Conference Agenda

19th NVP Dutch Society for Brain and Cognition Winter Conference

Session

Poster session 1

Time:
Thursday, 14/Dec/2023:
3:30pm - 5:15pm

Location: **Zuiderduinzaal**

Poster format: A0 landscape

Take off your poster immediately after the session

Presentations

ID: 101 / **Poster session 1: 1**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Methods and modelling

Deep Learning Disconnectomes to accelerate and improve Long-Term Predictions for Post-Stroke Symptoms

Anna Matsulevits[1,2], Pierrick Coupe[3], Huy-Dung Nguyen[3], Lia Talozzi[4], Chris Foulon[5], Parashkev Nachev[5], Maurizio Corbetta[6], Thomas Tourdias[7], Michel Thiebaut de Schotten[1,2]

[1]Groupe d'Imagerie Neurofonctionnelle, Institut des Maladies Neurodégénératives-UMR 5293, CNRS, CEA, University of Bordeaux, Bordeaux, France; [2]Brain Connectivity and Behaviour Laboratory, Sorbonne Universities, Paris, France.; [3]University Bordeaux, CNRS, Bordeaux INP, LaBRI, UMR 5800, 33400, Talence, France; [4]Department of Neurology and Neurological Sciences, Stanford University School of Medicine, Stanford, CA, 94305, USA; [5]Institute of Neurology, UCL, London, UK; [6]Clinica Neurologica, Department of Neuroscience, University of Padova, Padova, Italy; [7]Inserm-U1215, Neurocentre Magendie; CHU de Bordeaux, Neuroimagerie diagnostique et thérapeutique, Bordeaux France; anna.matsulevits@u-bordeaux.fr

Deep learning is revolutionizing a wide range of fields, making a significant difference in medical imaging where recent advancements have yielded remarkable outcomes. In a connected brain, maps of white matter damage — disconnectomes — are essential for capturing the effects of focal lesions. Here, we have achieved a significant milestone for clinical neuroimaging by accelerating and ameliorating the creation of disconnectome maps using deep learning.
We trained a 3D U-Net algorithm to produce *deep-disconnectomes* from binary stroke lesion masks. This artificial neural network was able to capture most information obtained in conventional disconnectomes, i.e., statistical maps filtering normative white-matter networks, but output a *deep-disconnectome* 170 times faster. The obtained *deep-disconnectomes* were challenged to predict cognitive and behavioral outcomes one-year post-stroke. In an additional cohort of N=139 stroke survivors, N=86 neuropsychological scores were predicted from *deep-disconnectomes* achieving, on average, 85.2% of accuracy and R^2= 0.208. The *deep-disconnectomes* predictivity power outperformed the conventional disconnectome predictions for clinical scores. By integrating deep learning into the management of stroke, one of the most prevailing catalysts for acquired disabilities, we deepen our understanding of its impact on the brain. This approach may offer potential avenues for acute intervention, ultimately enhancing patients' quality of life.

ID: 103 / **Poster session 1: 2**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Perception & Sensory Integration

Spatial factors influencing the pain ameliorating effect of CT-Optimal touch: a comparative study for modulating Temporal Summation of Second Pain

Larissa Lauren Meijer[1], Wouter Baars[1], H. Chris Dijkerman[1], Carla Ruis[1,2], Maarten J. van der Smagt[1]

[1]Utrecht University, Netherlands, The; [2]University Medical Centre, Utrecht, Netherlands, The; l.l.meijer@uu.nl

Recent studies show that CT-optimal touch can reduce pain. However, much is unknown regarding the factors influencing its pain ameliorating effect, such as tactile attention and touch application site. The current study investigates, in 36 healthy individuals, whether CT-optimal touch can reduce temporal summation of second pain (TSSP) compared to CT non-optimal touch and tapping the skin. All three conditions are applied on both the contralateral and ipsilateral side of pain induction. The results show that tapping the skin did not reduce TSSP, meaning that pain reduction through touch cannot be explained by tactile attention effects. CT non-optimal touch only reduced TSSP when applied on the ipsilateral side. Importantly, CT-optimal touch effectively reduced TSSP when applied on the contralateral and ipsilateral side. Furthermore, CT-optimal touch was more effective in reducing TSSP compared to CT non-optimal touch and Tapping when applied on the contralateral side. This effect was independent of perceived pleasantness. Interestingly, this difference between conditions was not present when CT-optimal touch was applied on the ipsilateral side. This study shows that that CT-optimal touch can reduce TSSP and this effect appears to be independent of touch application site, which is highly relevant for implementing CT-optimal touch as a treatment.

ID: 105 / Poster session 1: 3
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Attention

The current top-down attentional set is shaped by previous selection episodes

Changrun Huang[1,2], Dirk van Moorselaar[1,2], Mieke Donk[1,2], Joshua Foster[4], Jan Theeuwes[1,2,3]
[1]Department of Experimental and Applied Psychology, Vrije Universiteit Amsterdam; [2]Institute Brain and Behavior (iBBA), Amsterdam, the Netherlands; [3]William James Center for Research, ISPA-Instituto Universitario; [4]Department of Psychological and Brain Sciences, Boston University; c.huang@vu.nl

To date, it remains largely unclear whether, if at all, previous experiences can shape a top-down attentional set. To examine this, in an EEG experiment, we had participants perform a visual search task during the maintenance period of a spatial memory task, which served as a proxy for top-down attention. Critically, during the search, the singleton distractor appeared with a higher probability at a given location. The search was more efficient when distractors appeared at this location, suggesting that the high probability distractor location was suppressed. To characterize the interaction between top-down attention and selection history, we adopted a forward encoding approach to reconstruct the tuning profile of the memorized position. Forward modeling yielded reliable tuning profiles during memory maintenance that gradually decayed but critically revived again by the onset of a neutral placeholder display preceding the search. Consistent with behavior this tuning profile evoked by the placeholder display exhibited a scaling effect contingent upon the relative distance from the high-probability location. Intriguingly, however, locations proximal to the high-probability location were not attenuated but instead displayed more pronounced tuning. These results provide insight into how learned attentional biases are implemented and highlight the dynamic interplay between different sources of attentional control.

ID: 106 / Poster session 1: 4
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Attention

The electrophysiological markers of statistically learned attentional enhancement: evidence for a saliency based mechanism

Dock Duncan[1,2], Jan Theeuwes[1,2,3], Dirk van Moorselaar[1,2]
[1]Vrije Universiteit Amsterdam, Netherlands, The; [2]Institute for Brain and Behavior Amsterdam, the Netherlands (iBBA); [3]William James Center for Research, ISPA-Instituto Universitario, Lisbon, Portugal; d.h.duncan@vu.nl

It is well established that attention can be sharpened through the process of statistical learning – e.g. visual search becomes faster when targets appear at high-relative-to-low probability locations. Despite its popularity for nearly two decades, little is known about the electrophysiological correlates of this statistically learned attentional enhancement. In the current study, EEG data was collected while participants searched for an ambiguous unique shape in a visual array (the additional singleton task). Unbeknownst to the subjects, targets appeared more frequently in one location in space for long periods of time (probability cuing). The resulting encephalographic data showed no signs of well-known markers of proactive top-down attentional deployment (alpha lateralization and several preparatory ERP's), indicating this form of learned enhancement differs fundamentally from top-down attention. The target evoked N2pc, however, was reliably larger in amplitude at high-probability locations – a result which suggests items in this location were perceived as more salient. Together with earlier work supporting the activity-silent nature of statistically learned enhancement, the current results begin to characterize the cognitive mechanisms underlying experience driven attentional enhancement as being synaptic in origin, and operating via shifting latent saliency in the putative spatial priority map.

ID: 109 / Poster session 1: 5
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Perception & Sensory Integration

Adaptation to numerosity changes monotonic responses of early visual cortex

Liangyou Zhang[1], Evi H.H. Hendrikx[1], Yizhen Wang[2], Surya Gayet[1], Serge O. Dumoulin[3], Ben M. Harvey[1]
[1]Utrecht University, Utrecht, Netherlands; [2]South China Normal University, Guangzhou, China; [3]Spinoza Centre for Neuroimaging, Amsterdam, Netherlands; l.zhang6@uu.nl

The 'number sense' is a cross-species ability to automatically and rapidly estimate numerosity, the number of visual objects. The numerosity in recently displays affects the perceived numerosity of current displays: numerosity adaptation. Which changes in the brain's response to numerosity underlie numerosity adaptation? Numerosity-tuned responses peak at different (preferred) numerosities in different neural populations. Using 7T fMRI, we have recently shown that these preferred numerosities are affected by numerosity adaptation. Furthermore, responses in early visual neural populations monotonically increase with numerosity. We have recently shown these monotonic responses begin in V1 and follow the spatial frequency domain contrast of numerosity displays more closely than their numerosity. The close relationship between numerosity and this contrast may allow straightforward numerosity estimation from early visual responses. Here we show that the amplitude of these early visual monotonic responses is reduced by adaptation to high numerosities, consistent with perceptual adaptation effects where perceived numerosity is likewise reduced. This effect increases through the early visual hierarchy of early visual field maps from V1 to V3, hV4, V3A/B and LO1-2, where numerosity-tuned response emerge. These results imply that numerosity adaptation effects on perception and numerosity-tuned neural populations may begin in early visual responses to image contrast.

ID: 110 / Poster session 1: 6
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Learning & Memory

Neural and ocular responses to salient stimuli as classifiers in concealed information testing

Robbert van der Mijn, Elkan Akyurek
University of Groningen, Netherlands, The; robbertmijn@gmail.com

Classic Concealed Information Tests (CIT) are notoriously susceptible to deception. In a relatively novel paradigm, this problem is addressed by presenting stimuli "on the fringe of awareness": in Rapid Serial Visual Presentation (RSVP). If the information the subject is trying to hide is salient enough, being presented this information will evoke a neurophysiological response that is discriminable from responses to neutral information. Because of the rapid nature of the RSVP, a subject will not have anough time to mask this physiological response. However, participants will potentially recognize neutral stimuli and display a response similar to the probe information. Furthermore, the balance between true and false positives are underemphasized in studies investigating CIT. Here, we present an experiment in which participants are probed with either the face of one of their parents, or an unknown face. We use EEG and pupillometry to determine if the participants saw the probe or an unfamiliar face. Using this method of comparison, we aim to optimize the balance between true and false positives of our method. Results from this study can be used to design CIT for practical applications, in which knowledge of the reliability of a particular session is crucial.

ID: 112 / Poster session 1: 7
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Cognitive control and executive function

Frontal theta power predicts response inhibition

Daan van Rooij, Sam van Bijnen, Iris Schutte, Nathan van der Stoep, J. Leon Kenemans
Experimental Psychology, Helmholz Institute, Utrecht University, Netherlands; d.vanrooij@uu.nl

Frontal theta power is considered an important mechanism for cognitive control (Cavanagh & Frank, 2014). In our model proposed in (Kenemans, 2015), we postulate that response inhibition has a proactive cognitive-control component. We hypothesize that proactive cognitive control manifests in frontal theta power preceding a countermanding go-stop event in a stop-signal task. We examined the association between theta power, stopping success, and stop rates.

Behavioral and EEG data were collected in two samples of neurotypical participants performing a stop-signal task with auditory or visual stop signals. In both samples frontal theta power was significantly stronger preceding successful relative to failed stop trials. Furthermore, theta power was negatively associated with stop-signal-reaction times (SSRT) across participants, but not with go trial response times. These results confirm the hypothesis that theta power reflects proactive inhibitory control, and that this is specific to the extent that theta was not associated with the speed of go reactions.

ID: 113 / Poster session 1: 8
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Development

In utero exposure to antidepressants or maternal depressive symptoms and offspring white matter development from late childhood to adolescence

Dogukan Koc[1], Hanan El Marroun[1,2], Ryan Muetzel[1], Henning Tiemeier[1,3]
[1]Department of Child and Adolescent Psychiatry/Psychology, Erasmus MC, University Medical Center Rotterdam, Rotterdam, the Netherlands; [2]Department of Psychology, Education and Child Studies, Erasmus School of Social and Behavioral Science, Erasmus University Rotterdam, Rotterdam, the Netherlands; [3]Department of Social and Behavioral Science, Harvard T. H. Chan School of Public Health, Boston, MA, USA; elmarroun@essb.eur.nl

Background: We aimed to explore the potential association between prenatal selective serotonin reuptake inhibitors (SSRI) exposure and maternal depression during pregnancy with white matter microstructure in offspring from childhood to adolescence, utilizing a population-based birth cohort.

Methods: Self-reported SSRI use was verified and complemented by pharmacy records. In mid-pregnancy, women reported on depressive symptoms using the Brief Symptom Inventory. Using diffusion tensor imaging, white matter microstructure (whole-brain and tract-specific fractional anisotropy (FA) and mean diffusivity (MD)) was repeatedly assessed between ages 7 to 15 years (n=2978 with 4552 scans).

Results: Both intrauterine exposure to SSRIs and depressive symptoms were associated with lower whole-brain FA and lower FA in the forceps minor at age 7 years. Higher prenatal depressive scores were also associated with lower FA in the uncinate, cingulum, superior and inferior longitudinal fasciculi, and corticospinal tracts at mean age. Over the follow-up period from 7 to 15 years, children exposed to prenatal depressive symptoms showed a faster increase in FA in these white matter tracts.

Conclusions: This longitudinal cohort study suggests that prenatal exposure to maternal depressive symptoms was negatively associated with white matter microstructure in childhood, but these differences attenuated during development, which could potentially suggest catch-up growth.

ID: 114 / **Poster session 1: 9**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Attention

How do professors of psychology in the Netherlands view the relation between scientific knowledge, applicability, and societal relevance?

Gijs Holleman[1], Ignace Hooge[2], Chantal Kemner[2], Roy Hessels[2]
[1]Tilburg University, Netherlands, The; [2]Utrecht University, Netherlands, The; g.a.holleman@tilburguniversity.edu

Is psychology lacking in practicality and societal relevance? According to a recent critique, psychology's dominant focus on fundamental research and laboratory experiments (i.e., especially in experimental psychology and cognitive neuroscience) has come at the cost of societal relevance. Should researchers shift their interest from basic research to applied problems and societal issues instead? In this study, we interviewed 13 professors of psychology from departments of experimental, social, developmental, and clinical (neuro) psychology in the Netherlands to gauge their views about psychology its relevance to society. Interviewees engaged in different activities to engage science with society, from work in clinical practice, to consultancy, education, and science communication. As such, there seems to be a discrepancy between the general concerns about a lack of practicality and societal relevance in the literature, and the various public and societal roles that participants engaged in. Overall, interviewees regarded psychological theories as relevant to general contexts of application, but that most theories were not directly related to specific applications. Moreover, while most interviewees stated that societal relevance is important, some also argued that too much focus on current societal issues (e.g., by universities and funding agencies) may hamper psychology's benefits to society in the long run.

ID: 115 / **Poster session 1: 10**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Learning & Memory

The EEG maze: Studying cortical and subcortical activity of reward feedback at high spatial and temporal precision

Celina Pütz[1,2], Natasha Maurits[2], Monicque Lorist[1], Martien Kas[1]
[1]University of Groningen, The Netherlands; [2]University Medical Center Groningen, The Netherlands; c.putz@rug.nl

Processing feedback information from our environment allows us to learn to adapt our behaviour and to match environmental circumstances. Scalp-recorded electroencephalography (EEG) work has shown that the neural activity underlying feedback processing occurs within tens to hundreds of milliseconds after the onset of feedback presentation, but this methodology provides little information about brain activity in key subcortical regions. We developed a visual learning paradigm in mice that was designed to mimic a human computer-based EEG experiment to overcome this limitation. Mice underwent daily testing sessions in a Y-shaped maze during which the animals had to learn that approaching one of two visual stimuli would yield a food pellet reward. Neural activity was recorded using a wireless mouse EEG system on surface electrodes *and* subcortically placed depth electrodes simultaneously. Infrared beams placed inside the maye allowed us to time-lock specific events in the experiment to the EEG signal for subsequent electrophysiological analyses. All animals learned the visual reward association after an average of five testing sessions, and EEG analyses are currently being performed. Taken together, our setup provides an innovative translational approach in mice to establish high resolution spatiotemporal brain activity patterns elicited by the reception of feedback during visual learning.

ID: 116 / **Poster session 1: 11**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Action

Continuous visual guidance of the moving hand

Eli Brenner, Jeroen B.J. Smeets
Vrije Universiteit Amsterdam, Netherlands, The; eli.brenner@vu.nl

People look at a target when they want to reach for it. Doing so helps them continuously update their judgments about the target's position and motion. But not looking at their hand does not prevent people from updating judgments about its position on the basis of visual information: people respond to experimental perturbations of visual information about the position of their hand. Here, we study such responses by adding jitter to the movement of a cursor that follows participants' fingers. We analyse the response to the jitter to reveal how the vigour of the response depends on the moment at which the cursor changes its position. We compare the change in vigour to that for equivalent jitter in the position of the target. We find that participants respond to jitter in the position of the cursor in much the same way as they respond to jitter in the target's position. The responses are more vigorous late in the movement, when adjustments need to be made within less time, but similarly so for the cursor as for the target. The responses are weaker for the cursor, presumably because of the jitter-free kinaesthetic information about the position of the finger.

