is the Machery et al. project (2015), in which he studied the epistemic intuitions of people from the USA, Canada, Brazil and India.

My speech will address the methodological problems of cross-cultural research in experimental philosophy. By the example of the mentioned research, I will point out the difficulties associated with each of the presented approaches. I will point to problems related to

the content validity that appear in the choice of some cultural identity indicators. I will criticize various indicators of cultural identity that are used in the research of experimental philosophy (auto-identification, language). I will also point to those indicators that researchers in experimental philosophy do not use (but in my opinion they should).

Referring to intercultural research in the field of developmental psychology and psycholinguistics I will point to problems related to the bilingualism in first approach and to the translation of materials in the second approach. I will point out methodological problems related to the possible influence of language on the owned or reported philosophical intuitions of the participants and the impact of these problems on cross-cultural research.

My methodological analysis has two goals. Firstly, the section devoted to content validity and cultural identity indicators is intended to be a practical guide for future researchers interested in cross-cultural differences in philosophical intuition and a warning of methodological errors committed in the past by experimental philosophers.

Analysis of the possible influence of language on intuitions and the problems of scenario translation is also intended to be a methodological guideline for future researchers. Moreover - and that's my second aim - I will point out that when accepting the thesis on the linguistic nature of philosophical intuitions, or just the possibility of language's major impact on them, some methodological problems may not be transcended in cross-cultural research of experimental philosophy. It may not be possible to examine the differences between cultural philosophical intuitions.

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Adrianna Smurzyńska - INTERDEPENDENCE OF SELF-UNDERSTANDING AND OTHER-UNDERSTANDING IN INFERENCE-BASED STRATEGIES FOR UNDERSTANDING OTHER MINDS

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Classical other minds problem was focused on the question: how can we know that there are other minds apart from our own? One of the solutions of that problem was based on the analogical inference – basing on direct self-knowledge and similarities between me and other, the knowledge about other minds was provided (Hyslop, 2016).

Nowadays, philosophers and cognitive scientists less often ask 'how can we know if others have minds?' and more often: 'how do we ascribe mental states to others?' Mental states attribution to others can be modelled in different ways. In philosophical literature it is sometimes explained as the process of building folk theories (Theory Theory (TT)) (Dziarnowska, 2012; Goldman, 2012; Newen, 2015), making simulations (Simulation Theory (ST)) (Dziarnowska,

2012; Goldman & Mason, 2007; Newen, 2015), establishing person models (Person Model Theory (PMT)) (Newen, 2015), experiencing the mental states directly (Interaction Theory (IT)) (Gallagher, 2001), or understanding them through narrative abilities (Narrative Practice Hypothesis (NPH)) (Hutto, 2008).

Comparing to the classical theories concerning other minds (i.e. analogical inference mentioned at the beginning), in most of contemporary theories there is no place for privileged and direct access to one's own mind. The relation between the abilities to understand ourselves and understand others (respectively first-person and third-person mentalizing) is not well discovered. Some of the researches insist that first-person mentalizing is prior (c.f. Goldman, 1993; 2006), others that third-person mentalizing is more basic (c.f. Carruthers, 2009), others – that those capabilities are independent of each other (Robbins, 2004).

In my presentation, I will take the position that those processes are interdependent and reciprocal (Hodges, 2005). I will start with providing three theories: TT, ST and PMT (orthodox and some non-orthodox versions). In the comparison I will focus on the question 'what is the role of self-understanding?' in each conception. The main question will be divided into smaller issues, like: 'what is the relation between the ability to understand our own mind and minds of others?' (Cf. Bogdan, 2007; Decety & Grezes, 2006; Goldman, 2012) and 'what is the role of self-understanding in forming representations of other minds?'. In more elaborated analysis I will provide an explanation on specified dependency/ independence in that case (developmental – which ability develops first, cognitive – which of them is used by adults in recognizing others, explanatory dependency – which of them explains the other). I will also consider whether research on neurophenomenology and embodied cognition (especially the role of a body and sense of agency in mindreading) (cf. Gallagher, & Varela, 2003) would help with developing the issue of the interdependence/ independence of the first- and third person mentalizing.

The comparison will help me to investigate my hypothesis concerning interdependence of self-understanding and other-understanding and consider the role of self-understanding (which is, in my opinion, underestimated) in the theories mentioned in my presentation.

