

**Consciousness in a Natural and Cultural
Context (CNCC)**

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**Posters
(tentative)**

(Re-)conceptualisation in autism

Hollie Burnett, University of Hull (Boundaries)

Abstract to be included.

Metacognition and modality

Mehmet Cakmak, University of Salzburg (METACOGNITION)

Abstract to be included.

Reachability judgments change in a short period of time, irrespective of tool use

Denise D.J. de Grave, Eli Brenner, Jeroen B.J. Smeets, VU University Amsterdam (CEWR)

The judged distance one can reach (reachability) is generally larger when a tool can be used to reach for an object than without using a tool. In this study we investigated whether use of the hand or a tool, in depth or in the fronto-parallel plane affects reachability judgments differently. Subjects were asked to judge whether they would be able to touch a cylinder with their hand, without actually stretching out their hand. They performed 10 blocks of reachability judgments in 2 days. Between blocks, subjects moved the cylinder with a tool or with their hand several times back and forth between locations close to the body (either in depth or in the fronto-parallel plane). No differences in reachability thresholds were found after the hand or the tool was used to move the cylinder. Nor did we find differences in thresholds after movements in depth and in the fronto-parallel plane. However, reachability judgments changed over time: during the blocks on the first day reachability thresholds of subjects changed significantly. The next day subjects started out with a reachability threshold that was significantly different from the start value on the first day. Subjects' thresholds changed in the same direction as on the first day. We conclude that, irrespective of tool or hand use, reachability judgments are not constant within a subject, but can change in a very short time.

Logical constraints on metacognition

Simone Duca, University of Bristol (METACOGNITION)

My research addresses key questions such as the following: What are the kinds of introspective capacities that rational agents in principle can and cannot have? What formal limitations apply to metacognition? What is going to happen when an agent tries to make each of her implicit, dispositional states of belief explicit? In order to do that my analysis draws on theories of belief change, non-monotonic reasoning and probability logic. Within this framework, I examine two major problems:

- i. Under which respects the revision of beliefs by factual information differs from the revision of beliefs by introspective and conditional information and
- ii. How introspective processes might interfere with dispositional processes of revision and inference and whether introspection could be a means of avoiding potential inconsistencies.

Promising results have been obtained concerning both issues:

(i). In a recently published paper, I defend Adams' semantics for indicative conditionals as a better starting point for understanding how rational agents revise their beliefs by conditional information than other pragmatic approaches. This seems to have interesting consequences, though still in need of careful examination, concerning some popular accounts of conditional reasoning, such as relevance theory (Sperber et al.), probabilistic data-selection approach (Oaksford, Chater) and evolutionary psychology (Cosmides et al.).

(ii) In a second co-authored (with Hannes Leitgeb) paper, we show that an impossibility result by A. Fuhrmann - which entails that rational agents cannot have complete sets of metabeliefs of the form "I believe that I believe that A" and "I believe that I consider it possible that A" - rests on flawed assumptions concerning how introspection should work. In particular, we claim that Fuhrmann possibly overlooked the fact that modal judgments expressing the closure under introspection of belief sets are *context-sensitive*, i.e. their meaning depends on which set of beliefs they refer to. More generally, modal operators behave "like indexicals" in the sense that as we say that an indexical can refer to different people according to different occasions, so we may want to say that what is possible in some possible worlds, it is not in some others. Therefore, one cannot "jump" from one set of beliefs to a different one, without specifying the context of the relevant modal operator accordingly. If this assumption is made explicit, the proof of Fuhrmann's theorem is blocked. This is done by means of a new set of amended axioms for doxastic introspective agents. Furthermore, we provide a concrete model to show that the axioms are jointly consistent. However, it turned out that this construction is still in need of improvement and clarification. One of my research goals for the near future is to pursue that analysis by trying to develop a whole theory of belief sets as presented by terms, rather than belief sets *simpliciter*: agents would reflect on their belief states by making the belief state that they reflect on explicit, such that their epistemic access to their own belief states would be mediated by these explicit representations. Such reflective agents would also be required to satisfy an array of rationality postulates, which is yet to be discovered. If successful, this enquiry will shed new light on both the logic and philosophy of introspection.

Looking for neurophysiological substrates of metacognition

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Social cognition is the study of how social information is encoded, stored, retrieved and applied to others and self in social situations. Metacognition refers to the cognitive control and monitoring of subjective uncertainty in "first-order" cognitive processes. This self-evaluative function of metacognition, present in macaques and dolphins, is taken to be an evolutionary precursor of mindreading, as well as a precondition for cooperation. An important area of research is developing to distinguish metacognitive from (self-directed) mindreading skills. The metacognitive evaluation of subjective uncertainty can be explored either by requesting subjects to offer verbal reports on their performance, or by offering them the possibility to require additional information at a cost. While verbal report is taken to tap on mentalizing self-attribution, behavioural information request might be under the direct influence of metacognitive evaluation and might be reflected in neurophysiological activity.