ID: 117 / **Poster session 1: 12**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Social Cognition

Implicit social attunement & alcohol use: the effect of peer feedback on willingness to drink in social settings

Emese Kroon[1,2], Ran Zhang[1], Karis Colyer-Patel[1], Alix Weidema[1], Doğa Ünsal[1], Helle Larsen[2], Janna Cousijn[1]
[1]Erasmus University Rotterdam, Netherlands, The; [2]University of Amsterdam, Netherlands, The; kroon@essb.eur.nl

Social cognition appears to play an important role in alcohol consumption in social settings, with the presence of other drinkers being associated with heavier use. Aside from explicit peer pressure, implicit social attunement (ISA) to peers is likely to play an important role herein. This study assessed how willingness to drink is affected by the social setting and peers' willingness to drink in these settings, and whether ISA in different social settings is associated with alcohol use and related problems in a sample of 16–60-year-old alcohol users (N = 506, 60.1% female). Willingness to drink was highest in social settings where others consumed alcohol. Regardless of setting, peer feedback indicating lower willingness to drink induced larger ISA than peer feedback indicating higher willingness to drink. Higher ISA to higher peer willingness to drink in social settings in which alcoholic or non-alcohol beverages were consumed was associated with higher alcohol use and related problems. Higher ISA to lower peer willingness to drink in social settings in which no beverages were consumed was associated with lower alcohol use and related problems. Hence, ISA to peer feedback can act as protective or risk factor for alcohol use depending on the social setting.

ID: 118 / **Poster session 1: 13**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Learning & Memory

Comparing neural correlates of foveally and peripherally encoded memories

Güven Kandemir, Chris Olivers
Vrije Universiteit Amsterdam, Netherlands, The; g.kandemir@vu.nl

Vision worsens towards the periphery, as both bottom-up sensory feedforward routes and top-down attentional feedback loops privilege foveal over peripheral stimuli. Considering the significance of perceptual and attentional mechanisms for visual working memory (vWM), we investigated whether and how eccentricity affects vWM representations. Thirty participants memorized and recalled orientations presented either at the center of the screen or at 15° eccentricity to the left or right. Simultaneously, EEG activity and gaze position were recorded. Behavioural results showed a small advantage for foveally encoded items, which were remembered more frequently and precisely. Multivariate analyses of the EEG revealed that during encoding, peripheral stimuli were in fact untraceable from posterior electrodes, while there was a clear signal for foveal items. During early maintenance, vWM representations were equally strong for foveal and peripheral locations, with no discernible generalization, suggesting equivalent but location-specific involvement from top-down mechanisms. Later in the maintenance period, these earlier signals disappeared, while spatially generalized memory representations emerged in alpha power. Moreover, these transformed representations remained accessible through impulse-driven perturbations, unveiling the underlying memory state. The eccentricity-driven dissociation between disparate sensory and common maintenance representations indicates that storage activity patterns as measured by EEG reflect signals beyond primary visual cortex.

ID: 120 / **Poster session 1: 14**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Learning & Memory

What is learnt during statistical learning?

Ilayda Nazli, Matthias Ekman, Floris de Lange
Donders Center for Cognitive Neuroimaging, Netherlands, The; ilaydanazli@gmail.com

Our world is full of repetitive structures. Therefore, it is essential to form associations between events to make predictions about the future. Observers can detect and acquire these regularities from the environment automatically and incidentally in the absence of rewarding/punishing outcome or feedback. This form of learning is known as statistical learning (Saffran et al., 1996). Previous studies in statistical learning show that observers learn the strong predictive association between events (i.e., conditional probability). Yet a recent study by Leshinskaya and Thompson-Schill (2021) suggests that participants learned associations between events not based on their conditional probability but rather based on their unique predictive relations. The unique predictive relations between events can be defined by ΔP (i.e., ΔP=P(X|A)-P(X|~A); Allan & Jenkins, 1980) or *DFH* (i.e., $DFH=\sqrt{P(X|A)xP(A|X)}$; Hattori & Oaksford, 2007) depending on how observers process the occurrence and non-occurrence of events. In the present study, we aim to understand which forms of uniqueness influence statistical learning using fMRI. We present pairs of visual objects by manipulating expectation in spatial domain, and we expect that prediction suppression in visual cortex varies across the two kinds of uniqueness, ΔP and *DFH*.

ID: 121 / **Poster session 1: 15**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Attention

Effort fundamentally drives saccade behavior

Christoph Strauch[1], Damian Koevoet[1], Laura Van Zantwijk[1], Sebastiaan Mathôt[2], Stefan Van der Stigchel[1], Naber Marnix[1]
[1]Utrecht University, Netherlands, The; [2]Rijksuniversiteit Groningen; c.strauch@uu.nl

What determines where we move our eyes? Tremendous work has been devoted to understanding oculomotor selection processes, but a large

portion of saccade behavior remains unexplained. We recently demonstrated that the effort associated with planning saccades is quantifiable with pupil size, a potent marker of noradrenaline release. For the first time, we here demonstrated that effort critically underpins saccade preferences. When participants chose between any two directions, participants strongly preferred those directions associated with low effort (R^2=0.53). Strikingly, this principle also held in a substantially less controlled setting: Saccade directions deemed to be effortful during visual search in natural scenes were disproportionally avoided when effort increased on a secondary auditory counting task (R^2=0.49). This implies that cognitive resources are flexibly (dis)allocated from and to oculomotor processes as resource demands change. Effort optimization of eye-movements provides an overarching theoretical explanation why many oculomotor metrics, such as microsaccades or smooth pursuits, differ under high cognitive demands. This shows how the brain precisely and flexibly monitors even the most subtle differences in resource expenditure to tune for resource-efficient behavior. We argue that eye-movement behavior is determined by stimulus material and goals, as well as a qualitatively distinct and fundamental predictor: effort.

ID: 122 / **Poster session 1: 16**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Attention

Non-image forming vision as measured through ipRGC-mediated pupil constriction is not modulated by covert visual attention

Ana Vilotijević, Sebastiaan Mathôt
University of Groningen, Netherlands, The; a.vilotijevic@rug.nl

The pupillary light response (PLR) is driven by all photoreceptors—rods, cones, and intrinsically photosensitive retinal ganglion cells (ipRGCs)—where rods and cones cause the pupil to immediately constrict in response to light, whereas ipRGCs cause the pupil to remain constricted for as long as light is on. Recent studies have shown that the initial PLR is modulated by covert attention; however, it remains unclear whether the same holds for the sustained PLR that is driven by ipRGCs. In our study, we investigated the effect of covert attention on the sustained PLR by leveraging the fact that ipRGCs are predominantly responsive to blue light, causing the most prominent sustained pupil constriction. We found that the pupil constricted more when covertly attending to bright as compared to dim stimuli (with the same color), thus replicating the effect of covert attention on the initial PLR. However, there was no difference in pupil size when covertly attending to blue or red stimuli (with equal brightness). Interestingly, such differences were noticeable when participants directly observed these stimuli. This indicates that covert attention does not influence the sustained PLR, suggesting that non-image forming vision, measured through ipRGC-mediated pupil constriction, remains unaffected by covert visual attention.

ID: 123 / **Poster session 1: 17**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Learning & Memory

Expectations about Retention Interval tune Forgetting in visual Working Memory

Joost de Jong, Sophia Wilhelm, Elkan Akyürek
University of Groningen, Experimental Psychology; joost.de.jong@rug.nl

We can only maintain about a handful of items in our working memory at the same time. Consequently, we need to forget outdated information to make room for new information. Humans can use explicit forgetting cues to forget, but they only work when they are highly reliable and they may not occur frequently in daily life. Nonetheless, our working memory does not overflow for lack of explicit cues. We hypothesize that implicit expectations about retention interval tune forgetting: When participants expect a brief retention interval, forgetting should be faster. In a set of visual working memory experiments, we systematically vary how 'probing hazard' evolves over time by sometimes probing an item and sometimes presenting a new item instead. In 'decreasing' blocks, participants were likely probed after one second, but less likely after three seconds, inducing the expectation of a brief retention interval. In 'increasing' blocks, this was reversed. Overall, we found that participants forgot more quickly when they expected a brief retention interval. In sum, even in the absence of explicit forgetting cues, humans can learn to forget information from visual working memory by the time it has likely become irrelevant, possibly freeing up room for newly incoming information.

ID: 125 / **Poster session 1: 18**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Language

Listeners converge to fundamental frequency in synchronous speech

Orhun Uluşahin[1], Hans Rutger Bosker[1,2], James M. McQueen[1,2], Antje S. Meyer[1,2]
[1]Max Planck Institute for Psycholinguistics, Netherlands, The; [2]Donders Institute for Brain, Cognition and Behaviour, Netherlands, The; orhun.ulusahin@mpi.nl

Convergence broadly refers to interlocutors' tendency to progressively sound more like each other over time. Recent empirical work has used various experimental paradigms to observe convergence in voice fundamental frequency (f0). One study used stable mean f0 over trials in a synchronous speech task with manipulated (i.e., high and low) f0 conditions [1]. Here, we attempted to replicate this study in Dutch. First, in a reading task, participants read 40 sentences at their own pace to establish f0 baselines. Later, in a synchronous speech task, participants read 80 sentences in synchrony with a speaker whose voice was manipulated ±2st above or below (i.e., for the high and low f0 conditions,

respectively) a reference mean f0 value. The reference mean f0 value and the manipulation size were obtained across multiple pre-tests. Our results revealed that the f0 manipulation significantly predicted f0 convergence in both high f0 and low f0 conditions. Furthermore, the proportion of convergers in the sample was larger than those reported by the original study we replicated [1], highlighting the benefits of stimulus optimization. Our study thus provides stronger evidence that the pitch of two talkers tends to converge as they speak together.

ID: 126 / **Poster session 1: 19**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Perception & Sensory Integration

Surprise impairs perception of surprising and incidental events

Emma K. Ward[1,2], **Clare Press**[1,2]
[1]Birkbeck, University of London, United Kingdom; [2]Wellcome Centre for Human Neuroimaging, UCL; e.ward@bbk.ac.uk

When environmental regularities change, new observations should be weighted more highly than old observations, to allow model updating in a changing world. Changes in environmental regularities influence learning rates, but it is unclear how these changes influence perception of the stimuli themselves. A recent theory suggests that surprising observations trigger a reactive noradrenaline release, increasing sensory gain. This would mean that environmental changes elicit a perceptual boost, facilitating updating.
To test this account, we asked whether detection of surprising events themselves, and other events, improves after a surprising observation. Participants in four online experiments (N=1172) saw stimuli presented peripherally and at fixation and were tasked with detecting features of those events. Peripheral stimulus location was drawn from a truncated normal distribution, the mean of which changed once without warning during the task.
We modelled surprise to ask whether the surprising distribution shift led to higher hitrates. The modelling showed instead consistently lower hitrates on trials with higher modelled surprise. This was observed for the peripheral stimuli, which were themselves surprising, and for other stimuli in the environment.
This finding suggests that surprising observations do not automatically increase sensory gain, and suggests instead that attentional resources are allocated to previously-informative features.

ID: 127 / **Poster session 1: 20**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Attention

Re-evaluating the PD as the EEG hallmark of proactive distractor suppression

Dirk van Moorselaar[1,2], **Jan Theeuwes**[1,2,3]
[1]Vrije Universiteit Amsterdam, Netherlands, The; [2]IBBA, Institute Brain and Behaviour Amsterdam; [3]William James Centre for Research, ISPA Instituto Universitario Lisbon Portugal; d.van.moorselaar@vu.nl

In recent years there has been renewed interest in understanding how the brain handles visual distractions, driven by discoveries suggesting that environmental regularities enable the proactive suppression of highly salient distractors. Research in this domain often relies on an early EEG signal positivity known as the P_D to investigate whether distractors can be filtered out before capturing attention (i.e., proactively). However, the interpretation of the P_D as a marker of proactive suppression is not without problems. In a series of experiments, we systematically varied key aspects of standard experimental designs. We explored how the response to distractors changed when expectations could no longer enhance task-relevant features, examined the modulation of the P_D by distractor saliency, and assessed to what extent visual properties of standard search displays contributed to a lateralized positivity in the EEG waveform. Our findings reveal that the distractor P_D cannot be unequivocally attributed solely to suppression; it also reflects the upweighting of target features and can be elicited by displays that do not necessitate suppression. These results underscore the need for a more nuanced interpretation of the P_D and highlight its complex relationship with attentional processes.

ID: 129 / **Poster session 1: 21**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Cognitive control and executive function

Concealed familiar face detection with eye movement and pupillometry

Ivory Y. Chen, **Sebastiaan Mathot**, **Elkan G. Akyurek**
University of Groningen, Netherlands, The; y.n.chen@rug.nl

In concealed information tests (CIT), presenting critical stimuli in rapid serial visual presentation (RSVP) can improve resilience against countermeasures. Under this paradigm, pupil dilation can serve as an indicative measure for concealed familiar face to a certain extent. In our study, we utilized a novel paradigm by combining RSVP with stimuli moving either towards the left or right, to capitalize additionally on eye movements for detecting concealed familiar faces. For each stream, participants maintained fixation at a central fixation dot throughout the experiment, only deviating their gaze to follow and respond when they identified a target face. Besides the target faces, a familiar face (their parents' face), or one of two control faces also appeared in these streams. Results indicated that participants' eye movement did not track the familiar faces or the control faces. However, pupil dilation exhibited a noticeable increase when familiar faces appeared, in comparison to control faces. We identified concealed information in 16 out of 29 participants – a substantial improvement from the 7 out of 31 that were previously

detected using the standard RSVP-based CIT. In conclusion, RSVP combined with lateral stimulus movement offers a more effective method for detecting concealed information.

ID: 130 / Poster session 1: 22
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Methods and modelling

Predicting human interleaving time in semi-automated vehicles

Christian P. Janssen[1], Leonard Praetorius[2], Jelmer P. Borst[2]
[1]Utrecht University, The Netherlands; [2]University of Groningen, The Netherlands; j.p.borst@rug.nl

In more advanced automated vehicles, humans sometimes need to respond to in-car alerts in a fast time to take over control from the automated vehicle. This is also referred to as a "take-over process". Previous experimental studies typically studied how isolated factors (e.g., alert modality, alert onset time) impact human behavior. We use a different approach. We have developed an interactive open-source tool, PREDICTOR, that can be used to predict the timing of various stages of a transition of control, or take-over, in semi-automated driving. The underlying framework builds on psychological theories and cognitive models of interruption handling. Our tool is coupled to an extensive database of previous take-over studies. PREDICTOR can be used to interactively predict through simulation how specific factors (e.g., alert modality, alert onset time) impact four distinct stages of the take-over response process. The tool simulates and visualizes expected reaction time distributions for each stage of the take-over process. The use of distributions also highlights the likelihood of an accident – as long responses ("outliers") are quantifiable. In general, our tool helps in quantifying psychological theory and its impact on real-world scenarios. For example, what are the odds of an accident?

ID: 131 / Poster session 1: 23
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Language

The syllable frequency effect before and after speaking

Julia Chauvet[1,2], Sophie Slaats[1], David Poeppel[1], Antje Meyer[2,3]
[1]Max Planck Institute for Psycholinguistics, The Netherlands; [2]Ernst Struengmann Institute for Neuroscience in Cooperation with Max Planck Society, Frankfurt, Germany; [3]New York University, New York City, USA; julia.chauvet@mpi.nl

Speaking requires translating concepts into a sequence of sounds. Contemporary models of language production assume that this translation involves a series of steps: from selecting the concepts to be expressed, to phonetic and articulatory encoding of the words. In addition, speakers monitor their planned speech output using sensorimotor predictive mechanisms. The current work concerns phonetic encoding and the speaker's monitoring of articulation. Specifically, we test whether monitoring is sensitive to the frequency of syllable-sized representations.

We run a series of immediate and delayed syllable production experiments (repetition and reading). We exploit the syllable-frequency effect: in immediate naming, high-frequency syllables are produced faster than low-frequency syllables. The effect is thought to reflect the stronger automatization of motor plan retrieval of high-frequency syllables during phonetic encoding. We predict distinct ERP and spatiotemporal patterns for high- vs. low-frequency syllables. Following articulation, we analyse auditory-evoked N1 responses that – among other features – reflect the suppression of one's own speech. Low-frequency syllables are expected to require more close monitoring, and therefore smaller N1/P2 amplitudes. The results can be important as effects of syllable frequency stand to inform us about the tradeoff between stored versus assembled representations for setting sensory targets in the production of speech.

ID: 132 / Poster session 1: 24
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Cognitive control and executive function

Pupil and EEG correlates of decision making and memory in a naturalistic driving task

Charlotte Askey[2], Christopher Madan[2], Matias Ison[2], Andrew Reid[1]
[1]Dept Cognitive Neuropsychology, School of Social and Behavioural Sciences, Tilburg University, Netherlands; [2]School of Psychology, University of Nottingham, United Kingdom; a.t.reid@tilburguniversity.edu

Global release of norepinephrine (NE) is proposed to subserve the execution of cognitively demanding decisions, and may also have a role in the encoding of emotional memory. Typical tasks to study these roles include trial-based designs such as oddball, flanker, or image encoding paradigms, but the behaviour of this system under naturalistic conditions is less well understood. In this study, we used pupil diameter (PD) as an (imperfect) estimate of NE release, combined with EEG in a naturalistic highway driving task. Participants were asked to make decisions in realistic traffic scenarios, while simultanously encoding road sign information for later retrieval. Luminance-corrected PD was higher for high versus low traffic and, when locked to overtake decision events, began to dilate 10s prior to the decision and peaked 1s afterwards. We also found an "error-related negativity" EEG potential locked to overtake onset, which was modulated by outcome valence (negative > positive). For retrieval of road-sign information, PD occurred while participants were asked to recall the direction of specific place names, but was not dependent on confidence or accuracy. Our results suggest that NE activity is important for anticipating upcoming cognitive demands, and highlight the feasibility of investigating NE under simulated naturalistic conditions.