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Krzysztof Sołoducha - THE PARADIGM OF DECLARATIVE SOCIOLOGY AND THE OPPORTUNITIES OF AUTOMATING THE RESEARCH OF HIDDEN CONSUMER ATTITUDES

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In my paper I intend to focus on pointing out the possibility of crossing the paradigm of declarative sociology in consumer and social research thanks to the use of cognitive phenomena enabling the investigation of hidden cognitive attitudes with use of easy-to-use sensors and IT system analysis and presentation of test results. The system should meet network conditions

and low end-device costs so that it can be implemented for large and representative social groups. The presentation will be an analysis of the sociological, philosophical, neurobiological and computer assumptions of such a program. Final conclusions will concern certain limits and challenges facing such a program, and comparison with already existing in-country research systems for hidden consumer attitudes.

Małgorzata Stępień-Nycz, Marta Białecka-Pikul - TEST OF EMOTION COMPREHENSION: THE POLISH ADAPTATION

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The Test of Emotion Comprehension (TEC, Pons & Harris, 2000) is widely used all around the world (up to date the TEC was translated into 18 languages), as it proved to be a useful, valid and reliable tool for measuring children's emotion understanding. The TEC was designed to assess emotion understanding in children aged 3-11 years. It comprises of items measuring 9 different components of emotion knowledge. These are: emotion recognition, external causes of emotions, desire-based emotions, belief-based emotions, reminders, emotion regulation, hiding of emotions, mixed emotions and moral emotions. The main aim of our study is to adapt the TEC to Polish conditions

The TEC was translated into Polish language, then back translated and used in the pilot study with 18 children aged 5-11 years. In the main study we tested 180 children (86 girls, 94 boys), in 4 groups: 5-year-olds ($N = 71$, 37 boys, $M = 5.25$, $SD = .34$, range 4.5 – 5.75); 7-year-olds ($N = 46$, 24 boys, $M = 7.26$, $SD = .28$, range 6.75 – 7.75); 9-year-olds ($N = 43$, 23 boys, $M = 9.32$, $SD = .21$, range 8.92 – 9.75); and 11-year-olds ($N = 20$, 10 boys, $M = 11.52$, $SD = .32$, range 10.75 – 12.00). The Polish version of the Test of Emotion Comprehension was used during individual sessions in kindergartens and schools. To assess the validity of the TEC, part of the children ($n = 29$) were tested with the Test of Emotion Knowledge (Stępień-Nycz, 2015).

Cronbach alpha for the scale was .61, the value being at the threshold of acceptability. The clear developmental pattern was observed, as the emotion knowledge improved with age ($F_{(3,172)} = 63.67$; $p < .001$; $\eta^2 = .53$), although there was no significant difference between 9- and 11-year-olds ($p = .17$). Moreover, the nine components differed regarding their difficulty, with the emotion recognition and external causes being the easiest components (respectively 98% and 96% of children passed the components) and the morality being the most difficult (22% of children passed the component). Cluster analysis revealed three clusters of components with differing difficulty, similar to – although not identical with – those obtained in the study of Pons, Harris & de Rosnay (2004): the first cluster included components recognition, external causes and desire-based emotions (the mean level of success for these three components was .92); the second cluster included belief-based emotions, reminders, hiding and mixed emotions (the mean level of success was .62); the third cluster included emotion regulation and moral emotions (the mean level of success was .33).

The Test of Emotion Comprehension was significantly correlated with the Test of Emotion Knowledge, proving its external validity (partial r for total scores of the TEC and the TEK was .64, with age controlled for).

The Polish version of the TEC proved to be a valid and reliable tool for measuring emotion knowledge in children, enabling future cross-cultural comparisons in the domain of developing emotion comprehension. The difference between Polish results and those obtained in other culture will be discussed.

Konrad Szocik - ACQUISITION AND TRANSMISSION OF RELIGIOUS BELIEFS

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Religious components including behaviors, beliefs, values, moods, and feelings are transmitted and inherited among believers. They are acquired mostly by imitation and social learning. In recent years, the question of acquisition and transmission of religious beliefs is explained by Cognitive Science of Religion that assumes an existence of some cognitive biases and tendencies that make religious beliefs more intuitive, natural and cognitively effortless than alternative non-religious beliefs. Alternative explanatory proposal is offered by evolutionary adaptationist account that explains religious components in terms of survival, reproduction, and function.