A 64 channels EEG setup was used for ERP recordings during a visual task of varying difficulty in a paradigm of "face-target detection". Streams of scramble masks randomly including a face-target in 50% of the cases were presented to 10 subjects (1920 trials/subject). Task difficulty was manipulated by varying the duration of presentation of both scramble masks and face-targets which composed the visual stream. Durations were chosen to vary task difficulty from chance level to obvious presence. Subjects had to detect a face in the stream of visual masks in either a two "Alternative Forced Choice" or a "Metacognitive" one randomly drawn for each trial. The former (AFC) requires a forced choice between a

“seen” or “unseen” response while the later allows a third alternative choice corresponding to a “Supplementary Information Request”. In this case, the sequence is presented again with a longer duration of the stream events for which an AFC is finally imposed.

PRELIMINARY RESULTS

For both the AFC & Metacognitive situations, performance increased with duration when a face-target was presented and the number of requests for supplementary information decreased, indicating that subjects became more confident as the task became easier. In contrast, when no face was presented the number correct rejections were independent of stimulus duration for both the AFC & Metacognitive situations indicating that subjects confidence remains stable. This difference between the face-absent and face-present trials reveals a fundamental asymmetry in subjective uncertainty: confidence increases with increasing durations in the face-present situation, but not in the face-absent situation. Preliminary ERPs analyses for AFC versus Metacognitive comparison suggest that P300 amplitude could be higher for the metacognitive situation, which would support the idea that more information is processed for the latter. Further results will be provided and discussed during the meeting.

Categorization of morphed figures: Do we process the non-dominant object?

Mijke O. Hartendorp, Stefan Van der Stigchel, Albert Postma, Utrecht University (Boundaries)

We investigated context influences on object categorization under conditions of perceptual uncertainty. To create perceptual uncertainty, morphed figures were used which were created by merging two objects. In these morphed figures one of the morphed objects is the dominant object and the other is the non-dominant object. Typically, observers give a single, explicit interpretation of the morphed figures corresponding to the dominant object. However, this does not inform us to what extent the non-dominant object is processed. Influences of context could help answering this question. Morphed figures had to be identified in a two-choice discrimination task. They were preceded by either congruent prime words (corresponding to the dominant object), incongruent prime words (corresponding to the non-dominant object) or unrelated prime words. Congruent primes facilitated object identification. Interestingly, when the dominant response alternative was combined with the non-dominant response alternative clear interference was found, in particular when preceded by an incongruent prime. These context effects suggest co-activation of the non-dominant object when dealing with the perceptual uncertainty created by morphed figures. Both the dominant and non-dominant object are considered as possible response candidates of which the most stimulated one will reach the level of categorization as a result of response competition.

Do experiences have egocentric spatial contents?

Julian Kiverstein, PPLS, University of Edinburgh (CONTACT)

According to the two visual systems (2vs) hypothesis the human and primate brain contains two functionally dissociable visual systems, a vision for perception system and a vision for action system. The vision for perception system has as its function making information available for report, recall and planning of action. The vision for action system, by contrast, has the function of controlling and guiding motor behaviour. The 2vs hypothesis claims that visual experiences have representational contents that abstract away from an individual's egocentric point of view to represent things and their properties using scene-based or egocentric coordinates. In this poster I will show how an experience could play a role in report, recall and planning without abstracting away from a subject's egocentric point of view. I will consider where this leaves the central claim of the 2vs hypothesis that vision for perception is distinct from vision for action given that egocentric space is the space within which we perceive an act.

Switching dynamics of border ownership: a stochastic model for multi-stable perception

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The stochastic nature of perception is modeled using “face or vase” stimuli. The border-ownership (BOWN) is computed and its 2-D integration determines the figure-ground relationships. Random numbers are multiplied to the BOWN signals and feedback connections skew the probability density function in favor of the figure. This enhances the figure-ground segregation. Adaptation results in a decay of the response which leads to alternation. This triggers recovery of the adaptation.

The alternation rate decreases in response to the increased levels of disambiguation. With intermittent presentation, due to the recovery not only during the blank periods but also during the periods when the model is giving the opposite figure-ground relationship to the current response, the model shows the prolongation of the alternation as shown in other cases of bi-stable perception. In this framework, the adaptation and the recovery processes need to be perception dependent (not physical input dependent) to reproduce human perception.

Children understanding identity statements

Bibiane Rendl, Lisa Meitner, Josef Perner, University of Salzburg (METACOGNITION)

We investigated children's ability understanding identity statements, for example, that Susie's mother is the teacher. Performance of 59 3- and 4-year-old children on an identity-question ("Who is Susie's mother?") in relation to a control-question ("Who is Susie's mother searching for?") was analyzed. The identity-condition (including the identity-question) deals with Susie's mother who is the teacher and the control-condition (including the control-question) is about Susie's mother who is searching for the teacher.