ID: 133 / **Poster session 1: 25**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Attention

Efficient spatial coding for covert selective attention

Baiwei Liu, Zampeta-Sofia Alexopoulou, Anne Zonneveld, Freek van Ede
Institute for Brain and Behavior Amsterdam, Department of Experimental and Applied Psychology, Vrije Universiteit Amsterdam, The Netherlands; b.liu@vu.nl

Selective attention enables the prioritisation of task-relevant visual information, including among internal contents in working memory. Studies targeting the foundational mechanisms of covert selective attention often consider situations where to-be-attended and to-be-ignored visual contents are presented or memorised in distinct directions from fixation – rendering direction sufficient for covert selection. Yet, in everyday life, direction alone is typically insufficient for selection because multiple potential objects of attention compete along any given direction. To gain insight into the mechanisms of covert attention when direction is sufficient versus insufficient for selection, we cued participants to select memorised visual items that were encoded near or far from fixation while manipulating whether direction was sufficient (no competition along direction) or insufficient (competition along direction) for selection. To uncover the nature of spatial coding for covert attention, we tapped into directional biasing of fixational gaze behaviour as a non-invasive read-out of the brain's oculomotor system – a brain system widely recognised for its contribution to covert attention. This unveiled the principle of 'efficient spatial coding' whereby covert internal selective attention considers just direction when sufficient and considers the distance of the attended target only when necessary.

ID: 134 / **Poster session 1: 26**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Learning & Memory

Recall requirements can drastically modulate working memory representations in human visual cortex

Giuliana Martinatti Giorjiani[1,2], Rosanne L. Rademaker[1]
[1]Ernst Strüngmann Institute (ESI) for Neuroscience in Cooperation with the Max Planck Society, Frankfurt, Germany; [2]Department of Cognitive Neuroscience, Vrije Universiteit Amsterdam, The Netherlands; giuliana.mg17@gmail.com

Visual working memory (VWM) allows for temporary storage and flexible manipulation of relevant information to support adaptive behavior. Previous VWM studies have primarily focussed on the mechanisms of passive storage. However, stored information is ultimately used to accomplish specific tasks. Here, we manipulate behavioral requirements during recall to investigate how adaptive behavior impacts VWM representations in human primary visual cortex, and the roles that visual (mis-)matches and recall behavior play. We found a large increase in decoding of a remembered orientation when participants rotated a thin dial on the screen during recall. In this closed-loop scenario, ongoing motor actions and visual input are both at play. However, neither visual input alone, or motor output alone, could account for response-period decoding. Specifically, we found chance-level decoding when a visual dial was rotating independently to a random end-orientation, and slightly above-chance decoding when participants executed motor responses while rotating an invisible dial. Only an independently rotating dial with an end-orientation that closely matched the remembered orientation was able to evoke strong above-chance decoding, similar to closed-loop recall. Together, these results imply an important role for visual matches in the ability to engage early visual cortex during memory recall.

ID: 136 / **Poster session 1: 27**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Learning & Memory

Is working memory maintenance truly silent? The role of alpha band activity during working memory maintenance

Sophia Wilhelm, Elkan Akyurek
Experimental Psychology, University of Groningen, The Netherlands; s.a.sophia.wilhelm@rug.nl

In recent years the idea of activity-silent working memory (WM) has gained popularity, which holds that in the absence of visual input, information can be stored in a neuronally silent trace by rapid changes in synaptic weights, which thereby constitute the memory. Critics highlight that continuous alpha band activity of cued items is observed in EEG during memory maintenance, which could be interpreted as a persistent memory signal. Alternatively, this alpha band activity might reflect attentional mechanisms directed towards the cued object. This view predicts that an unprioritized item that is not currently in the focus of attention should not be represented in the alpha band. To test this, we employ a two-item delayed-response WM paradigm in combination with impulse perturbation. After encoding of the memory items, we retro-cue the response order to study how the alpha band representation changes over time between a prioritized and deprioritized item. If continuous alpha band is exclusively attention-related, we expect to see only the prioritized item in ongoing alpha; however, if the alpha band plays an active role in working memory maintenance, we expect to see both the prioritized and deprioritized item to be tracked in ongoing alpha.

ID: 139 / **Poster session 1: 28**
Abstract Submission for Poster / Talk
I prefer to present a poster.

Select best fitting topic: Methods and modelling

Are you sure? Modelling drivers' confidence in left-Turn gap acceptance decisions

Floor Bontje[1,2], **Arkady Zgonnikov**[1]
[1]Department of Cognitive Robotics (CoR), Faculty of Mechanical, Maritime and Materials Engineering, Delft University of Technology, The Netherlands; [2]Experimental Psychology & Helmholtz Institute, Utrecht University, The Netherlands; f.bontje1@uu.nl

Decisions are automatically accompanied by confidence judgements which have, among other, an effect on justifications of future decisions and behaviour. A better understanding of the metacognitive processes responsible for these confidence judgements could improve behaviour models. To date, confidence judgements are studied in a fundamental manner. Limited research is done into confidence in more dynamic tasks. Such applied research could render insights on whether fundamental principles also hold for real-life tasks. Driving is amongst the areas for which an improved understanding of confidence judgements can be useful. In this study, we investigated the confidence of drivers in left-turn gap acceptance decisions in a driver simulator experiment (N=17). The study showed that confidence is negatively related to response time and that it can be related to the gap size with respect to the oncoming vehicle. In addition, we concluded that confidence judgements can be captured with an extended dynamic drift diffusion decision model with collapsing boundaries. We demonstrated that allowing for post-decision evidence accumulation in the model increases its ability to describe confidence judgements in gap rejecting decisions. Overall, the study confirmed confidence judgments in a dynamic task can be described by the principles known from fundamental confidence research.

ID: 140 / **Poster session 1: 29**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Decision Making

Learning to avoid harm in uncertain social contexts in relation to anxiety and fear of negative evaluation

Selin Topel, **Ili Ma**, **Henk van Steenbergen**, **Anna van Duijvenvoorde**, **Ellen de Bruijn**
Leiden University, The Netherlands; s.topel@fsw.leidenuniv.nl

In order to successfully navigate social settings in which the outcomes of social interactions are uncertain, it is important to learn from past experiences to estimate the best course of action. Studies have shown that individuals with anxiety have difficulties adapting their learning according to the source and degree of uncertainty in the environment in non-social contexts. Here, we investigated (1) whether trait anxiety was associated with difficulties adapting learning rates (LR) in social contexts where outcome contingencies are stable or volatile, and (2) differences in learning in social vs. non-social contexts. We employed an adapted trust game where participants (N = 190) could either lose or keep their investments depending on their interactions stable or volatile players in different blocks. Participants also played a matching non-social control task. We compared different computational models to model participants' behavior. Anxiety did not modulate adaptability of LR in either context. Instead participants demonstrated higher learning rates in social compared to non-social contexts. Additionally, we found that social LRs, but not non-social LRs, were particularly higher in those with increased fear of negative evaluation (FNE)—a hallmark of social anxiety—suggesting these individuals might have a heightened sensitivity to learning under uncertainty in social contexts.

ID: 141 / **Poster session 1: 30**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Learning & Memory

Memory search is facilitated by attentional modulation of visual object processing

Linlin Shang[1], **Lu-Chun Yeh**[1,2], **Yuanfang Zhao**[1], **Marius Peelen**[1]
[1]Radboud University; [2]Justus-Liebig-University; linlin.shang@donders.ru.nl

We often need to decide whether the object we look at is also the object we look for. When we only look for one object, this process is relatively straightforward. However, when we look for multiple objects at the same time (e.g., the products on our shopping list), the process additionally requires memory search. Previous research has shown that memory search is very efficient when a non-target probe is categorically different from the memory set. Here, in two EEG studies, we show that this efficiency is supported by category-level attentional modulation. In the first study, participants performed a memory search task on individually presented probe objects that could be from the same or a different category as the memory set. We observed category-level modulation of visual object processing from ~150 ms after stimulus onset. In the second study, memory search was performed on two concurrently presented objects. When both objects were non-targets, spatial attention (indexed by the N2pc component) was directed to the object that was of the same category as the items in the memory set. Together, these results provide evidence for a proactive (template-based) strategy of memory search at the level object category.

ID: 142 / **Poster session 1: 31**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Decision Making

Pupil dynamics preceding switches in task engagement

Philippa A. Johnson, **Sander Nieuwenhuis**, **Anne E. Urai**
Leiden University, Netherlands, The; p.a.johnson@fsw.leidenuniv.nl

When completing a task for a prolonged period, our ability to sustain attention fluctuates over time. Disengagement is associated with a large

baseline pupil size, suggesting that high levels of arousal impair behavioural performance. In mice, disengaged behaviour has temporal autocorrelation (i.e., 'disengagement states'), with lapses clustering in time, rather than occurring randomly. In this disengaged state, mice make more errors and provide responses biased towards one side. What neural and physiological processes trigger the transition into, and out of, disengagement states? Here, we investigate the role of pupil-linked arousal. We use a public dataset of 140 mice performing a perceptual decision-making task, including extracellular recordings alongside behavioural and pupil responses. We show that trials with slow response times are associated with larger and more variable baseline pupil. Next, we plan to apply hidden Markov models to identify engagement states based on either response times or behavioural choices. We expect that, prior to state switches, activity of arousal systems will cause increases in mean and variability of baseline pupil size. These findings will provide a starting point for exploring the cortical, subcortical and neuromodulatory processes preceding task (dis)engagement, with the ultimate aim of predicting behavioural state transitions before they happen.

ID: 143 / **Poster session 1: 32**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Social Cognition

Cumulative culture spontaneously emerges in social navigators with imprecise memory

Edwin S. Dalmaijer
University of Bristol, United Kingdom; edwin.dalmaijer@bristol.ac.uk

Cumulative cultural evolution occurs when adaptive innovations are passed down generations through social learning. This process shaped human technological innovation, and is traditionally argued to rely on high-fidelity social transmission and advanced cognitive skills. However, here I show that cumulative culture spontaneously emerged in artificial agents who navigate with only a minimal cognitive architecture of goal-direction, social proximity, and route memory. Within each generation, naive individuals benefitted from being paired with experienced navigators because they could follow previously established routes. Crucially, experienced navigators also benefitted from the presence of naive individuals through *regression to the goal*. As experienced agents followed their memorised path, their naive counterparts (unhindered by route memory) were more likely to err towards than away from the goal, and thus biased the pair in that direction. This improved route efficiency within each generation. In control experiments, cumulative culture was attenuated when agents' social proximity or route memory were lesioned, whereas eliminating goal-direction only reduced efficiency. These results demonstrate that cumulative cultural evolution occurs even in the absence of sophisticated communication or thought. Thus, rudimentary cumulative culture is an emergent property of social systems with imprecise memory capacities, and provides a flexible complement to biological evolutionary mechanisms.

ID: 145 / **Poster session 1: 33**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Development

Assessing short-term intra-individual variability in adolescent neural responses to rewards

Rebecca van Rijn, Rosalie Ursinus, Lydia Krabbendam, Barbara R. Braams
Vrije Universiteit, Amsterdam, The Netherlands; r.van.rijn@vu.nl

Neural measures are often assumed to provide a consistent measure within participants. However, studies assessing developmental change on the longer timescale have shown poor test-retest reliability. We hypothesize that poor test-retest reliability might be related to high variability at the short term. Adolescence is a period known for increased risk-taking and heightened activity of reward-related areas including the ventral striatum. Here we tested short term variability in neural responses to rewards in 16- and 17-year-old adolescents. Participants (N=77, 52% girls, M_{age}=16.91, SD=0.53) performed a reward-sensitivity task while undergoing functional MRI. Participants repeated the same task one week later, again undergoing fMRI assessment. Preliminary intra-class correlation analysis, based on a subset of participants (N=19, 42% girls, M_{age}=16.98, SD=0.48) revealed notable intra-individual variability in the ventral striatum (ICC=0.482). Subsequent linear mixed effects models showed that ventral striatum variability corresponds with variability in BAS scores, a measure to assess motivation to approach goal-oriented outcomes. These results provide a preliminary indication that ventral striatum shows high short-term variability, which can result in inaccurate estimations developmental effects. To gain a deeper understanding of this variability, future research should explore potential factors such as stress, sleep patterns, physiological measurements, and eventually compare short-term and long-term variability.

ID: 146 / **Poster session 1: 34**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Perception & Sensory Integration

Using hearing and vision for localization, motion perception, and motion prediction

Yichen Yuan, Surya Gayet, Nathan Van der Stoep
Experimental Psychology, Helmholtz Institute, Utrecht University; y.yuan@uu.nl

Predicting motion is essential to everyday behavior, like when participating in traffic. Although many objects provide multisensory information, it remains unknown whether humans benefit from multisensory input when tracking occluded objects.

We investigated multisensory benefits for localizing audiovisual targets compared to unisensory auditory and visual targets in three experiments, respectively assessing localization of static stimuli, moving stimuli, and predicting the location of occluded moving stimuli. Performance for

audiovisual targets was compared to performance predicted by an optimal cue integration model.

A substantial multisensory benefit was found when participants localized static audiovisual targets (Experiment 1), showing near-optimal audiovisual integration. In Experiment 2, no multisensory benefits were found, but localization accuracy followed maximum likelihood predictions, indicating that responses to audiovisual moving targets were influenced by auditory and visual inputs. In Experiment 3, moving targets were occluded, and their location had to be inferred from target speed and occlusion duration. Here, participants relied exclusively on the visual component of the audiovisual target, even though the auditory component demonstrably provided useful location information when presented in isolation.

Observers use both hearing and vision when tracking moving objects and localizing static objects, but use only visual input when predicting motion under audiovisual occlusion.

ID: 147 / **Poster session 1: 35**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Decision Making

History-dependent decision-making across species

Anne Urai
Leiden University, The Netherlands; a.e.urai@fsw.leidenuniv.nl

Mice are increasingly used to study the neural basis of behavior, often with the ultimate goal of extrapolating these insights to humans. To generalize insights about neural functioning between species, it is crucial to first ensure correspondence in behavior and computational strategy. Here, we use a large public dataset of mouse behavior and neural recordings and replicate a finding previously observed in humans: individual differences in choice repetition are explained by a change in the rate of evidence accumulation. Evidence accumulation over multiple temporal scales thus reflects a fundamental aspect of decision-making, conserved across mammalian species. These findings set the stage for linking the computations of evidence accumulation to neural dynamics and the single-cell and population level across the mouse brain.

ID: 148 / **Poster session 1: 36**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Learning & Memory

Individually tailored feedback to optimize learning

Jessica Schaaf, Michael Aristodemou, Rogier Kievit
Radboud UMC, The Netherlands; jessica.schaaf@radboudumc.nl

Feedback is a key ingredient for learning. As such, many studies have shown how feedback valence, that is, whether individuals receive positive or negative feedback, affects learning across development. The results from these studies are mixed, especially in adolescents. Accordingly, we found individual differences in feedback-valence effects with some adolescents learning more from positive feedback and others learning more from negative feedback. Surprisingly, educational learning platforms, that are more and more often used in the classroom, apply the same feedback algorithm to all individuals. This likely results in worse learning outcomes for at least some of these individuals. In this presentation, I will discuss experimental findings on feedback-valence effects on learning and how we can incorporate these findings in learning platforms in order to individually optimize learning.

ID: 149 / **Poster session 1: 37**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Language

Learning hierarchical centre-embedding structures: Influence of distributional properties of the Input

Yao Chen[1], Ambra Ferrari[1,2], Peter Hagoort[1,2], Bruno Bocanegra[3], Fenna Poletiek[1,4]
[1]Max Planck Institute for Psycholinguistics, Nijmegen, The Netherlands; [2]Donders Institute for Brain, Cognition and Behaviour, Nijmegen, The Netherlands; [3]Department of Psychology, Educational and Child Studies, Erasmus University Rotterdam; [4]Institute of Psychology, Leiden University, Leiden, The Netherlands; Yao.Chen@mpi.nl

Nearly all human languages have grammars with complex recursive structures. These structures pose notable learning challenges. Two distributional properties of the input may facilitate learning: the presence of semantic biases (e.g. p(barks|dog) > p(talks|dog)) and the Zipf-distribution, with short sentences being extremely more frequent than longer ones. This project tested the effect of these sources of information on statistical learning of a hierarchical center-embedding grammar, using an artificial grammar learning paradigm. Semantic biases were represented by variations in transitional probabilities between words, with a biased input (p(barks|dog) > p(talks|dog)) compared to a non-biased input (p(barks|dog) = p(talks|dog)). The Zipf distribution was compared to a flat distribution, with sentences of different lengths occurring equally often. In a 2×2 factorial design, we tested for effects of biased transitional probabilities (biased/non-biased) and the distribution of sequences with varying length (Zipf distribution/flat distribution) on implicit learning and explicit ratings of grammaticality. Preliminary results show that a Zipf-shaped and semantically biased input facilitates grammar learnability. Thus, this project contributes to understanding how we learn complex structures with long-distance dependencies: learning may be sensitive to the specific distributional properties of the linguistic input, mirroring meaningful aspects of the world and favoring short utterances.