In this paper, I would like to propose a pluralistic approach that combines explanatory advantages of cognitive and evolutionary approaches to the study of religion but that would avoid their reductive and limited explanatory capacity. I am going to discuss possible solutions for explanation of acquisition and transmission of religious components. There is no need to choose between only cultural or biological evolutionary approaches. Cultural evolution has its own mechanisms and processes of transmission of cultural traits and it seems that at least some of them correspond with biological evolution. Nevertheless, the Darwinian approach that is effectively and broadly applied to the study of culture seems to be too much reductive and methodologically limited. Some scholars assume that Darwinian account cannot explain the transmission of acquired traits, invention, and human creativity. Other ones point out that biological approach towards religion and looking for similarities between humans and non-human animals should be applied very carefully and has insurmountable limits. Despite the fact that comparison between humans and non-human animals including not only primates but also social insects can show some similarities by homology and/or analogy and evolutionary continuity, animal populations were not affected by culture, especially not by such specific traits like religion and religious components. For this reason, some principles and regularities that are observed in the animal world perhaps cannot be applied to the humans which are affected especially by culturally and socially inherited traits, including religious and non-religious norms, habits, and beliefs. In this theoretical landscape, it can be assumed that evolutionary biological account can find and explain some strategically basic similarities between humans and non-human animals but fails to explain the so-called human uniqueness.

This and many other points show that mechanisms and rules of cultural transmission including acquisition and transmission of religious beliefs work in an alternative way to how genetic transmission works. However, they overlap in many ways. Cultural traits including religious ones have built many niches that affected human evolution. One of the most important and most discussed topics is the evolution of cooperation and altruism. This topic combines among many others evolutionary biological, evolutionary cultural, cognitive and experimental accounts, and is a good example of effective application of the pluralistic explanatory framework. Altruism is a combined result of many various factors and forces. In a similar way as with the study of altruism, we need to account for the study of religion's evolution with several variables that contribute to this feature and its change.

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Konrad Talmont-Kaminski - SCIENCE AND RELIGION AS EXAMPLES OF SOCIAL COGNITION

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Science and religion provide us with a pair of contrasting examples of the forms that social cognition can take. The striking differences between them can be traced back to a pair of distinctions, the first between the kinds of function that beliefs have, the second between the means by which people evaluate the claims made by others. Looking at those distinctions helps to understand a number of the features which distinguish science from religion.

The first distinction is between beliefs whose function is tied to their truth or accuracy and those whose function is not connected in this way (Talmont-Kaminski 2013). By far the majority of beliefs are of the first kind but there is at least one class of beliefs whose function is nonalethic. These are ideological beliefs, whose function is merely to motivate cooperation. It does not have to be true that people will be punished for not cooperating. It is enough that they continue to believe that they will. This distinction helps to explain much of the difference between science and religion. The reason is that while the function of scientific beliefs is very much tied to their accuracy, religious beliefs appear to be an example of ideological beliefs so their function is nonalethic.

The difficulty for beliefs with nonalethic function – discussed by McKay and Dennett among others – is that while for pragmatic reasons their acceptance and stability within a society should not be connected to their accuracy, people – while far from perfectly rational – are not willing to act on claims unless they believe that there are good epistemic reasons for thinking them to be true. This necessitates that ideological beliefs engage in something like Batesian mimicry – needing to appear like beliefs justified by our imperfect epistemic abilities. The means by which this is achieved are various and involve details of both our cognitive abilities, such as our cognitive biases, and the cultural processes that are constructed on their basis. One basic way in which religious claims can mimic beliefs justified on rational epistemic grounds is to be understood in terms of a distinction pointed out by Mercier and Sperber.

In their work on the argumentative account of reasoning, Mercier and Sperber distinguish between content and source vigilance. Both kinds of vigilance have the function of ensuring that we can learn from others without being easily misled by them for their own ends. Also, both kinds of vigilance are used by people in their normal everyday interactions: Can I trust that nice salesman trying to sell me the Ford Pinto? Does the idea of a sure-fire investment make sense given how markets work? Science and religion, however, have come to use a variety of social and cultural means to limit how epistemic vigilance is used within their context. In the case of science, institutions such as blind peer-review have the function of ensuring that claims are evaluated on the basis of their content alone. In contrast, within religion it is source vigilance that plays the main role in determining what authorities and, thereby, what claims are to be trusted. Once content vigilance is sufficiently reduced, it becomes possible for traditions of beliefs to be passed on largely on the basis that epistemic authorities articulate them.