Results revealed that 3-year-olds did better on the control-question than on the identity-question, whereas 4-year-olds showed no significant difference. Children's performance improved significantly with age only on the identity-question.

Situated normativity: the normative aspect of embodied cognition in unreflective action

Erik Rietveld, University of Amsterdam (CONTACT)

In everyday life we often act adequately, yet without deliberation. For instance, we immediately obtain and maintain an appropriate distance from others in an elevator. The notion of normativity implied here is a very basic one, namely distinguishing adequate from inadequate, correct from incorrect, or better from worse in the context of a particular situation. In the first part of this paper I investigate such 'situated normativity' by focussing on unreflective expert action. More in particular, I use Wittgenstein's examples of craftsmen (tailors and architects) absorbed in action to introduce situated normativity. Situated normativity can be understood as the normative aspect of embodied cognition in unreflective skillful action. I develop Wittgenstein's insight that a peculiar type of affective behaviour, 'directed discontent', is essential for getting things right without reflection. Directed discontent is a reaction of appreciation in action and is introduced as a paradigmatic expression of situated normativity. In the second part I discuss Wittgenstein's ideas on the normativity of what he calls 'blind' rule-following and the 'bedrock' of immediate action. What matters for understanding the normativity of (even 'blind') rule-following, is not that one has the capacity for linguistic articulation or reflection but that one is reliably participating in a communal custom. In the third part I further investigate the complex relationships between unreflective skillful action, perception, emotion, and normativity. Part of this entails an account of the link between normativity at the level of the expert's socio-cultural practice and the individual's situated and lived normativity.

Escape from meta-ignorance: how children develop an understanding of their own lack of knowledge

Michael Rohwer, Daniela Kloo, Josef Perner, University of Salzburg (METACOGNITION)

Two experiments were conducted to study children's metacognitive development. In Experiment 1, 3-to 7-year-old children were presented with complete knowledge about a hidden object, total ignorance about a hidden object, or they were allowed to see a selection of two objects at the beginning of a task, out of which one was subsequently hidden. Even 3-year-old children achieved very high performance rates both in the total ignorance task and the complete knowledge task. But on the other hand, only children older than 6 years were able to reliably assess their epistemic state in the task setting, with the selection at the beginning. One explanation for children's overestimation of their own knowledge in this condition, might be that children younger than 6 years may use an immature, action-based theory of knowledge, and therefore only take into account if they can come up with an answer, and consequently equate this ability with knowledge. In Experiment 2, children continued to show this tendency even when more objects were shown in the selection phase.

Why we don't need global body representations

Adrian J.T. Smith, University of Mainz (CONTACT)

What is the relationship between bodily experience and the unity of the body? In exploring potential answers to this question, it is worth separating two claims: that bodily experience has a characteristic unity; bodily experience involves the experience of a unity. I argue that we can endorse the latter without endorsing any version of the former. For the sake of the argument I endorse a "thin" conception of bodily experience, on which we experience no more of our bodies than what can be in the focus of our attention, namely body parts. I then argue that one experiences parts of one's body in particular ways that reflect their situation in the whole. And, finally, I offer an explanation of how subjects are able to experience their body parts in those particular ways, without having a unified experience of the body as a whole.

Towards integrating emotion into accounts of cognition

Mog Stapleton, University of Edinburgh (CONTACT)

The argument in this paper is that cognition cannot be separated from emotion at the neural level, the psychological/functional level, and the phenomenological level. I do this by presenting evidence from neuroscience that the traditional distinction between emotion and cognition is not evident in either structural or functional analyses of the brain (Pessoa 2008). I then outline a model of the self-regulating brain (Lewis & Todd 2007) that maps the folk psychological notions of emotional response and cognitive interpretation onto the vertical dimension of the neuroaxis. Finally, I sketch a phenomenological account of mood as a structure of experience (Ratcliffe in Press) in which cognition is embedded. I conclude that given the inseparability of emotion from cognition at these three fundamental levels of cognitive science, emotion should be integrated into all accounts of cognition.

Metacognitive aspects of identity statements – an fMRI study

Benjamin Weiss, Josef Perner, Markus Aichhorn, University of Salzburg (METACOGNITION)

The mind taking a certain perspective on the world is a core aspect of theory of mind reasoning. While left temporoparietal junction (lTPJ) is active in perspective computation for mental and non-mental objects, right temporoparietal junction (rTPJ) is selectively active for mental objects like belief (Aichhorn et al., 2006; Perner et al. 2006). We contrasted identity statements requiring the revision of one's belief as well as maintaining different "modes of presentation". rTPJ clusters responded reliably to awareness of belief revision. lTPJ clusters additionally tended to respond to different "modes of presentation". The common meta-representational aspect to which lTPJ responds may be the representation of differences in perspectives created by a difference in viewing angle, in belief or in reference to an object. Additionally, different perspectives evoked by referentially ambiguous pronouns (Nieuwland et al., 2007) may explain overlapping activations found in their task and in our task.