ID: 150 / Poster session 1: 38
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Cognitive control and executive function

Disentangling the role of dopamine and noradrenaline in methylphenidate effects on functional brain circuits using PET/SPECT-enriched fMRI

Ruben van den Bosch, Roshan Cools
Radboud University Medical Center, Donders Institute for Brain, Cognition and Behaviour, Nijmegen, The Netherlands; ruben.vandenbosch@donders.ru.nl

The psychostimulant methylphenidate acts by blocking the dopamine and noradrenaline transporters (DAT and NET). Its effects may thus reflect modulation of dopamine and/or noradrenaline. Functional magnetic resonance imaging (fMRI) is well-suited for investigating drug effects on brain-wide activation, however it does not clarify which pharmacological targets underpin such drug-induced changes. To address this limitation we enriched fMRI analyses of methylphenidate effects during a reversal learning task with information about the spatial distribution of DAT and NET, based on publicly available single photon emission computed tomography (SPECT) and positron emission tomography (PET) scans, as well as transcriptomic data of genes expression. In addition, we quantified striatal dopamine synthesis capacity for our sample of 85 healthy volunteers using [^{18}F]FDOPA PET. Our preliminary task-independent analyses suggest that methylphenidate increased connectivity between the DAT-rich striatum and sensorimotor areas as well as the supramarginal gyrus, consistent with a previous finding using resting-state fMRI. This effect was stronger for participants with higher striatal dopamine synthesis capacity. In contrast, methylphenidate decreased activity in NET-mediated functional circuits. These preliminary results suggest that during task performance, but independent of reversal learning events, methylphenidate acts primarily by promoting activity in dopamine-mediated functional circuits of the brain and inhibiting noradrenaline-mediated circuits.

ID: 151 / Poster session 1: 39
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Learning & Memory

Interplay between sampling of naturalistic visual input and robust maintenance of visual working memory

Amit Rawal[1,2], Rosanne L. Rademaker[1]
[1]Ernst Strüngmann Institute (ESI) for Neuroscience in Cooperation with Max Planck Society, Germany; [2]Department of Cognitive Neuroscience, Vrije Universiteit Amsterdam, The Netherlands; amitrawal1643@gmail.com

Accomplishing behavioral goals requires coordinating the acquisition of new sensory input with holding relevant information in mind. Given the interdependence of these two processes, we examine how natural visual exploration via eye movements and visual working memory (VWM) might interact. First, we asked if VWM is affected by the unique spatio-temporal statistics of an individual's eye movements. We mimicked these statistics by having participants free-view natural images, from which we then cropped 7º sections around participant's gaze position. This moment-by-moment visual input was replayed centrally (in intact or shuffled order) during a subsequent VWM task while participants remembered randomly oriented gratings for 5s. Recall error was largest on trials with intact replay, and trials with larger recall errors were associated with a greater number of saccades. Second, we asked if viewing behavior is affected by VWM contents. Participants remembered one, three, or five orientations while free-viewing natural or phase-scrambled images for 5.5s. Preliminary results show larger recall errors, and lower exploration, when more items are remembered. Together, we find that naturalistic visual input impacts VWM, and that VWM contents and performance is related to oculomotor activity.

ID: 152 / Poster session 1: 40
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Methods and modelling

Individualizing instantaneous frequency measurements for better results.

Raquel Elea London
Universiteit Gent, Belgium; raquellondon@gmail.com

Alpha oscillations play a key role in perception and their frequency seems to matter for the timing of perception. Instantaneous frequency gives us the time-resolved frequency of an oscillation. This enables a fine-grained analysis of the mechanism by which oscillations are involved in the flow of perceptual signals.

In an individual, instantaneous alpha frequency varies around their "peak alpha frequency". While in most samples individual peak alpha frequency ranges from roughly 8 to 13 Hz, the bandpass filter used to isolate alpha activity is usually chosen to be the same for the entire sample. This seems reasonable, but is far from optimal.

Using simulated data, I will show that even small differences between individual peak alpha frequency and the center of the bandpass filter lead to a significant over- or under- estimation of a participant's instantaneous alpha frequency. While it doesn't necessarily lead to false conclusions in within-participant designs, this measurement error lowers statistical power, and biases results by selectively down-weighting participant's data in the group-level result.

Using experimental data I will demonstrate how solving this measurement error affects the results of an EEG study of an audiovisual temporal order judgement task.

ID: 154 / **Poster session 1: 41**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Methods and modelling

Auditory confounds can drive online effects of transcranial ultrasonic stimulation in humans

Benjamin R. Kop, Tulika Nandi, Judith Lefkes, Sjoerd W. Meijer, Soha Farboud, Marwan Engels, Andrey Chetverikov, Hanneke E.M. den Ouden, Lennart Verhagen
Donders Institute for Brain, Cognition, and Behaviour, Netherlands, The; benjamin.kop@donders.ru.nl

Transcranial ultrasonic stimulation (TUS) is rapidly emerging as a promising non-invasive neuromodulation technique. TUS is already well-established in animal models, providing foundations to now optimize neuromodulatory efficacy for human applications. Across multiple studies, one promising protocol, pulsed at 1000 Hz, has consistently resulted in motor cortical inhibition in humans (Fomenko et al., 2020). At the same time, a parallel research line has highlighted the potentially confounding influence of peripheral auditory stimulation arising from TUS pulsing at audible frequencies. In this study, we disentangle direct neuromodulatory and indirect auditory contributions to motor inhibitory effects of TUS. To this end, we included tightly matched control conditions across four experiments, one preregistered, conducted independently at three institutions. We employed a combined transcranial ultrasonic and magnetic stimulation paradigm, where TMS-elicited motor-evoked potentials (MEPs) served as an index of corticospinal excitability. We replicated motor inhibitory effects of TUS, but showed through sham and (in)active controls, as well as through manipulation of stimulation intensity, stimulation duration, and auditory masking conditions, that this inhibition was driven by peripheral auditory stimulation, not direct neuromodulation. For TUS to realize its potential in research and clinical settings, we must critically reevaulate prior findings and ensure rigorous experimental control moving forward.

ID: 155 / **Poster session 1: 42**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Attention

Attentional cueing effects on performance without attentional shifts

Sisi Wang, Freek van Ede
Vrije Universiteit Amsterdam (VU), The Netherlands; s.wang5@vu.nl

The effects of attentional cues on performance have been well established and have traditionally been interpreted as stemming from attentional allocation to cued sensory information. Here we show how this intuitive interpretation is not always valid. Human observers performed a visual working-memory task in which cues directed attention to either of two memory items. In different blocks, we varied the validity of the cue (100, 80, 60%) and tracked attentional allocation across time through two previously established signatures: the lateralization of EEG-alpha activity and the spatial biasing of fixational microsaccades. Most critically, while we found a robust benefit on accuracy and response time (RT) even for cues that were only 60% valid, we found no evidence for attentional shifts in either of our measures, even though both measures clearly tracked attentional allocation when cues were more informative. Instead, we observed cue-validity effects only after the probe, in both the EEG and the gaze data. These findings challenge the common interpretation that cue-validity effects must stem from attentional allocation by revealing how cue-validity effects in performance need not always be paralleled by cue-induced allocation of attention and may instead be driven by other mechanisms that have yet to be deciphered.

ID: 156 / **Poster session 1: 43**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Learning & Memory

Visual representations during perception and working memory use a combination of real-world and retinal reference frames

Maria Servetnik[1], Nicolás Pollán Hauer[2], Michael J. Wolff[1], Chaipat Chunharas[3], Rosanne L. Rademaker[1]
[1]Ernst Strüngmann Institute (ESI) for Neuroscience in Cooperation with the Max Planck Society, Frankfurt, Germany; [2]Centre de Recerca Matemàtica, Campus de Bellaterra, Barcelona, Spain; [3]Department of Medicine, King Chulalongkorn Memorial Hospital, Chulalongkorn University, Bangkok, Thailand; servetnikmaria@gmail.com

Visual information in our environment is anchored to a real-world reference frame – a skyscraper remains upright even when you tilt your head, although the skyscraper's projection on your retina changes from vertical to diagonal. Does retinotopic cortex represent perceptual inputs, or information held in visual working memory (VWM), in a retinal or real-world reference frame? We dissociated retinal and real-world reference frames via head tilt, and measured brain responses using 64-channel electroencephalography. Nineteen participants remembered randomly oriented gratings with their heads either upright or tilted by 45º. If orientations are represented in a retinal reference frame, a decoder trained on head-upright trials would predict a 45º offset in decoded orientation when tested on head-tilted trials. No such offset should be observed if mnemonic representations are anchored to the real world. In our data, cross-generalized decoding demonstrated a shift of approximately 22.5º, which corresponds to a representation that's "in-between" real-world and retinal reference frames. An approximately retinal representation was found shortly after stimulus-offset, and shortly before behavioral report. These results suggest that both perceptual and mnemonic

representations use a combination of real-world and retinal reference frames and can shift dynamically between reference frames, potentially in behaviorally relevant ways.

ID: 157 / **Poster session 1: 44**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Cognitive control and executive function

Cognitive control is task specific: further evidence against the idea of domain-general conflict adaptation

Daxun Zhu[1], Xiangpeng Wang[2], Enwei Zhao[2], Nazbanou Nozari[3], Wim Notebaert[1], Senne Braem[1]
[1]Ghent University, Belgium; [2]Jiangsu Normal University, China; [3]Indiana University, USA; daxun.zhu@ugent.be

Adaptive control refers to flexible adjustments in control settings in response to conflicting situations, often measured using the congruency sequence effect (CSE). There has been a long-standing debate as to whether CSEs reflect a domain-general or domain-specific process – as often tested by studying CSEs across tasks. One model predicts a U-shaped relation where only highly similar or dissimilar tasks would show CSEs across tasks, because only those tasks can be represented or activated in parallel. Only some recent studies seem to have reported CSEs across highly dissimilar tasks, with some failures to replicate. To this end, we interleaved two distinct conflict tasks, a manual multi-source interference task and a vocal picture-word interference task. We ran this experiment in Dutch (Experiment 1, n=50) and Chinese (Experiment 2, n=39). Results show no cross-task CSE, but rather a reversed CSE when the previous trials are response-interference trials, which is suggestive of very task-specific adaptive processes. These results do not fit with the U-shaped model, nor with the conclusion of other studies suggesting that there might be a domain-general mechanism behind CSEs. Instead, our results are most compatible with a very task-specific view on the mechanisms behind the CSE.

ID: 159 / **Poster session 1: 45**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Attention

Selective distractor suppression in primary visual cortex

David Richter[1,2], Dirk van Moorselaar[1,2], Jan Theeuwes[1,2,3]
[1]Vrije Universiteit Amsterdam; [2]Institute Brain and Behavior Amsterdam (iBBA); [3]William James Center for Research, ISPA-Instituto Universitario; david.richter.work@gmail.com

Selective attention is fundamental for effective interaction with our surroundings. A primary mechanism behind this is the automatic suppression of the numerous distracting stimuli that compete for our attention. This suppression allows us to focus on essential tasks, like driving a car, without being overwhelmed by salient but irrelevant sensory inputs. While the phenomenon of distractor suppression is well-established, its neural underpinnings remain poorly understood. In an fMRI study, we examined where and how sensory responses in the visual brain display signs of distractor suppression after incidental learning of spatial statistical regularities. Our findings indicate that implicit spatial priors shape sensory processing even at the earliest stages of cortical visual processing in V1, evident as a suppression of stimuli at locations which frequently contained distracting information. Notably, this neural suppression occurred for both distractor and target stimuli, and possibly even before stimulus onset. This suggests that early visual cortex selectively and proactively suppresses responses at distraction-prone locations. In sum, our study underscores how the brain efficiently leverages prior knowledge, for example from statistical learning, to optimize sensory processing and attention allocation.

ID: 160 / **Poster session 1: 46**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Perception & Sensory Integration

Binding is slow: Temporal integration explains apparent early visual binding

Lucija Blaževski, Timo Stein, H.Steven Scholte
University of Amsterdam, The Netherlands; l.blazevski@uva.nl

Visual perception involves binding of distinct features into a unified percept. While traditional theories link feature binding to time-consuming recurrent processes, Holcombe and Cavanagh (2001) provided evidence for extremely rapid early feature binding in a task requiring binding of orientation and luminance. However, because visual stimuli were presented over multiple presentation cycles, their findings can alternatively be explained by temporal integration over the extended stimulus sequence. To address this, we conducted three experiments manipulating the number of presentation cycles. If early binding occurs, one extremely short cycle should be sufficient for feature integration. Conversely, late binding theories predict that successful binding requires substantial time and improves with additional presentation cycles. Our results show that participants can only complete the task by integrating features over time, supporting late binding theories and underscoring the role of recurrent processing. Additionally, by using different spatial frequencies to define the stimuli, we observed a second process: higher spatial frequencies prolonged the initial processing time needed to complete the task, and this effect appeared to be independent of the subsequent integration time. These findings thus robustly support late binding theories and propose an innovative approach for manipulating feedforward versus recurrent processing within human psychophysics.

ID: 161 / Poster session 1: 47
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Attention

Preparatory templates for anchor-object guidance in object-selective cortex

Maëlle Lerebourg, Floris P. de Lange, Marius V. Peelen
Donders Institute for Brain, Cognition and Behaviour, Radboud University; maelle.lerebourg@donders.ru.nl

Visual search involves attentional guidance as well as target identification. Both may rely on an internal representation of visual target features, the attentional template. Features for identification and guidance can however be separated and guidance be provided also by features of non-target objects, e.g. when search for small targets is guided by large, salient anchor objects consistently associated with them (e.g. a sink when looking for a toothbrush). Whether preparatory activity in visual cortex, assumed to be the neural basis of the template, represents such guiding features or only the cued target is yet unknown.

Using fMRI and eyetracking, we investigated the neural basis of anchor-guided search. We designed an anchor-guided search task in which participants (n = 34) learned novel associations between two targets (books, bowls) and two tables acting as anchors, switching across two scene contexts. First fixations were reliably guided towards the associated anchor. We found preparatory voxel activity patterns reflected the associated anchor, but not the target, in LOC. This anchor template also generalized across scenes and associated targets. Our results suggest preparatory templates flexibly reflect visual information that is most relevant for guidance, including newly learned object-associations, contributing to the efficiency of naturalistic visual search.

ID: 162 / Poster session 1: 48
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Learning & Memory

The neural signature of novelty-induced memory benefits

Judith Schomaker[1,2], Kreeta I.L. Kerkkänen[1], Svetlin Hansov[1], Carla Maló Calmus[3], David Amadeus Vogelsang[1,4]
[1]Leiden University, Netherlands, The; [2]Leiden Institute for Brain & Cognition, Netherlands, The; [3]University of Padova, Italy; [4]University of Amsterdam, Netherlands, The; j.schomaker@fsw.leidenuniv.nl

Studies in animals have robustly shown that exposure to novelty can promote memory for information presented in the temporal vicinity. Research in humans is lagging, but several recent studies have reported similar memory-facilitating effects of novelty. Thus far, however, no studies have investigated the neurobiological mechanisms of memory in humans. In the current study, we examined the role of theta oscillations in successful encoding of episodic information after exploring either a novel or familiar environment. In this EEG study, participants first explored one of two virtual environments (i.e., the *familiarization phase;* Day 1). Participants then subsequently explored the same (familiar condition; Day 1) or a novel environment (Day 2; order of novelty/familiar conditions was counterbalanced across participants). After exploring a novel or familiar environment, participants performed a word learning task. Word recall and word recognition was tested in an immediate and a delayed memory test (±24 hours later). Exploration of the familiar, rather than novel environment, increased theta power, which may reflect environment-related memory processes. We addressed the effects of novelty on memory, by linking theta power during word encoding to later memory success. Our findings provide novel insights into the neurobiological mechanisms of novelty-related memory enhancements in humans.

ID: 163 / Poster session 1: 49
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Cognitive control and executive function

Sleep deprivation increases belief update and suppresses confirmation bias in decision tasks

Charlotte Anckaert, Wim Gevers, Philippe Peigneux
Université Libre de Bruxelles, Belgium; charlotte.anckaert@ulb.be

Processing new information and updating beliefs are crucial in current information-rich societies for accurate understanding and informed decision-making. The impact of sleep deprivation on belief updating is still debated. Despite its prevalence, the impact on cognitive functions remains relatively understudied, with mixed findings. Theoretically, sleep deprivation may diminish motivation for deeper cognitive processing, leading individuals to adopt or ignore the beliefs of others, or rather facilitates modification of existing beliefs, with greater ease due to fatigue. In this study, 36 participants completed a binary decision task after a night of sleep and after a night of sleep deprivation, counterbalanced. Results disclosed a significant impact of sleep deprivation on belief changes and confidence updates: as compared to after a night of sleep, sleep-deprived individuals doubled their belief changes. Also, lower confidence led to more belief changes regardless of sleep condition, showing an impact of initial confidence levels. After a normal sleep night, a confirmation bias emerged with a boost in confidence when the partner agreed, a bias effect that was not present in the sleep-deprived condition. Results confirm sleep deprivation's role in altering beliefs while considering initial confidence.