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Brandon Tinklenberg - TWO SYSTEMS ACCOUNTS OF MINDREADING REVISITED

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Primates and infants may be responsive to others' perceptual perspectives, though their capacity is generally distinguished from children's ability to verbally reason about others' beliefs. That said, testing belief representation by measuring preferential looking times has some now thinking both preverbal infants and primates have mindreading skills as well (Southgate et al. (2007), Krupenye et al. (2016)). Determining exactly what individuals are tracking in these cases, I argue, starts by disentangling automatic belief representation and perceptual mindreading. One way to explain the pattern of performance across species and developmental stages is to consider mindreading not as unitary process, but rather one that can be decomposed into unique social cognition skills. Just as one might distinguish between explicit and implicit knowledge of the causal structure of some physical system, we might discover dual processing systems for mindreading. According to the two systems account (Apperly & Butterfill 2016), infants and primates succeed in perceptual mindreading tasks since those tasks require representing mentalistic, subdoxastic states. This interpretation, seen in relation to early mindreading studies, poses somewhat of a dilemma for two systems accounts. If the abilities underwriting performance in both tasks are functionally identical, then early mindreading tasks measure nothing more than a species of perceptual mindreading. There is therefore no basis for thinking that preferential looking experiments demonstrate that individuals are sensitive to the beliefs of others, since there is no cognitive difference between representing what someone sees and what they believe. If they are functionally distinct, then subdoxastic states ascribed in perceptual mindreading situations and those ascribed in early mindreading tasks are related in a way that demonstrates two systems accounts are at best underspecified. Getting clear on the integration of automatic belief representation and perceptual mindreading abilities requires determining a 'unique causal role' for these two species of subdoxastic states. I argue that modelling the relationship between these two states requires reflecting on how the content is determined—following Sober (2016), what is represented in mindreading tasks are the common causes of nonaccidentally related behaviors. Perceptual mindreading and automatic belief ascription have different background conditions under which they subsume socially salient information.

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Duygu Uygun Tunc – INTERSUBJECTIVITY AND THE DEVELOPMENT OF PERSPECTIVES

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Although there is agreement in the literature across various disciplines regarding that perspective-taking plays a role in social understanding and the development of self, there is wide dissensus over what that role consists in; particularly over whether the activity is primarily of a mental or social-pragmatic nature and how constitutive it is in development, that is, whether it is a later and secondary development following a basic understanding of self and other or foundational. Cognitive-neuroscientific branches of social and developmental psychology, in particular current social cognition theories, place the focus on the individual and offer representationalist accounts, whereas interactionist, relational and lately phenomenological theories prioritize interpersonal interaction and argue for a basic, immediate understanding of others in interaction. While the cognitivist accounts miss the social and situated context of the development of social understanding, interactionist accounts downplay the significance of mediation and symbolic activity. Social-relational theories dating back the works of Lev Vygotsky, Jean Piaget and George Herbert Mead do not assume a representation-interaction divide and still offer valuable insight into how perspective-taking emerges and develops through symbolic activity within a social context. The present work is inspired largely by the social-relational theories of perspective-taking and offers a semiotic-pragmatic account of the development of perspectives through intersubjectivity. It conceives perspective as an orientation to a socially mediated environment that offers action-possibilities and argues in three interconnected theses that understanding of self and others depends for its possibility and development on intersubjectivity, which is taken to be a particular form of social interaction characteristically dominant in early phases of development. It asserts that, firstly, perspective-taking is primarily social-relational and secondarily individual and cognitive. Perspectives are first differentiated, assumed, and coordinated within social interaction and through pragmatic involvement with a socially mediated environment, and later the social operation is internalized and transformed into the cognitive function of perspective-taking. Secondly, the development of the capacity for perspective-taking goes hand in hand with and is essentially related to the development of the capacity for sign-use and symbolic activity. Thirdly, intersubjectivity is the condition of the development of perspectives with regards both to its proximate and ultimate causes. Ontogenetically viewed, perspective-taking is born out of intersubjectivity because the latter brings about the capacity for sign use. Perspective-taking depends on intersubjectivity also as its ultimate cause, since it serves to contain and overcome, through signification, a peculiarly social—not individual—problematic, that is the plurality of and conflict between agencies.

Jasper van Den Herik - THE ONTOGENETIC ORIGINS OF CONTENT THROUGH METALINGUISTIC MASTERY

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Some utterances and inscriptions have correctness conditions, in which case they have content. Sensitivity to content is crucial for a wide variety of human practices, the most conspicuous example being claim making practices. Traditionally, content was seen as the mark of the cognitive. This means that all cognition was thought to be contentful. Philosophers therefore aimed to provide a reductionist account of mental content (e.g. in terms of biological functions). In contradistinction, radical enactive-ecological approaches to cognition deny that cognition is always contentful (Hutto & Satne 2015), opting for explaining basic cognition in

terms of world-involving instead of world-representing processes (Varela, Thompson, & Rosch 1991; Gibson 1979). This raises the question: how do contentful forms of cognition emerge from non-contentful forms?

In this paper I answer this question on ontogenetic timescales by proposing a two stage developmental account of content-sensitivity – which I understand as a sensitivity to the correctness conditions of other's as well as one own's acts and attitudes. Note that the two stages, although analytically separable, will in practice be intertwined.

In the first stage, a child's normative similarity responses are 'calibrated' by a caregiver, so that the child responds appropriately to culturally salient aspects of her world (Williams 2010) such as emotions, (social) situations, but also shapes, colours, &c. This calibration is a form of ostensive training and can be explained through the education of attention (Reed 1995). The initiate learning situation is normatively structured by the caregiver: in first instance, the actions of the child are completely dependent for their meaning on the background provided by the caregiver. However, by being treated as if she is already competent, a child can gradually grow into her role as participant in her communities practices (Rączaszek-Leonardi 2016). The initiate learning situation is in first instance a non-epistemic context: it is aimed at coordinating behaviour in culturally appropriate ways, not about getting things right in the sense of making contentful claims about the world.

In the second stage the child has to become a master of contentful practices. I argue that content-sensitivity stems from the child's growing competence in participating in metalinguistic practices (talking about talking). This growing competence can similarly be explained through calibration, only now with respect to verbal aspects of the child's world (Taylor 2013). Against the background of her acquired normative similarity responses her growing metalinguistic competence allows the child to construe (verbal) responses of others as expressions of their perspective on the world, perspectives that can be correct or incorrect. This realisation allows for a novel kind of reflexivity: as her attention is educated to the affordances of linguistic behaviour, she becomes able to relate to other people's relation to the world, and ultimately, to herself as a subject of a perspective on the world. Her content-sensitivity is expressed in a reflective attitude which consists in a non-focal responsiveness that enables the child to engage in explicit metalinguistic articulation of correctness conditions. This means that content-sensitivity is not an all-or-nothing affair: throughout our life we continue to acquire skills for articulating correctness conditions, a prime example being academic training to become a philosopher.

So what is it that the child becomes sensitive to? In other words: what is the nature of content? In contradistinction to traditional accounts of mental content, that see content as an abstract object expressed by decontextualised symbols, we see content-sensitivity as a repertoire of social skills. Although the normative similarity responses form a necessary ground for the development of content-sensitivity, they do not determine content: content is always determined – provisionally and defeasibly – by the interacting individuals themselves. What the child learns in becoming sensitive to the content of what she and others say is to articulate correctness conditions when the situation requires her to do so, for example by offering a candidate understanding of what someone just said ('do you mean x by that'), by making a distinction that clarifies what someone says, or by settling on a procedure to determine whether a particular claim is true, &c. Content is thus not a determinate object that exists independent of ongoing human activity, but instead is continually renegotiated by us as we talk about what we mean when we talk.

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Julia Wolf- FALSE-BELIEF UNDERSTANDING: COGNITIVE AND SITUATIONAL FACTORS TRIGGER THE DEVELOPMENT

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It is a well replicated finding that children as young as 15 months are able to pass the implicit false belief tasks and there is evidence of children engaging in early deceptive behaviour after their first year (Newton, Reddy, & Bull, 2000). These findings seem to indicate some early understanding of other people's beliefs. Nonetheless, linguistically quite well developed children still fail the explicit false belief task till they are approximately 4 years old (Wellman, Cross, & Watson, 2001). This generates the so called paradox of the false belief task.