ID: 164 / Poster session 1: 50
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Action

Exploring variability in step localization during stair walking in blind people using white canes

Andrea Ghiani[1], Ahmet Burak Kurt[2,3], Eli Brenner[1], Giorgia Bertonati[2,3], Monica Gori[2]
[1]Department of Movement Sciences, Vrije Universiteit Amsterdam, Netherlands, The; [2]Unit for Visually Impaired People (U-VIP), Italian Institute of Technology, Italy; [3]Department of Informatics, Bioengineering,Robotics and Systems Engineering (DIBRIS),Università degli Studi di Genova, Italy; a.ghiani@vu.nl

Recent research demonstrates that normally sighted people differ considerably in the number of steps they gaze during stair walking. This variability is likely related to peripheral vision being sufficient to guide actions, leaving more flexibility to scan their surroundings. If so, such variability should not be expected in how blind people use their white cane to localize steps, as peripheral information is unavailable.

To this aim, we asked blind people to ascend and descend two staircases as they would normally do with their cane. All but one participant had prior experience navigating stairs independently with their cane. Using a top view video recording of the stairs, we quantified the number of steps that each participant touched with the cane.

Despite all participants being aware of the recommended strategy for climbing staircases, which involves touching each step with the cane, our results showed individual differences in terms of the number of steps they touched. Blind people showed a similar variability with the cane as sighted people with gaze, despite the absence of peripheral information. It is possible that the regularity of stairs and awareness that no obstacles were present were sufficient to safely navigate without localizing each step with the cane.

ID: 165 / **Poster session 1: 51**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Attention

Do microsaccades correlate with shifting but not sustaining covert attention?

Anna Michelle van Harmelen, Freek van Ede
Institute for Brain and Behaviour Amsterdam, Department of Experimental and Applied Psychology, Vrije Universiteit Amsterdam; a.m.van.harmelen@vu.nl

Microsaccades are increasingly used as an indicator of the focus of covert selective attention, but the exact relationship between microsaccades and attention remains elusive. Because attention comprises different processes and stages, it is conceivable that microsaccades may be particularly correlated with some stages and less so with other stages. A recent study by Willett & Mayo (PNAS, 2023) found no directional bias of microsaccades towards a visual target in a sustained visuospatial attention task. In contrast, we and others have systematically found robust microsaccade biases in tasks requiring shifting (rather than sustaining) covert selective attention. In order to study whether microsaccades correlate with shifting attention, sustaining attention, or both, we developed a task that involved both shifting and sustaining attention to investigate whether and how microsaccades track these respective attentional stages. While data collection is ongoing, we anticipate, based on our review of the literature, that microsaccade directions will correlate particularly with attentional shifts and less (or even not at all) with sustaining attention at a stimulus, once attention has already shifted.

Affiliations
This work is supported by an NWO Vidi Grant [14721] and an ERC Starting Grant from the European Research Council [MEMTICIPATION, 850636] to F.v.E.

ID: 166 / **Poster session 1: 52**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Attention

Microsaccades track location-based object rehearsal in visual working memory

Eelke de Vries, Freek van Ede
Vrije Universiteit Amsterdam, Netherlands, The; evs236@vu.nl

Besides controlling eye movements, the brain's oculomotor system has been implicated in the control of covert spatial attention and the rehearsal of spatial information in working memory. We investigated whether the oculomotor system also contributes to rehearsing visual objects in working memory when object location is never asked about. To address this, we tracked the incidental use of locations for mnemonic rehearsal via directional biases in microsaccades while participants maintained two visual objects (coloured oriented gratings) in working memory. By varying the stimulus configuration (horizontal, diagonal, and vertical) at encoding, we could quantify whether microsaccades were more aligned with the configurational axis of the memory contents, as opposed to the orthogonal axis. Experiment 1 revealed that microsaccades continued to be biased along the axis of the memory content several seconds into the working-memory delay. In Experiment 2, we confirmed that this directional microsaccade bias was specific to memory demands, ruling out lingering effects from passive and attentive encoding of the same visual objects in the same configurations. Thus, by studying microsaccade directions, we uncover oculomotor-driven rehearsal of visual objects in working memory through their associated locations.

ID: 167 / **Poster session 1: 53**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Methods and modelling

Fitting brain data to model structure: exploring metrics for evaluating and validating alternate model architectures

Catherine Sibert, Sönke Steffen
University of Groningen, Netherlands, The; c.l.sibert@rug.nl

One of the primary challenges of using cognitive models to predict and explain brain data is a lack of concrete metrics that capture the quality of model results. Any model represents a simplified account of the complex processes of cognition, with even the best of models capturing only a part of the variance in the observed data, and the differences in model predictions are difficult to quantify and compare. Previous research into this area was able to use Bayesian Model Selection (BMS) to determine which of a given set of alternate model structures was most likely able to account for the observed human data. However, this method can only compare models of similar complexity, and only in relation to each other. We explore the plausibility of quantifying the quality of a given model by producing two sets of predictions: one based on the real task inputs, and the other based on phase-shifted inputs, and comparing the results to the observed brain activity output. A significant difference between the degree of similarity suggests the proposed model structure to be an improvement over a random model, and the magnitude of difference could indicate the degree of improvement over other potential model structures.

ID: 168 / Poster session 1: 54
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Attention

Dissociable roles of the striatum and thalamus in the attentional control of working memory

Helena S. Olraun[1,2], Quan Wan[3], Rebecca D. Calcott[1], Brad R. Postle[3], Roshan Cools[1,2]
[1]Donders Institute, The Netherlands; [2]Radboudumc, The Netherlands; [3]University of Wisconsin-Madison, United States; h.olraun@gmail.com

In our modern world, we are constantly flooded with information and are often required to keep multiple representations active in working memory (WM). To guide behavior, we must select which representation in WM should be prioritized for action. This process is called WM output gating. A variety of subcortical structures, including the striatum and the thalamus, have been proposed to control attention in WM. We investigated the neural basis of WM output gating in a double serial retrocueing task that requires retrieving gratings that were presented in either right or left hemifield (N = 10). Preliminary results show greater activity in the striatum and more lateralized activity in relevant visual cortex during retrocues that require WM output gating compared with retrocues that do not. Conversely, we observe activation of the thalamus and more lateralized activity in relevant visual cortex when the retrocue additionally requires a (covert) shift of attention to the memorized item in the other hemifield. Together, these findings point to dissociable roles of striatum and thalamus for distinct forms of attentional control of WM. Future connectivity analyses will unravel how the striatum versus the thalamus guide the flow of task-relevant information during selection versus attention shifting in WM.

ID: 169 / Poster session 1: 55
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Attention

Dissociable Effects of Hypervigilance and Worry on Attentional Control----Perspectives from Drift Diffusion Model

Nan Wang[1], Sam Verschooren[1], Aurora Gasparello[1], Luc Vermeylen[1,2], Ivan Grahek[3], Gilles Pourtois[1]
[1]Ghent University, Belgium; [2]KU Leuven, Belgium; [3]Brown University, USA; nan.wang@ugent.be

Previous studies found a stable asymmetric switch cost between external and internal attention across different contexts, reflected by a larger interference in reaction time (RT) speed when switching from external to internal attention than the other way around. In current study, we aimed to test whether state anxiety could alter this asymmetric switch cost and hence attentional control. In Experiment 1, hypervigilance was elicited by a task-irrelevant aversive sound, while in Experiment 2, we induced worry through a negative feedback related to task performance. We also used a Drift Diffusion Model (DDM) to assess whether negative affect could influence either task-set reconfiguration (as shown by an effect on the non-decision time) or task-set inertia (as shown by an effect on drift rate) during attentional control. In both experiments, subjective and psychophysiological measurements (in Experiment 1 only) confirmed that state anxiety increased. In Experiment 1, we found that the asymmetric switch cost disappeared under hypervigilance, and this effect stemmed from a better task-set reconfiguration. Interestingly, results of Experiment 2 showed that worry exerted a qualitatively different effect on attention control, influencing mostly proactive interference. These findings suggest that different components of state anxiety differentially influence attentional control.

ID: 170 / Poster session 1: 56
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Learning & Memory

Humans can learn rapid sequence implicitly without stimulus-response rules

Ningkai Wang[1,2,3], Tomas Knapen[1,2,3], Jan Theeuwes[1,2]
[1]Institute Brain and Behavior Amsterdam (iBBA), Vrije Universiteit Amsterdam, Noord-Holland, The Netherlands; [2]Department of Experimental and Applied Psychology, Vrije Universiteit, Amsterdam, Noord-Holland, The Netherlands; [3]Spinoza Centre for Neuroimaging, Royal Academy of Sciences, Amsterdam, Noord-Holland, The Netherlands; n.wang@vu.nl

The human brain can build models from historical events and anticipate the future. Previous inter-trial sequence learning studies using the serial

reaction time (SRT) paradigm suggest that implicit sequence learning is represented by stimulus–response rules (Schwarb & . Schumacher, 2010). Here, we designed an implicit rapid sequence learning paradigm to explore whether intra-trial rapid sequence can be learned implicitly. In our experiment, participants were exposed to rapid spatiotemporal sequences, each consisting of five items (O-A-B-C-D). Each sequence started with a particular object, followed by two colored faces and two scene pictures. Each picture in the sequence was presented for 200 ms. Participants needed to respond to greyscale faces or scene pictures. There were three kinds of sequences in the current study: 1) "Structured sequence," which has exemplar pictures and regularities in picture order and location. 2) "Exemplar sequence," which has exemplar pictures but in random order and location. 3) "Random sequence," with pictures randomly picked from the file pool, random order, and random location. We found that participants responded significantly faster to greyscale pictures from the structured sequence. Participants were not aware of the hidden structure. These findings suggest that humans can learn rapid sequence implicitly without stimulus–response rules.

ID: 171 / **Poster session 1: 57**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Learning & Memory

Taking time: Auditory statistical learning benefits from distributed exposure

Jasper de Waard[1], Jan Theeuwes[1], Louisa Bogaerts[2]
[1]Vrije Universiteit, the Netherlands; [2]Universiteit Gent, Belgium; j.dewaard.jdw@gmail.com

In auditory statistical learning (ASL), listeners implicitly learn to partition a continuous stream of syllables by discovering the fixed pairs or triplets of syllables that make up the auditory stream. We ask whether auditory statistical learning benefits from spaced exposure (spread out over multiple days) as compared to massed exposure (lumped together on a single day). Given the advantage of spaced learning in explicit learning paradigms, we predicted that auditory statistical learning would benefit from a spaced exposure phase, and this is indeed what we found. In a longitudinal online study on Prolific, we exposed 100 participants to the regularities in a spaced way (spread out over three days), and another 100 in a massed way (in one day). The exposure phase consisted of listening to streams of syllables made up of pairs, while responding to a target syllable. After a two-week retention period, we tested participant's knowledge of the pairs in a 2AFC task. While both groups performed above chance level, the spaced group had higher accuracy. Our findings speak to the importance of statistical learning outside of experiments, for example in real-life language learning, and imply that current investigations of ASL underestimate human's statistical learning abilities.

ID: 172 / **Poster session 1: 58**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Learning & Memory

Statistical learning of spatiotemporal regularities does not necessarily require the intrinsic saliency of target events

Zhenzhen Xu[1,2], Jan Theeuwes[1,2], Sander A. Los[1,2]
[1]Vrije Universiteit Amsterdam, The Netherlands; [2]Institute Brain and Behavior Amsterdam (iBBA); z.z.xu@vu.nl

In previous studies, we found that individuals can implicitly learn spatiotemporal target event regularities during visual search. However, these regularities were tied to bottom-up attention because the target was salient. The current study investigated whether stimulus saliency is a necessary condition for statistical learning of spatiotemporal target regularities. In a visual search task, participants were asked to search for a unique circle with a gap (Landolt C) among two other circles, and to indicate the location of the gap. Unbeknownst to them, the search display's timing predicted the target location. Specifically, the target appeared more often at one peripheral location after a short interval and at the opposite peripheral location after a long interval. Furthermore, by manipulating the gap size of the Landolt C, we created low saliency (tiny gap) and high saliency (large gap) target events. The results showed that regardless of prior exposure to targets that are salient (Experiment 1) or target that are not salient (Experiment 2), visual search was more efficient when the target appeared at the temporally valid location than when it appeared at the invalid location. In conclusion, the intrinsic saliency of objects is not necessary for learning spatiotemporal target regularities during visual search.

ID: 341 / **Poster session 1: 59**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Development

The Impact of Technoference on Mother-Infant Brain-to-Brain Synchrony

Agata Mosinska, Elise Turk, Maryam Alimardani, Marion van den Heuvel
Tilburg University, The Netherlands; mosinskaagata@gmail.com

The quality of mother-infant interactions is crucial for healthy socio-emotional development in infants. Currently, the ubiquitous presence of mobile devices offers countless opportunities for distractions, inevitably impacting face-to-face interactions. This study investigated the effects of maternal distraction by digital devices, also known as "technoference", on mother-infant brain-to-brain synchrony. We collected data from thirty-three mother-infant pairs participating in a Still Face Paradigm (SFP) that incorporated maternal smartphone distraction. Using the dual-EEG method, we assessed brain-to-brain synchrony, which was subsequently quantified using the Phase Locking Value (PLV) analysis. The analysis focused on the infant's theta (3-5 Hz) and alpha (6-9 Hz) frequency bands, which are known for their role in social interactions. We found that smartphone interruptions disrupted synchrony in the theta frequency band but had no significant impact on the alpha band. These results align with earlier research, highlighting the theta band's heightened sensitivity to disruptions in social interactions compared to the alpha band.

Additionally, brain-to-brain synchrony returned to baseline during the reunion, suggesting that mother-infant synchrony can be restored when the mother reengages in the interaction. Overall, our findings underscore the detrimental impact of technoference on mother-infant interactions, emphasizing the need to minimize technological distractions in daily life.

ID: 342 / **Poster session 1: 60**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Perception & Sensory Integration

Next-interval dynamics of tactile inputs shape the distinct stages of cortical information processing

Wenyu Wan[1,2], Arko Ghosh[1]
[1]Leiden University, the Netherlands; [2]University of Amsterdam, the Netherlands; w.wan@fsw.leidenuniv.nl

In the real world, the brain experiences complex trains of environment inputs, but conventional paradigms mostly focus on simple sequences. To address how complex temporal structures of tactile inputs shape cortical processing, and whether the temporal structures use common principles across different spatial locations, we applied a complex train of ~1800 tactile stimulations to the tip of the right thumb, index finger, and little finger during EEG recording (n = 62 subjects). We separated the diverse stimuli by using a joint interval distribution (JID), where a given inter-stimuli interval is described in conjunction with the previous interval. We quantified the intervals in 25 two-dimensional bins and then separately estimated the tactile event-related potential (tERP) at each of the bins (i.e., JID-tERPs). Contrary to expectations, trials with long intervals did not yield larger signal amplitudes, and instead, all three fingers revealed complex JID-tERP. Interestingly, how the temporal dynamics shaped the cortical processing was sustained for the cortical processing spanning from early stages (around 50-75 ms) to the late stages (around 125-300 ms). This was apparent across the three stimulation locations. We propose that tactile input patterns shape different spatial locations and temporal stages of cortical processing by using shared principles.

ID: 343 / **Poster session 1: 61**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Language

Lexical predictability and eye-movement control: a parallel-graded account using a contextual language model

Adrielli Lopes Rego, Joshua Snell, Martijn Meeter
Vrije Universiteit Amsterdam, Netherlands, The; a.t.lopesrego@vu.nl

As reading unfolds, oculomotor behaviour is influenced by word length, frequency and predictability. Relative to word length and frequency, measuring word predictability is considerably more challenging. Cloze norming has been traditionally used as a proxy of word predictability, but what it precisely captures remains unclear. This study investigates whether language models can provide a more fine-grained measure of word predictability. In addition, we propose a parallel-graded mechanism, where all predicted words at a given position are pre-activated as a function of contextual certainty, which varies dynamically as text processing unfolds. Through reading simulations with OB1-reader, a model of eye-movement control in reading, we compare the model's fit to eye-movement data when using predictability values derived from a cloze task to when using those derived from a contextual language model. Preliminary results indicate that, while both predictors improve the model's overall fit relative to the baseline, language model predictability provides a slightly better fit relative to cloze norming. We argue for the suitability of this approach for operationalizing contextual semantic effects in cognitive models of reading. To our knowledge, this is the first study to combine predictability derived from a language model with a cognitive model of eye-movement control in reading.

ID: 344 / **Poster session 1: 62**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Cognitive control and executive function

The rise and fall of decision making during increasing physical exercise

Marie Van de Walle, Wim Notebaert, Leslie Held, Alessandro Colosio
Ghent University, Belgium; madwalle.vandewalle@ugent.be

In current research, the relationship between physical exercise and cognitive performance is described by an inverted U-shaped function. Cognitive control tends to improve during physical exercise until it reaches a critical turning point, beyond which it declines. Our primary focus centers on an exploration of the physiological parameters underlying this cognitive turning point on the one hand, and a detailed analysis of evidence accumulation using the Diffusion Model for Conflict (DMC) on the other hand. Therefore, participants perform a flanker task while cycling until VT2 (secondary ventilatory threshold) is reached, what we predict will cause the inverted parabolic-shaped pattern. Heart rate, oxygen uptake, lactate level and RPE (rate of perceived exertion) will be measured and examined in relationship to the reaction times and error rates. Furthermore, these measurements are also gathered during the post-exercise cooldown period to examine the sequential development of the curve. Overall, the goal of this research is to relate the physiological measures to the cognitive performance parameters. Insights derived from this research could offer valuable recommendations for optimizing daily work routines, desk configurations, sport intensities, and even training regimens of Olympic athletes.