One of the main defects of previous cognitive explanations of the false belief paradox is that the nature of the cognitive development which enables children to pass the explicit false belief task is not specified. Perner and Leahy's (2016) Mental Files account provides a solution to this. Mental files are mental representations of objects. Perner and Leahy argue that children have two object files: one from their own perspective, and a vicarious mental file which represents the object from the perspective of the other person. It is only once these two files are linked, enabling the children to appreciate that there are different perspectives on the same object, that children understand beliefs and are able to pass the explicit false belief task.

Expanding upon Perner and Leahy's account, I argue that the paradox of the false belief task can be explained in terms of cognitive development as well as a systematically improved usage of social cues. Moreover, the improved internal processing might plausibly be achieved via the usage of social cues. I suggest that situational factors help to link the object file and the vicarious object, thus leading to the early false belief competence. For example, Rubio-Fernández and Geurts (2013) showed that if tracking the perspective of the agent is emphasised children younger than three are able to pass a verbal version of the false belief task. This temporary linking due to external factors is then internalised through experience, giving rise to the fixed, situation independent linking between object files, which is necessary for passing the explicit false belief task. Importantly, prior to the linking of the files there is a dominance of the own object file, which can be overcome through situational factors. But it is only once the two object files are linked that children are able to pass the false belief task independently of helping social cues.

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Marcin Zaród – COMPUTER SECURITY TOURNAMENTS AND CONSTRUCTION OF HACKING KNOWLEDGE

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A Capture the Flag (CTF) is a computer security competition, when team of the hackers compete against each other or against predefined tasks. Typical CTF lasts from 6 to 72 hours and could be played from one physical location (e.g. hacking convention common room). Over 800 teams compete each year in legal CTFs, hosted by other hackers, computer security companies or military agencies. Competitions are legal, but often hermetic and cryptic. Whereas hacking or computer security is usually considered an individual practice (Jordan & Taylor, 1998; Turkle, 2005), CTF provides opportunity to study knowledge processes at a level of a group operating within constrained time, space and well-defined tasks.

The paper presents results from ethnographical observations and interviews during selected CTFs from 2015 until 2017. Up to my best knowledge, this is the first empirical work on this particular social mechanism. 2 CTF were observed in media res (direct and IRC observation, numerous impromptu interviews), with full information from one of the participating teams, 2 other CTF were analysed basing on the post-factum interviews, write-ups and notes. In one case (one of the most highly-ranked tournaments) also the creators of the tasks and other teams were interviewed and triangulated with the observed participants. The paper is a part of larger ethnographical project conducted in hackerspaces since 2013.

In the paper I will show how knowledge about hacking and computer security is constructed and transferred by the CTFs. I will highlight how do they compare with formalized approaches to science and engineering knowledge practices previously described in Science and Technology Studies (Knorr Cetina, 1999; Orr, 1996). I will show CTF make use of the oral engineering knowledge (Orr's: "tales from the field") and how hackers compare with epistemic culture of physicists in regards to unfolding, framing and convoluting (from Knorr-Cetina's study). Hacking could be understood as unfolding the computer process, but the anomalies are treated differently. Framing occurs not only in relation to logs, but also using scoreboards and teammates. Convoluting and tinkering uses diverse and conflicting frameworks within as recognized by the cognitive carnival concept (Zaród, 2017).

The paper will start with basic information about CTF and hackers' community. I will discuss how CTF is fitted into more general hacking frameworks: hackerspaces, hacktivism and computer security as a profession. I will show that two types of CTF (attack-defence and jeopardy) construct different cognitive scaffoldings and different knowledge transfer dynamics. Attack-defence CTF forces constant shifts between the perspective of the attacker and the defender, which frames hacking as a part of system administrators knowledge. In comparison: Jeopardy-style CTF recreates closed task solving, which is more similar to "distilled hacking experience" (quote from one of the participants).

The paper will provide an outline of possible applications of CTF in the field of social cognition. By comparing attack-defence CTF and jeopardy CTF, one could compare group processes in tasks promoting role switching with the more traditional problem solving challenges. I will also outline how CTF fits into broader issue of mediations between different epistemic cultures in the computer security field.

In final part, I will show some traits that make hacking a particular social cognition mechanism: basing on the exceptions, ability to frame between otherwise conflicting frameworks and knowledge models about computer systems.

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Karolina Ziembowicz and Andrzej Nowak - MINE OR THINE? THE STRUCTURE OF TURN-TAKING PROCESS IN TEAMS WITH CONSENSUS-MAKING TASK

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Turn-taking, the orderly succession of speakers taking the floor, may be considered as one of the basic manifestations of synchronization in group interaction. Although extensively studied by conversation analysis, turn-taking has received unjustifiably little attention in the experimental inquiry (c.f. Holler et al, 2015). The existing literature on turn-taking in group interaction is dominated by work on the structure of participation, i.e. how much group members speak during interaction and why they differ in their propensity to speak (cf. Bonito & Hollingshead, 1997). Much less is known about the structure of turn taking sequences, i.e. why and when group members speak in a particular order.

The goal of the presented research is linking structural properties of turn-taking in group conversations, i.e. sequential patterns of turn taking to a) content of verbal exchanges and b) situational context of group interaction – group task and composition. We posit that patterns of turn taking are indicators of momentarily established coordination, oriented at the realization of a specific collective action. Coordination emerges as a patterned sequence of individual behaviors in a bottom-up fashion, however it also has its own autonomous dynamics, or “grammar”, that reorients individual behaviors in a top-down manner (Di Paolo & De Jaegher, 2012). Individual agents become captured by the ongoing social exchange – sometimes even against their own will – as in escalation of mutual hostility in the ‘spiral of conflict’ dynamics (Pruitt & Rubin, 1986).

In the presented study we analyzed 16 group interactions whose goal was finding consensus on a controversial vs. non-controversial issue. We measured turn-taking patterns emerging spontaneously when group members exchanged various types of content. Basing solely on turn taking structure we were able to distinguish disagreeing from agreeing groups, identify moments of elevated group conflict and predict mutual peer-to-peer ratings of group members. As we show, turn taking structure can serve as an accurate approximation of coordination pathways emerging between members. These pathways, crystallizing during group interaction, shape social relationships between members and their satisfaction from the experienced social encounter. Our results confirm that recurrent patterns of interaction are symptoms of a meaningful social process that can be studied for its function and relationship to other individual and system-level variables.

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Adrian Ziółkowski and Nathan Otteman - PROTAGONIST PROJECTION: A SOCIALLY DEPENDENT PHENOMENON

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Experimental Philosophers analyze philosophical intuitions of the folk. They have recently collected various data suggesting that intuitions expressed by non-philosophers are often at odds with philosophical tradition. This is a serious issue in experimental epistemology, where it turned out that many laypersons attribute knowledge in hypothetical cases that are considered by most philosophers to be clear cases of non-knowledge (e.g. Starmans, Friedman, 2012). These hypothetical scenarios are known in the literature as Gettier or Gettier-style cases, and are believed to show some crucial aspects of our concept of knowledge. The fact that philosophers' intuitions are not backed up by the folk may be seen as problematic. However, recently it was suggested (Buckwalter, 2014) that these problematic intuitions might be explained away as an instance of a psychological phenomenon called "protagonist projection". In our paper, we explore this hypothesis and analyze mechanisms involved in protagonist projection basing on data we collected.

Protagonist projection consists in answering questions concerning a given hypothetical scenario from the epistemic standpoint of the protagonist in the scenario (Holton, 1997). This is arguably illustrated with Buckwalter's (2014) findings concerning factive verbs, such as 'know'. Laypersons tend to accept some apparently non-factive uses of the verb 'know', i.e. they might agree with a claim, 'Agent A knows that p', even if 'p' expresses a false proposition, like 'People in medieval times knew that Earth was flat'. This seemingly irrational tendency, however, turned out to be only apparently inconsistent - when presented with a paraphrasing question, most subjects no longer claimed that people really 'knew' the Earth was flat, but rather that the protagonist merely believed they knew the Earth was flat.

Buckwalter's data has shown that given a widespread social misconception laypeople are readily taking the position of the protagonist and attributing knowledge from that perspective. Our study is aimed at testing whether the scale of the misconception makes a difference in the appearance of protagonist projection. In other words if a layperson is given a scenario of localized small scale misconception are they just as likely to accept (apparently) non-factive uses of factive terms as they are if given a large scale social misconception? The data shows that protagonist projection occurs predominantly in scenarios of widespread social misconception. When given a scenario of localized misconception protagonist projection is less likely to occur. This ultimately causes us to question whether or not philosophers are justified in using the psychological phenomenon of protagonist projection to explain away the attribution of knowledge in Gettier and Gettier-style Cases, as they involve a "local" cognitive perspective. We also tested two famous Gettier-style cases from Alvin Goldman, the Fake Barns Case (Goldman,

1976) and the Thermometer Case and found very little protagonist projection, with majority of laypersons strongly attributing knowledge, against the consensus among epistemologists. This is an ongoing research project, where we are preparing more material that will be used to test the mechanics of protagonist projection with regards to scalable misconceptions.