ID: 345 / Poster session 1: 63
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Cognitive control and executive function

Attention in neural networks for efficient generalization

Xiaoyu Zhang[1], Mehdi Senoussi[2], Tom Verguts[1]
[1]Gent University, Belgium; [2]Universite Toulouse 2, France; xiazhan.zhang@ugent.be

Cognitive flexibility allows humans to adapt to diverse tasks and environments. Presumably, this flexibility is supported by fast learning in neural networks. However, conventional neural networks are notoriously plagued by severe constraints to implement such flexibility, most notably, catastrophic forgetting. To address this, we consider attention. This has long been a key concept in psychology and neuroscience. However, attention has recently also become influential in the AI community (in the context of transformers). Yet, how attention is implemented in transformers is cognitively implausible. Here, we seek a middle ground by training knowledge (i.e., network weights) and attention in a neural network simultaneously (as in transformers), but in a manner inspired more directly by cognitive neuroscience. We investigate how the resulting model implements cognitive flexibility, and in particular generalization. We employ two well-established psychological tasks: the cued reversal learning task and the modularity task. Our findings reveal that neural network models equipped with multiplicative attentional gating exhibit significantly improved generalization compared to traditional networks. The insights gained from this study hold meaningful implications for how attention may be implemented in biological neural networks, and how it supports generalization and cognitive flexibility demonstrated by humans in adapting to various environments and tasks.

ID: 346 / Poster session 1: 64
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Attention

Precision of the attentional spotlight influences attraction of population receptive fields

Sumiya Sheikh Abdirashid[1,2,3], Tomas Knapen[1,2,3], Serge O. Dumoulin[1,2,3,4]
[1]Spinoza Centre for Neuroimaging, Royal Academy of Arts and Sciences, Netherlands; [2]Computational Cognitive Neuroscience and Neuroimaging, Netherlands Institute for Neuroscience, Netherlands; [3]Experimental and Applied Psychology, Vrije Universiteit Amsterdam, Netherlands; [4]Experimental Psychology, Helmholtz Institute, Utrecht University, Netherlands; s.abdirashid@spinozacentre.nl

Attention attracts population receptive fields (pRFs) towards the attended locus. The attention field model predicts that in addition to attended position, the precision of attention influences the attraction of receptive fields. Here we manipulated the precision of attention while using 7T fMRI to measure pRF properties. Two attentional conditions were used: attention focused at fixation (0.1 deg radius) and attention distributed across the entire display (>5 deg radius). Conditions were matched in the visual stimulus presented, the task being performed, and the difficulty of the task. We observed differences in the BOLD task response, with a selective increase in the task response of foveal pRFs for the focused attention task and increase in task response of peripheral pRFs for the distributed attention task. We observed changes in pRF position, with focused attention resulting in a stronger attraction of pRF position compared to distributed attention. The attraction of pRFs was also influenced by their size and their distance to the attended locus. We proposed an addition to the attention field model which both encompassed previous predictions and better captured new findings. Together, these results indicate precision of attention influences the degree of attraction of population receptive fields.

ID: 347 / Poster session 1: 65
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Perception & Sensory Integration

Modelling temporal expectations: A probabilistic model and an entrainment model explain distinct aspects of rhythmic behavior

Fleur L. Bouwer[1,2,3], Thomas M. Kaplan[4], Atser Damsma[2,3,5], Edward W. Large[6], Marcus T. Pearce[4]
[1]Cognitive Psychology Unit, Institute of Psychology & Leiden Institute for Brain and Cognition, Leiden University; [2]Department of Psychology, University of Amsterdam; [3]Amsterdam Brain and Cognition, University of Amsterdam; [4]Cognitive Science Research Group, Queen Mary University of London; [5]Institute for Logic, Language and Computation, University of Amsterdam; [6]Department of Psychological Sciences, Department of Physics, University of Connecticut; f.l.bouwer@fsw.leidenuniv.nl

To predict event timing, the brain uses several forms of temporal structure in the auditory environment, including the periodicity of input (the regular beat) and the predictability of sequences of temporal intervals (the rhythmic pattern). Here, we examine whether temporal expectations based on beats and patterns are subserved by distinct mechanisms that can be modelled using entrainment and probabilistic models respectively. We generated 3.7 million unique rhythmic sequences, agnostic of temporal structure. For each sequence, we modelled beat periodicity using a gradient frequency neural network, and pattern predictability using a variable-order Markov model. Based on the modelled periodicity and predictability, we selected 56 rhythms that maximally differentiated between the models for a behavioral experiment. Participants (N=133) performed three tasks: target detection; complexity rating; and tapping along. We found that 1) the models make distinct predictions about temporal expectations in rhythmic sequences, 2) behavior across three different tasks, including both perceptual and motor tasks, is best predicted by combining both models, and 3) expertise (e.g., musical training) affects how periodicity but not predictability influences rhythmic behavior. Taken together, this suggests that temporal expectations are formed using two distinct mechanisms, which are flexibly engaged depending on sensory input structure and listener experience.

ID: 348 / Poster session 1: 66
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Language

Validation Processes and Reading Tasks: is Validation against Background Knowledge and Prior Text influenced by Reading Tasks?

Marloes van Moort[1], Arnout Koornneef[2], Paul Van den Broek[2]
[1]Universiteit Utrecht, Netherlands, The; [2]Leiden University, Netherlands the; m.l.vanmoort@uu.nl

Prior work on the influence of reading tasks on comprehension processes and products involved examinations of how people read and learn valid, true information, but in daily life people frequently encounter false or incongruent information. Therefore, we investigated whether and how reading tasks affect the processing of texts containing false or incongruent information and readers subsequent memory for those texts. We used a self-paced sentence-by-sentence contradiction paradigm with texts that varied systematically in (in)congruency with prior text information and (in)accuracy with readers' world-knowledge. Participants evaluated either the accuracy (fact-checking) or the congruency of text information (coherence-checking). Memory for text information was assessed the next day. Results show different patterns of online and offline results that are difficult to reconcile. Instructions influence knowledge-based and text-based validation processes, but they did not differentially affect readers' memory for incongruent and false targets. This suggests that the processing differences elicited by the task did not affect readers memory for incongruent or false target information. Although the different patterns of online and offline results are difficult to reconcile, they do illustrate the importance of going beyond the impact of reading tasks on comprehension of a text as a whole and focusing on their effects on specific component processes.

ID: 349 / Poster session 1: 67
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Emotion and motivation

The functional network signature during reward and valence processing

Julie Mae Hall[1], Iris Klaasse[1], Noa Majeau[1], Ruth Krebs[2]
[1]Leiden University, Netherlands, The; [2]Ghent University, Belgium; j.m.hall@fsw.leidenuniv.nl

Studies on reward and valence processing have predominantly focused on neural regions and their interconnections, rather than the brain's functional architecture. In this study, we sought to elucidate the network topology during reward and valence processing. We hypothesized that the brain would show increased global efficiency (GE) during reward and (negartive) valence processing. In 38 healthy participants, we measured the GE and betweenness centrality (BC) across the brain using the Harvard-Oxford Atlas including 132 (sub)cortical regions in a reward-emotion recognition fMRI task. No changes in BC was observed, and no changes in GE during valence processing. Reward processing was associated with significantly higher GE compared to the no-reward condition, predominantly in regions part of the default mode network (DMN), such as the posterior cingulate cortex (PCC), and precuneus. While the DMN is not traditionally associated with reward processing, emerging evidence suggests it may play a role in specific aspects of this function. Moreover, the PCC and precuneus are centrally located within the brain's functional connectivity network. They are important for the integration and coordination of information across various brain regions. These results show the brain architecture changes to subserve more efficient processing during the execution of a cognitive task.

ID: 351 / Poster session 1: 68
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Perception & Sensory Integration

Time-resolved EEG decoding of perceptual surprise

Kirsten Rittershofer[1], Peter Kok[2], Clare Press[1,2]
[1]Birkbeck, University of London; [2]Wellcome Centre for Human Neuroimaging, UCL; k.rittershofer@bbk.ac.uk

From noisy input, our brains must construct perceptual experiences that accurately reflect the state of the world and tell us what we did not already know. It is widely thought that prior expectations play an important role in achieving these goals. However, it is currently unclear how both veridicality and informativeness can be achieved as they require enhancement of opposite (expected vs. unexpected) inputs. The opposing process theory offers a potential solution, proposing that perceptual processing is initially biased towards what we expect with subsequent reactive enhancement only of particularly surprising events. Here, we tested this account using time-resolved decoding of electroencephalography (EEG) data. Participants learned relationships between actions and visual shapes, which were degraded in an EEG session the following day such that the shapes varied in their level of expectedness (72%-4% range). Behaviourally, accuracy decreases and reaction times increase in response to the shapes as they become more unexpected. The EEG decoding profiles peak around 150 ms post-stimulus regardless of expectedness level, but for the most surprising condition this peak is sustained for longer. We discuss how neural surprise enhancements, interestingly, in the absence of perceptual enhancement, may inform model-updating and render our perception both veridical and informative.

ID: 353 / Poster session 1: 69

Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Language

PONG: A model of visual word recognition through bi-hemispheric activation

Joshua Snell
Vrije Universiteit Amsterdam, Netherlands, The; j.j.snell@vu.nl

Orthographic processing is an open problem. Decades of reading research have fueled the development of various theoretical frameworks. Although these frameworks have had good explanatory power, various recent results cannot be satisfactorily captured in any model. In order to account for old and new phenomena alike, here I present a new theory of how the brain computes letter positions. According to *PONG* (which describes the *Positional Ordering of N-Grams*), each hemisphere of the brain comprises a set of mono- and multigram detectors. The crux is that the detectors for a given N-gram are activated to different extents in their respective hemispheres, depending on where in the visual field the N-gram is located. This differential activity allows the brain to estimate the left- or rightness of that N-gram, whereby word activation is a function of the N-gram's identity plus its laterality relative to that of other activated N-grams. Simulations with PONG suggest that the framework effectively accounts for classic phenomena, as well as newer phenomena and cross-linguistic differences that cannot be explained by other models. I also reflect on the neurophysiological plausibility of the model, and avenues for future inquiry.

ID: 354 / Poster session 1: 70
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Perception & Sensory Integration

Recurrent dynamics underlying perception of familiar and novel images

Lea-Maria Schmitt, Wouter Schellekens, David G. Norris, Floris P. de Lange
Donders Institute for Brain, Cognition and Behaviour, The Netherlands; lea-maria.schmitt@donders.ru.nl

The brain's initial feedforward sweep of activity is thought to implement a fixed mapping from sensory input to a perceptual interpretation. Later feedback recurrence iteratively refines this interpretation. Such iterative refinement may be specifically required for novel input that has never been encountered before. To test this hypothesis, we showed participants images of fantastical hybrids which were either novel or had been familiarized. Moreover, image processing was interrupted by a visual mask either early or late after image onset, to either block or allow recurrent feedback. Initial results (n=4) show that an early mask onset selectively decreased behavioural performance for novel images, suggesting that additional recurrent processing is required to understand input for which no stable bottom-up interpretation has yet been established. We are currently directly testing this hypothesis in a functional magnetic resonance imaging study with laminar precision. This study holds promise for identifying a dynamic laminar architecture balancing between rapid and precise inference, thereby furthering our understanding of the computational consequences of neural feedback.

ID: 356 / Poster session 1: 71
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Emotion and motivation

The neural correlates of emotion processing and reappraisal as reflected in EEG

Jinyu Chen[1,2], Vijver Irene[1,2], J.Leon Kenemans[1,2], Joke Baas[1,2]
[1]Utrecht University_spcial and behaviour science; [2]Experimental Psychology and Helmholtz Institute; j.chen7@uu.nl

Successful reappraisal modulates the emotional impact by reinterpreting the meaning of emotion-inducing stimuli, evidenced by decreasing the subjective emotional experience. Here, we recorded EEG during a cued emotion-regulation paradigm including negative and neutral pictures to examine whether the Late Positive Potential (LPP) is sensitive to effects of reappraisal. Firstly, we aimed to replicate LPP analyses commonly conducted at midline electrodes (Fz, Cz, Pz). Typically, the centroparietal LPP is sensitive to the emotional content of stimuli, while only some studies also show effects of reappraisal. We found that the early fronto-centro-parietal LPP (400-1000ms) was increased when passively viewing negative compared to neutral pictures, replicating the basic emotional reactivity finding. The parietal LPP was sustained until the offset of negative pictures during reappraisal, but this LPP was not decreased. Secondly, we applied a localizer approach to uncover reappraisal effects with other spatiotemporal characteristics, but these were not found. There are numerous indications that theta oscillations are associated with cognitive control, while frontal alpha might reflect inhibition processing. We therefore also explored the effects of emotion processing and reappraisal on oscillatory activity to further disentangle the involved cognitive processes, focusing on frontal and parietal theta- and alpha-band power.

ID: 357 / Poster session 1: 72
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Learning & Memory

Action similarity modulates visual working memory representations

Caterina Trentin, Christian N.L. Olivers, Heleen A. Slagter
Vrije Universiteit Amsterdam, Netherlands, The; c.trentin@vu.nl

Recent studies suggest a close link between action and sensory representations in visual working memory (VWM). Here we investigated how action plans influence the way in which VWM representations interact – specifically whether different associated action plans also lead to more differentiated mnemonic representations of sensory input. We hypothesized that associating two visual orientations with different action plans would make them appear more dissimilar in memory than two orientations linked to the same action plan. Participants (n=32) memorized the orientation of two bars, sequentially presented on a touch screen. After a delay, they reproduced each of the orientations. Each bar was associated with a cued action to be performed at test in order to reproduce the memorized orientations. In the *different action* condition, the bars were associated with different action plans, i.e., a grasp and a swipe action. In the *same action* condition, they were linked to the same action plan, namely both grasp or both swipe actions. Our results show that similarly oriented bars repelled each other in both conditions, but more so when associated with different action plans. The findings reveal that not only visual features but also action attributes modulate the way VWM representations interact.

ID: 358 / Poster session 1: 73
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Language

Inter-brain synchrony during (un)successful face-to-face communication

Sara Mazzini[1], Judith Holler[1,2], Peter Hagoort[1,2], Linda Drijvers[1,2]
[1]Max Planck Institute for Psycholinguistics; [2]Donders Institute for Brain, Cognition and Behaviour; Sara.Mazzini@mpi.nl

Human communication requires interlocutors to mutually understand each other. Previous research has suggested inter-brain synchrony as an important feature of social interaction, since it has been observed during joint attention, speech interactions and cooperative tasks. Nonetheless, it is still unknown whether inter-brain synchrony is actually related to successful face-to-face communication. Here, we use dual-EEG to study if inter-brain synchrony is modulated during episodes of successful and unsuccessful communication in clear and noisy communication settings. Dyads performed a tangram-based referential communication task with and without background noise, while both their EEG and audiovisual behavior was recorded. Other-initiated repairs were annotated in the audiovisual data and were used as indexes of unsuccessful and successful communication. More specifically, we compared inter-brain synchrony during episodes of miscommunication (repair initiations) and episodes of mutual understanding (repair solutions and acceptance phases) in the clear and the noise condition. We expect that when communication is successful, inter-brain synchrony will be stronger than when communication is unsuccessful, and we expect that these patterns will be most pronounced in the noise condition. Results are currently being analyzed and will be presented and discussed with respect to the inter-brain neural signatures underlying the process of mutual understanding in face-to-face conversation.

ID: 359 / Poster session 1: 74
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Decision Making

Linking drift-diffusion model parameters to nonlinear neural markers of kinaesthetic awareness across drowsiness stages

Sean David van Mil[1], Valdas Noreika[2,3], Simon van Gaal[1], Tristan Andres Bekinschtein[2]
[1]University of Amsterdam, the Netherlands; [2]University of Cambridge, United Kingdom; [3]Queen Mary University of London, United Kingdom; s.d.vanmil@uva.nl

Drowsiness is a phenomenon affecting our general everyday performance and that of study participants. Especially the latter is often ignored in cognitive science, while it may strongly impact the obtained results in our experiments. However, our understanding of how drowsiness influences cognition and which compensatory mechanisms our brains employ, remains limited. Previous studies have revealed that (nonlinear) cortical and behavioural changes occur across different drowsiness stages, with evidence of a compensatory shift in cognitive resources. In this study, we employ a model-based cognitive neuroscience approach to explore kinaesthetic awareness in response to transcranial magnetic stimulation (TMS) across drowsiness levels. Behavioural dynamics were characterized using drift-diffusion modelling (DDM), while we quantified both linear (weighted Phase Lag Index) and non-linear (weighted Symbolic Mutual Information) neural markers of information processing. Our primary aim was to investigate the extent to which these neural markers predict changes in decision-making parameters. We hypothesized that these markers predict relevant DDM parameters in a spatiotemporally distinct manner, and are modulated by alertness levels. Second, given that non-linear neural markers have been proposed to outperform linear markers in capturing conscious state and content, we anticipated wSMI to be more informative for changes in DDM-informed decision making parameters than wPLI.