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Julian Zubek, Łukasz Jonak, Dariusz Plewczynski and Joanna Raczaszek-Leonardi - COMMUNICATION AS MUTUAL CONSTRAINT: CONCEPTUAL FRAMEWORK FOR MODELING COLLECTIVE COGNITIVE SYSTEMS

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As social animals, we have always been living among – and as part of – various collective cognitive systems. With time, such systems became increasingly collective and heterogeneous. Internet is the most vivid example. Massive network infrastructure allows unprecedented communication between very diverse groups of individuals. Various technological mechanisms and algorithms mediate this communication, but also begin to participate in it as artificial actors shaping and producing content. Our understanding of the world becomes, consequently, not ours alone; it is a product of symbiotic relationship of multiple human and artificial cognitive agents (Clark 1998). It is not obvious how to conceptualize systems characterized by such cognitive symbiosis effectively, while respecting their complexity and heterogeneity. Here we tackle this problem by introducing a theoretical framework for understanding, modeling and designing collective cognitive systems, inspired by enactivism and dynamical systems theory.

The conceptual framework we aim at should be as universal as possible; it should allow to model systems comprising of agents of various kinds: cooperating humans, humans and animals (e.g., shepherd dogs), humans and digital agents etc., while still capturing important differences between agents' modes of operation. Traditionally cognitive agents are conceptualized in terms of the internal information-processing capabilities (Newell 1972, Fodor 1983, Pinker 2009) and the communication among systems is usually framed in a so-called conduit metaphor, where one system's output becomes another system's input, etc. Here, in order to avoid still heated and unresolved debates about the nature of individual internal cognitive processes, we take an enactivist perspective on extended and distributed cognition (Clark 1998, Hutchins 1996). The way the systems coordinate is not through the content of agents' heads, but through the fact that they all function in a common environment, where all their actions are interdependent. Collaboration between agents in such environment can be described in terms of mutual bindings of agents' degrees of freedom from which the coordinated behavior emerges (Pattee 1972).

We understand an agent as an actor which acts upon its environment. Agents are treated like black boxes in cybernetics: their internal architecture is of no interest to the model, what matters is how they interact with each other and their surroundings. Depending on the scope and granularity of the model, agents may correspond to single cells, people, computer

programs, telecommunication systems, nations, etc. Ultimately, it is a decision of the modeler which phenomena will constitute “an agent”, but consistency within a single model is necessary.

A set of constraints binding agent’s degrees of freedom is modeled as context in which the agent operates. This is a very broad category which may encompass physical abilities of an agent to act in a given environment, knowledge and beliefs directing agent’s actions, social conventions etc. Some parts of the context may be shared among the population of agent and some related to individual characteristics of a given agent. It is important to stress that constraints forming the context always arise as a product of the relation between agent and its environment, and have no meaning when these two are separated.

As an example, let us think about social media where content presented to the user is highly customized. We can portray the user and the algorithm generating her news feed as a collective system of two agents. User’s context contains her interests and her network activity: pages she visits, comments she writes, content she shares, etc. The algorithm operates in the context of goals determined by the social portal owners, and its capabilities of content filtering. A designated part of the context is shared between the two agents in the form of customization settings available to the user (for example, user may be allowed to limit the amount of personalized advertisement). The emergent result of system operation is the customized news feed shaped by the behavior of both agents.

This rudimentary definition of heterogeneous cognitive systems in terms of availability, mutual constraint and binding of degrees of freedom creates a promising perspective for investigating the collective processing of cognitive tasks. It also opens some interesting avenues of inquiries into the mechanisms and modes of functioning of agents and systems. For example, when the diversity of agents and cognitive styles is beneficial for the functioning of the whole system, and when it becomes an obstacle? What are possible roles the agents may perform within the system? How different allocation of resources between external and internal contexts affects systems functioning?

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NOTES

This image shows a full page of white paper with horizontal dotted lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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