ID: 362 / Poster session 1: 76
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Methods and modelling

Some but not all speakers sometimes but not always derive scalar implicatures

Sonia Ramotowska[1], Paul Marty[2], Leendert Van Maanen[3], Yasutada Sudo[4]
[1]Heinrich-Heine-Universität Düsseldorf; [2]University of Malta; [3]Utrecht University; [4]University College London; ramotowska.or.s@gmail.com

Sentences like `*Some* elephants are mammals' are ambiguous between a literal reading, compatible with *all* elephants being mammals, and a reading with scalar implicature (SI), implying that *not all* elephants are. Thus, when providing truth-value judgements (TVJ), participants may

respond either true or false, depending on which reading they get. Previous studies (e.g., Bott & Noveck, 2004) report inter- and intra-individual variations in responses, however, the questions of how consistent participants are in their responses and how to model such variations have received little attention. We report on the data from a TVJ task (N = 95) testing three different types of SIs associated with the <*some*, *all*> scale and introduce a rigorous way of estimating individual differences using a hierarchical Bayesian model with latent group classifications. Our model assumes two groups (literal vs. pragmatic responders), each of which with a different prior distribution of responses. Results show that (i) participants were more likely to be classified as literal responders for one type of SI but as pragmatic responders for the other two, and (ii) each group had a wide distribution of responses. We discuss how the analysis proposed here may help compare processing models of SI in future work.

ID: 363 / **Poster session 1: 77**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Perception & Sensory Integration

Prediction of higher-level features in mouse V1 during natural scene perception

Micha Heilbron[1,2], Floris de Lange[2]
[1]University of Amsterdam, Netherlands, The; [2]Donders Institute for Brain, Cognition, and Behaviour; m.heilbron@uva.nl

Predictive processing postulates that perception involves the comparison of bottom-up signals with top-down predictions. In line with this idea, a large body of work indicates that the brain responds differently to stimuli when they are predictable. However, these studies typically rely on artificial, prediction-encouraging experiments, leaving it unclear whether the findings would generalize to perception more broadly. Here, we test this idea in natural scene perception. Building on recent work, we use generative AI (reconstructing auto-encoders) to quantify the spatial predictability of natural image patches, and compare these predictability estimates to neuropixels recordings of mice viewing natural images from the Allen Institute. The results clearly show that visual cortex responds more strongly when visual information is less predictable. Strikingly, when we examine the feature-specificity of these predictability effects, we find opposite tuning for bottom-up features and top-down predictability. In particular, low-level visual cortex is sensitive to low-level visual features, but *high-level feature predictability*. Together, the results underscore the ubiquity of prediction in cortex, indicating that visual cortex is continuously engaged prediction, in particular of high-level visual features. This motif bears striking similarities to recent, successful self-supervised predictive learning objectives from machine learning.

ID: 364 / **Poster session 1: 78**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Decision Making

Detecting controllability in appetitive and aversive environments

Julie Hoomans, Bertalan Polner, Hanneke Den Ouden
Donders Institute for Brain, Cognition and Behavior, Radboud University; julie.hoomans@ru.nl

Knowing whether we have an influence on our environment is critical for making optimal decisions. The learned helplessness paradigm has yielded a wealth of studies focused on reactions to (un)controllable stressors. However, recent computational accounts consider controllability estimation as a valence-independent process (Ligneul et al., 2022). How does the brain estimate environmental controllability, and is this process valence-dependent?

Here, we create a new explore-and-predict task, based on Raab et al. (2022), that varies environmental controllability in appetitive and aversive contexts. Participants instruct pilots to fly to different islands, and the pilots may comply or follow their pre-determined route. Participants' estimated controllability can be inferred from counterfactual judgements.

Using an established cognitive computational model, we can quantify if people differently estimate control in appetitive versus aversive environments. We will report data from 45 healthy volunteers, who will be tested twice to assess test-retest reliability. Establishing the behavioral effects and psychometric properties of individual differences will pave the way for investigating the role of serotonin in controllability estimation, in an interventional study using the SSRI escitalopram.

ID: 365 / **Poster session 1: 79**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Perception & Sensory Integration

Gravity and Biomechanical Constraints independently bias body posture perception

Qiu Han, Marco Gandolfo, Marius Peelen
Donders Institute, Netherlands, The; qiu.han@donders.ru.nl

Our perception is often biased by prior knowledge of the world. While some knowledge applies universally, for example, gravity, some knowledge pertains to specific objects, for example, an arm can only bend backward for a certain amount due to biomechanical constraints. When both general and specific knowledge influence the perception of a category, an intriguing question emerges: Do they share a mechanism or function independently?

To investigate this question, we used body posture as an example and measured the bias of a lifted arm. We introduced different levels of uncertainty in sensory information by increasing the blur level or memory delay. We found that as sensory uncertainty increased, the bias caused

by biomechanical constraints increased, while the bias caused by gravity remained stable. The gravity bias was already evident even at a 250 ms delay and for the sharpest stimulus, suggesting the knowledge of gravity influences perception early and is resilient against sensory input. Conversely, the effect of knowledge of biomechanical constraints took time to manifest and was contingent on the fidelity of sensory information. This dissociation might indicate that general knowledge is encoded at a very early stage in the perceptual system while specific knowledge is stored later.

ID: 367 / **Poster session 1: 80**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Emotion and motivation

Cerebellar-cortico-limbic functional connectivity and aggressive behaviour: A 7T resting-state fMRI study in healthy volunteers

Elze M.L. Wolfs, Jana Klaus, Dennis J.L.G. Schutter
Department of Experimental Psychology, Helmholtz Institute, Utrecht University, Utrecht, The Netherlands; e.m.l.wolfs@uu.nl

In addition to the involvement of cortico-limbic structures in human aggressive behaviour, recent structural and functional neuroimaging studies have demonstrated that the cerebellum is associated with anger processing, impulsivity and aggressive acts. However, how the cerebellum fits in the cortico-limbic circuit of aggression remains unclear. The aim of the present study was to examine functional connectivity between regions of the cerebellum (i.e., posterior vermis, fastigial nuclei, left and right Crus I) and cortico-limbic regions implicated in aggression (i.e., amygdala, hypothalamus, prefrontal cortex). Furthermore, we explored whether these connections were associated with measures of aggressive behaviour (i.e., self-reported aggression and impulsivity, stealing during a laboratory paradigm, steroid hormone measures). Twenty-seven healthy volunteers (14 males) aged 18-32 years underwent a 9-minute resting-state 7T fMRI scan. Results showed functional connectivity between the vermis and hypothalamus and an anti-correlation between the vermis and prefrontal cortex. Exploratively, more stealing during a laboratory paradigm was correlated to higher functional connectivity between the vermis and right prefrontal cortex. In addition, a higher testosterone/cortisol ratio was associated with lower functional connectivity between right Crus I and the left centromedial amygdala. Overall, our findings provide evidence that the cerebellum is part of the cortico-limbic network of aggression in humans.

ID: 368 / **Poster session 1: 81**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Language

Individual differences in statistical learning ability correlate with morphosyntactic processing in Turkish: Evidence from eye-tracking-while-listening

Talat Bulut[1,2], N. Evra Günhan Şenol[2]
[1]Max Planck Institute for Psycholinguistics, the Netherlands; [2]Istanbul Medipol University, Turkey; talat.bulut@mpi.nl

This study aimed to investigate the association between statistical learning (SL) and morphosyntactic processing in Turkish. In an eyetracking-while-listening experiment, 52 adults listened to Turkish reversible canonical, reversible scrambled and non-reversible sentences, while viewing two pictures (target/foil). The participants had to use morphological cues (case markers) on the noun phrases (NP) to identify the target picture. Gaze proportions to target picture were calculated for each interest period: NP1, NP2 and verb phrase (VP). In addition, auditory and visual SL tests were implemented utilizing triplets of auditory (synthetized syllables) and visual (alien pictures) stimuli with higher transitional probability within than between triplets. The participants' short-term memory capacity and nonverbal intelligence scores were also measured using digit span tests and Raven's matrices. Linear mixed-effects models showed that canonical sentences were associated with more gaze proportions to target than scrambled sentences on NP1. Also, an interaction was found between auditory SL and sentence type on VP, which stemmed from greater gaze proportions to target in canonical sentences than scrambled sentences for participants with higher ASL scores. This finding suggests that individual differences in SL ability correlate with morphosyntactic processing, possibly due to differences in sensitivity to distributional and transitional statistics of case markers.

ID: 369 / **Poster session 1: 82**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Perception & Sensory Integration

Synesthetic colors as window into understanding cognitive mechanisms

Romke Rouw, Nicholas Root
University of Amsterdam, Netherlands, The; r.rouw@uva.nl

For individuals with synesthesia, a particular stimulus ('inducer') evokes a specific, consistent and conscious sensory experience ('concurrent'). For example, in a relatively common variant, grapheme–color synesthesia, linguistic symbols evoke consistent colors ("R is sky blue"). In our lab, we precisely measure synesthetic colors in color space. Synesthetic color associations are not random; instead, there are rule-based regularities that predict which inducer will be associated with which color. This is not only interesting in its own right: by inverting this logic, we can use synesthetic color associations to reveal (regulatory) properties of the inducer stimuli.

In this talk we will discuss 1) grapheme-color synesthesia: how synesthetic letter-colors reveal environmental influences on cognitive concepts shaped during childhood (the "time capsule" approach), and how synesthetic colors reveal linguistic influences on the concept of "letter" 2)

tactile-color synesthesia: how sensations resulting from haptic exploration of surfaces (e.g., sensing 'roughness' or 'stickiness') evoke specific colors. A nano-engineering lab creates specifically tailored stimuli for our experiments; surfaces that vary precisely (e.g., in terms of N/m^2 of adhesion) and orthogonally. We can thus relate physical (material) surface properties to tactile (sensory) experiences, and employ associated (synesthetic) colors to untangle the cognitive properties of these tactile experiences

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ID: 370 / **Poster session 1: 83**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Methods and modelling

Computational modeling of large EEG dataset reveals limitation of EEG signal in reflecting high-level visual features

Jessica Ling Xin Loke, H. Steven Scholte
University of Amsterdam, Netherlands, The; jessica_2020@hotmail.com

Understanding the neural mechanisms of vision is a major goal in computational neuroscience. While deep convolutional neural networks (DCNNs) have shown promise by predicting human visual processing dynamics, the specificity of these predictions remains unclear. To probe the extent to which DCNNs can capture object category information in EEG signals, we trained various DCNNs using distinct "visual diets" - object-only, background with silhouette, background-only, and original images. These DCNNs were then used to build encoding models for a large-scale EEG dataset (n = 10, 82.160 trials each). Our analysis reveals a striking uniformity in encoding performance across differently trained DCNNs. This suggests that the high-level visual features associated with object categories have a negligible impact on EEG-based encoding performance. Consequently, our findings highlight the limitations of EEG data in reflecting object-specific information, thereby cautioning against overinterpreting results from EEG-based object classification studies. This work contributes to a nuanced understanding of the relationship between DCNNs and neural activity, elucidating the constraints of EEG as a tool for investigating high-level visual features.

ID: 371 / **Poster session 1: 84**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Perception & Sensory Integration

The Association between mental imagery Abilities, sensory Sensitivity, and divergent Perception

Tessa M. van Leeuwen[1,2], Thijs van Laarhoven[3], Janina Neufeld[4,5], Reshanne R. Reeder[6], Corina U. Greven[7,8]
[1]Department of Communication and Cognition, Tilburg University, The Netherlands; [2]Donders Institute for Brain, Cognition and Behaviour, Radboud University, Nijmegen, The Netherlands; [3]Department of Cognitive Neuropsychology, Tilburg University, The Netherlands; [4]Karolinska Institute, Stockholm, Sweden; [5]Swedish Collegium for Advanced Study, Uppsala, Sweden; [6]Department of Psychology, University of Liverpool, UK; [7]Radboud University Medical Centre, Nijmegen, The Netherlands; [8]Karakter Child and Adolescent Psychiatry University Centre, Nijmegen, The Netherlands; t.m.vanleeuwen@tilburguniversity.edu

Perception is shaped by both bottom-up input from the senses and by prior information that exerts a top-down influence. A disrupted balance between top-down drive and bottom-up input can lead to divergent perception, e.g., hallucinations. We hypothesize that in individuals with perceptual extremes, e.g., with very strong/weak mental imagery or high/low sensory sensitivity, divergent perception is more prevalent, and possibly associated with stronger (subclinical) psychiatric traits.

In this survey study, we study individual differences in sensory sensitivity (bottom-up) and mental imagery ability (top-down), and their relations to divergent perception. We assess hypo- and hypersensitivity with the Glasgow Sensory Questionnaire, and index sensory processing sensitivity (SPS-Q). For imagery abilities ranging from imagery's absence (aphantasia) to very vivid imagery (hyperphantasia) we use the Vividness of Visual Imagery Questionnaire (VVIQ). Assessing divergent perception, we administer questionnaires for unusual perceptual experiences including hallucinations (O-LIFE), and synaesthesia. We index autistic traits (AQ), Generalized Anxiety Disorder (GAD-7), depression (PHQ-9), and ADHD (ASRS).

Data collection is underway and we expect >200 undergraduate survey responders. We will test whether perceptual extremes are more likely to co-occur with divergent perception. We will apply exploratory clustering methods to uncover relationships between perceptual properties and (subclinical) psychiatric traits.

ID: 372 / **Poster session 1: 85**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Perception & Sensory Integration

Neural encoding with affine feature response transforms

Lynn Le[1], Nils Kimman[1], Thirza Dado[1], Paolo Papale[2], Antonio Lozano[2], Feng Wang[2], Pieter Roelfsema[2], Marcel van Gerven[1], Yağmur Güçlütürk[1], Umut Güçlü[1]
[1]Radboud University, Donders Institute for Brain, Cognition and Behaviour, Netherlands; [2]Netherlands Institute for Neuroscience, Amsterdam, Netherlands; lynn.le@donders.ru.nl

Deep neural network models of biological visual systems aim to achieve high expressivity through massive overparameterization. However, their interpretability and generalizability suffer due to the lack of inductive biases to constrain the optimization. We present affine feature response transforms (AFRT), a new family of spatial transformer networks, that incorporate anatomical constraints on receptive fields to improve model

tractability. AFRT factorizes each neural unit's receptive field into an affine retinal transform followed by a local feature response. This disentangles the retina's sensor transformations from downstream feature computations.

We use the AFRT algorithm to encode multi-unit activity of the macaque V1, V4, and IT regions to show that incorporing neuroscience-based inductive biases is a promising approach for improving deep network tractability without sacrificing expressivity. The compact form of AFRT also enables interpretability, as we show that the higher-level brain regions utilize larger receptive fields learned through AFRT, consistent with previously shown principles regarding the visual cortex.

ID: 373 / **Poster session 1: 86**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Methods and modelling

Differential neural decoding

Thirza Dado, Umut Güçlü
Donders Institute for Brain, Cognition and Behaviour, Netherlands; thirza.dado@donders.ru.nl

Decoding complex perceptual stimuli from limited noisy neural recordings remains a key challenge in systems neuroscience. Conventional neural decoders face difficulties due to high-dimensional nonlinear stimulus-response relationships and variability in neural responses. Recent approaches address these issues by mapping neural data to the latent spaces of generative models such as Generative Adversarial Networks (GANs), but learning robust mappings from absolute neural responses to stimuli or latents remains fundamentally challenging. Here, we present a novel differential neural decoding paradigm that reconstructs stimuli from relative changes between neural responses, offering inherent denoising and quadratic expansion of the training data. We leverage Euclidean geometry exhibited by GAN latent spaces to enable geometric stimulus manipulations aligned with how generators manipulate factors of variation. That is, we combine the predicted latent offsets, which represent perceived stimulus changes, with a reference latent code via vector addition. Overall, our geometrically principled framework facilitates more effective reconstruction of complex stimuli from limited noisy biological response data by emphasizing relative sensory processing.

ID: 374 / **Poster session 1: 87**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Decision Making

How academic stress relates to effortful prosocial behaviour and students' academic achievement

Lonneke Elzinga[1,2,3], Giulia Murgia[1], Todd Vogel[4,5], Jo Cutler[4,5], Matthew Apps[4,5], Merel Teijink[1], Oliver Genshow[6], Berna Güroğlu[1,2,3], Eveline Crone[1,2,3,7], Patricia Lockwood[4,5], Anna van Duijvenvoorde[1,2,3]
[1]Developmental and Educational Psychology, Faculty of Social and Behavioural Sciences, Leiden University, Leiden, The Netherlands; [2]Leiden Institute for Brain and Cognitive Sciences, Leiden University, The Netherlands; [3]Growing Up Together in Society Consortium, Erasmus University Rotterdam, Rotterdam 3062 PA, The Netherlands; [4]Centre for Human Brain Health, School of Psychology, University of Birmingham, Birmingham, UK; [5]Institute for Mental Health, School of Psychology, University of Birmingham, Birmingham, UK; [6]Institute for Management & Organization, Leuphana University Lüneberg, Lüneberg, Germany; [7]Department of Psychology, Education and Child Studies, Erasmus School of Social and Behavioural Sciences, Erasmus University Rotterdam, Rotterdam, The Netherlands; l.elzinga@fsw.leidenuniv.nl

Recent research incorporates the role of effort in prosocial behaviour, little is known about how prosocial behaviour relates to academic achievement and the moderating role of academic stress. This preregistered study therefore investigated how academic stress affected effortful actions for oneself and others (https://osf.io/bne5u/). During an online prosocial effort task, 510 students (18-35 years) chose between resting for lower rewards or exerting effort for higher rewards (Contreras-Huerta et al., 2022; Lockwood et al., 2017). Reward and effort varied over trials. Rewards could be obtained for oneself or an unknown other. During wave 1, half the sample completed the task in an exam period, the others during regular academic weeks. At wave 2, there were no exams. Preliminary analyses of wave 1 indicated that participants exerted more effort for self than others, and effort allocation was sensitive to reward and effort levels. Individuals who exerted more effort for others did not show higher academic performance. Interestingly, greater academic stress was associated with increased effort exertion for others. Currently, we are comparing longitudinal and computational models on within-subject effects in prosocial effort allocation. Our findings could help elucidate when people act prosocially and how it can benefit students' wellbeing and academic success.

ID: 375 / **Poster session 1: 88**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Perception & Sensory Integration

Towards biologically plausible phosphene simulation for the differentiable optimization of visual cortical prostheses

Maureen van der Grinten[1,2], Jaap de Ruyter van Steveninck[1], Antonio Lozano[2], Laura Pijnacker[1], Bodo Rückauer[1], Pieter Roelfsema[2], Marcel van Gerven[1], Richard van Wezel[1], Umut Güçlü[1], Yağmur Güçlütürk[1]
[1]Donders Institute / Radboud University, Nijmegen; [2]Netherlands Institute for Neuroscience, Amsterdam; jaap.deruyter@donders.ru.nl

Blindness affects millions of people around the world and is associated with impaired autonomy and a reduced quality of life. Visual neuro-prosthetics are a promising technology to restore elementary visual function in blind individuals with prior visual experience.There are many challenges ahead for the development of visual prostheses and simulation studies with sighted participants or computational models have proven to be a resourceful method for non-invasive functional evaluation and prototyping. An important drawback, however, is the lack of realism

in existing approaches for the simulation of cortical prosthetic vision. In the current study, we developed a PyTorch-based, fast and fully differentiable phosphene simulator. Our simulator transforms specific electrode stimulation patterns into biologically plausible representations of the artificial visual percepts that the prosthesis wearer is expected to see. The simulator integrates a wide range of neurophysiological results from explorative clinical experiments and from the non-human primate literature, improving the validity for real-life applications. Our results demonstrate the suitability of the simulator for both computational applications such as end-to-end deep learning-based prosthetic vision optimization as well as behavioural experiments. Hereby, our framework forms the ideal toolkit for computational, clinical and behavioural neuroscientists to accelerate the research and development of visual neuro-prosthetics.

ID: 376 / **Poster session 1: 89**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Emotion and motivation

Accounting for taste: visual features of art evaluation

Sjoerd Martin Stuit
Utrecht University, Netherlands, The; s.m.stuit@uu.nl

While experiencing art can be a highly personal and emotional, there is a consensus on what constitutes fine art. Research suggests that the emotional evaluation of art is linked to its basic visual properties. Since such results are often based on averaged ratings of artworks, aiming to find properties that affect individuals similarly. We examined predictability of art evaluations using both individual and averaged ratings based on visual properties such as color and contrast. We asked raters to indicate both 1) if a painting was perceived as positive or negative and 2) if it was perceived as appealing or unappealing. Results show that, while there is more consensus on positivity judgements compared to appeal judgements, both positivity and appeal could be predicted on both the individual- and the group-level using classifiers trained on basic visual properties. However, while classification performance for positivity judgements did not differ between the individual- and the group-level, decoding performance for appeal was higher on an individual- compared to a group-level, indicating a stronger subjective component. We show that both individual- and group-based art evaluations can be modeled using basic visual properties and that appeal judgements have a stronger subjective component compared to positivity judgements.

ID: 377 / **Poster session 1: 90**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Emotion and motivation

Beyond Birth Control - Effects of the menstrual cycle & hormonal contraceptive use on ERP measures of emotion reactivity and regulation

Anne Marieke Doornweerd[1,2], Lotte Gerritsen[2], Estrella Montoya[3], Jinyu Chen[1], Irene van de Vijver[1], Joke Baas[1]
[1]Department of Experimental Psychology, Utrecht University, the Netherlands;; [2]Department of Clinical Psychology, Utrecht University, the Netherlands;; [3]Huijs GGZ, Den Bosch, the Netherlands; a.m.doornweerd@uu.nl

Mental health problems are often reported in hormonal contraceptive (HC) users. Sex hormones affect brain structure and functioning involved in emotion processing.

Effects of HC use on emotion regulation are unknown and could have hormonal and clinical relevance.

We examined emotion regulation in naturally cycling (NC) women (luteal and follicular phase, n=26), OC users (n=35) and IUD users (n=28). EEG activity served as a psychophysiological marker of emotion processing. The Late Positive Potential (LPP) and a new ERP, Frontal Regulation Potential (FRP), were assessed for emotion reactivity and regulation.

During the luteal phase NC women showed a decreasing and lower late LPP; as seen in MDD. During the follicular phase NC women showed different LPP activity when regulating compared to the viewing.

Frontal regulation activity was most prominent in the follicular phase, OC users showed the lowest FRP activity.

Results show a blunted late emotional processing in the luteal phase, possibly reflecting increased vulnerability to depressive symptoms. Regulation relevant activity was shown in frontal-dorsal regions, where OC users showed the lowest activity, highlighting a different emotion regulation pattern for different forms of HC. These findings propose the FRP as a new ERP measure of emotion regulation.

ID: 379 / **Poster session 1: 91**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Perception & Sensory Integration

Prediction error representations in visual word recognition

Jakub Szewczyk[1,3], Micha Heilbron[2], Floris de Lange[3]
[1]Institute of Psychology, Jagiellonian University, Poland; [2]Amsterdam Brain and Cognition, University of Amsterdam; [3]Donders Institute for Brain, Cognition and Behaviour, Radboud University; jakub.szewczyk@gmail.com

Explicit computation of prediction error has been proposed as a key element of predictive coding, an architecture that naturally integrates bottom-up and top-down information. It has been hypothesized that this could lead to increased stimulus representations when prior expectation

conflicts with sensory input (Blank and Davis, 2016). In this fMRI study, we test this hypothesis within the context of visual word recognition. We manipulated the signal strength of visually presented words (low vs. high noise), as well as prior information (visual words were preceded by an auditory word that was unrelated, semantically related, or the same word). Using forward encoding models, we investigated whether stimulus information was stronger when the input was clear and mismatching with prior expectations, therefore generating a strong prediction error.

Preliminary results do not directly confirm this hypothesis: stimulus information in the visual ventral stream was not stronger for mismatching than matching conditions. However, we did find stimulus information patterns consistent with prediction error coding in the inferior frontal and parietal lobes. The results show that findings from Blank and Davis do not generalize to visually presented stimuli and thereby challenge their prediction error coding model.

ID: 380 / **Poster session 1: 92**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Perception & Sensory Integration

The Arrow of Time Dataset: whole brain 7T BOLD responses to thousands of naturalistic videos

Shufan Zhang[1,2], Jurjen Heij[1,2,3], Kendrick Kay[4], Heleen Slagter[1], Tomas Knapen[1,2,3]
[1]Cognitive Psychology, Vrije Universiteit Amsterdam; [2]Spinoza Centre for Neuroimaging, KNAW, Amsterdam; [3]Netherlands Institute for Neuroscience, KNAW, Amsterdam; [4]CMRR & Department of Radiology, University of Minnesota; s.zhang2@vu.nl

Extensive sampling of neural activity during rich cognitive phenomena is critical for robust understanding of brain function. To this end, we introduce the Arrow of Time dataset, a novel resource that captures high-resolution functional magnetic resonance imaging (fMRI) responses to thousands of richly annotated short (2.5s) naturalistic videos.

Participants are exposed to up to 2000 video stimuli while ensuring strict fixation, across eight scanning sessions. The extensive and varied stimuli are annotated using separate eye-movement recordings in different participants as well as neural network-based object segmentation, action recognition, and semantic descriptions. This allows us to investigate how the brain processes and represents complex visual information, such as object recognition, scene understanding, and semantic processing.

The dataset is generated using whole-brain 7 Tesla fMRI optimized for SNR. In our hands, data are preprocessed by NORDIC denoising and spatiotemporal upscaling during distortion correction. Then beta weights are estimated for each single video presentation using GLMsingle which projects out sources of noise and estimates the shape of the HRF at the single-voxel level.

The Arrow of Time dataset will help elucidate the neural basis of naturalistic visual processing in the hands of researchers in the fields of cognitive neuroscience, psychology, and artificial intelligence.

ID: 381 / **Poster session 1: 93**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Learning & Memory

The influence of audio, tactile, and audio-tactile landmarks on route learning in virtual environments

Dominique Blokland, Krista Overvliet, Harmen Gudde, Albert Postma, Nathan van der Stoep
Utrecht University, Department of Experimental Psychology, Helmholtz Institute, Utrecht, The Netherlands; d.p.h.blokland@uu.nl

People travel to their destinations every day, but it can be especially tricky to remember your exact route when navigating unfamiliar environments. In this study, we investigated the influence of auditory, haptic, and auditory-haptic landmarks on route learning ability. We hypothesized that route learning is easier when there are landmarks, and specifically when routes contain audio-haptic compared to unisensory landmarks. To investigate this, we used a videogame-like task in which participants (N = 124) learned routes from a first-person perspective through a virtual maze with a uniform visual look. We presented either auditory, haptic, auditory-haptic (a congruent combination of the two) cues, or no additional cues at decision points along the routes. Participants were asked to walk the exact same routes back to the starting points, as quickly as possible. Sixty-two percent of the participants were able to find their way back in all four levels, meaning 38 percent indicated they were lost in at least one of the environments. Finish times and time spent outside the route were similar for all landmark types. These findings suggest that navigating in unfamiliar environments lacking visual landmarks is quite difficult and that the current auditory or haptic landmarks were not particularly helpful.

ID: 382 / **Poster session 1: 94**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Social Cognition

Freezing in response to ethnic minority faces: testing a fear-based hypothesis of prejudice

Iris J. Traast[1], Felix H. Klaassen[2], Bertjan Doosje[1], Karin Roelofs[2], David M. Amodio[1]
[1]University of Amsterdam, Amsterdam; [2]Radboud University, Nijmegen; i.j.traast@uva.nl

Classic theories of prejudice suggest that prejudice may be rooted in fear and threat (e.g., fear of intergroup violence, threat of intergroup competition, or simply xenophobia). A behavioral expression of fear is freezing: a reduction in body sway and heart rate, and an increase in skin conductance response. Freezing has been found in response to threatening social images, such as faces with an angry facial expression. In our study, we investigated whether White Dutch participants would display more freezing when confronted with an ethnic minority (Moroccan) face

compared with a White Dutch face, especially in trials where the faces displayed an angry facial expression. Freezing was tested by measuring heart rate, and skin conductance response, and with a balance board that measured body sway. Additionally, we tested whether participants would be slower to step forward to (i.e., full-body approach) Moroccan faces than White faces. All data for this study have been collected, but we currently only have preliminary results. This study was ran as an initial test that prejudice might be rooted in fear. This finding would be important because it has implications for how prejudice is learned, expressed in social behaviors, and possibly reduced.

ID: 384 / **Poster session 1: 96**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Cognitive control and executive function

Improving emotional action control in social anxiety by targeting phase-amplitude coupling between prefrontal and sensorimotor cortex

Sjoerd Meijer[1], Bob Bramson[1,2], Ivan Toni[1], Karin Roelofs[1,2]
[1]Donders Institute for Brain, Cognition and Behavior, Centre for Cognitive Neuroimaging (DCCN), Radboud University Nijmegen, 6525 EN Nijmegen, the Netherlands; [2]Behavioral Science Institute (BSI), Radboud University Nijmegen, 6525 GD Nijmegen, the Netherlands; sjoerd.meijer@donders.ru.nl

Social anxiety can be caused and maintained by a lack of emotional action control, leading to persistent avoidance behavior. In this preregistered study, we delivered dual-site phase-coupled brain stimulation to the frontal regions of socially anxious participants, facilitating theta-gamma phase-amplitude coupling, which is own to implement that form of control in non-anxious individuals. We measured fMRI-BOLD responses during in-phase, anti-phase, and sham stimulation of prefrontal and sensorimotor cortex, while participants performed a social approach-avoidance task, requiring automatic and controlled emotional actions. In-phase stimulation led to enhanced behavioral control over emotional action tendencies, modulating neural responses in a portion of prefrontal cortex where stimulation reactivity increased as a function of trait anxiety. These findings illustrate how human neurophysiological connectivity can be leveraged to improve emotion control over social avoidance, opening the way for mechanistically grounded clinical interventions of persistent avoidance in anxiety disorders.

ID: 285 / **Poster session 1: 97**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Emotion and motivation

Enhancing exposure-efficacy in social anxiety using transcranial alternating current stimulation: a proof-of-concept study

Mariana Carneiro de Andrade[1], Davide Ahmar[1], Sjoerd Meijer[1], Bob Bramson[1,2], Moniek Hutschemaekers[2,3], Mirjam Kampman[2,3], Ivan Toni[1], Karin Roelofs[1,2]
[1]Donders Institute for Brain, Cognition and Behavior, Centre for Cognitive Neuroimaging, Radboud University Nijmegen, 6525 EN, Nijmegen, The Netherlands; [2]Behavioral Science Institute, Radboud University Nijmegen, 6525 HR, Nijmegen, The Netherlands; [3]Overwaal Centre of Expertise for Anxiety Disorders, OCD and PTSD, Institution for Integrated Mental Health Care Pro Persona, Nijmegen, The Netherlands, Tarweweg 2, 6534 AM Nijmegen, the Netherlands; mariana.carneirodeandrade@ru.nl

Social anxiety disorder (SAD) is characterized by intense fear and avoidance of social situations. Exposure therapy is its first-line treatment, but avoidance behavior is an important hampering factor in treatment success: as long as patients avoid, fear cannot be extinguished, and new behaviors cannot be learnt. Here, we aim to enhance exposure using a transcranial alternating current stimulation (tACS) protocol previously shown to improve control over social approach-avoidance behavior in both healthy and high-anxious individuals. This approach-avoidance action control is supported by rhythmic interactions between lateral prefrontal cortex (lPFC) theta-band oscillations and sensorimotor cortex (SMC) gamma-band oscillations. tACS can target this endogenous mechanism by rhythmically stimulating the lPFC (6 Hz) and the SMC (75 Hz). In this proof-of-concept study, we investigate whether this in-phase protocol can enhance exposure for SAD, as compared with a matched active-sham stimulation. Participants will receive 20 minutes of stimulation during a speech preparation and delivery as part of an exposure exercise. Subjective and physiological (heart rate and skin-conductance) markers of fear will be measured. Avoidance behavior will be assessed using motion-tracking and eye-tracking. We expect in-phase tACS to reduce in-session avoidance behavior compared to active-sham tACS, and this to be reflected in fear reactivity changes.

ID: 385 / **Poster session 1: 98**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Perception & Sensory Integration

Touch time: The effect of finger size distortions on tactile temporal-order judgments

Chris Dijkerman, Chrysi Stergianni, Krista Overvliet
Utrecht University, Netherlands, The; c.dijkerman@uu.nl

Previous studies have shown that visual distortions of a body part can affect spatial tactile judgements. For example, visually enlarging the arm results in enhanced spatial discrimination. Others have proposed that spatial and temporal processing is highly related. This may also be the case for tactile perception, which is inherently spatiotemporal. In the current study we tested whether a stretched hand illusion influences temporal judgements of touches on that hand.

48 participants performed tactile temporal order judgements, while viewing their hand in a mediated reality set-up under two different conditions: while experiencing the stretched hand illusion, or with an undistorted view of the hand. 10 different stimulus onset asynchronies ranging were used. We fitted a psychometric curve for each participant and condition and extracted the slope at the inflection point, a measure of the discriminability of the stimuli.

The results showed that when the index finger appeared to be longer, the slope was significantly steeper, suggesting that participants were better able to determine the temporal order of the tactile stimuli.

This finding shows that a visual illusion of finger size, and thus body perception, influences temporal tactile processing and suggests that time perception and body size perception are linked.

ID: 387 / **Poster session 1: 99**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Cognitive control and executive function

Expecting a need for control: dissociating experience and expectation in adaptive cognitive control

Bryant Jongkees[1], Roel van Dooren[1], Roberta Sellaro[2]
[1]Universiteit Leiden, the Netherlands; [2]University of Padova, Italy; b.j.jongkees@fsw.leidenuniv.nl

Our dynamic world requires that we tailor our cognitive control to the current context. People indeed adjust, for example, their task-switching ability to contextual demands such as an increased frequency of task-switches. However, research often fails to address a core confound in this finding, by conflating the role of more global, proactive adjustment of cognitive flexibility and more local, reactive adjustment that is driven by short-lasting trial-to-trial sequential effects.

To disentangle this confound, in multiple experiments we investigated to what extent participants adjust their cognitive flexibility to task-switching contexts that were matched for local, trial-to-trial sequential effects (i.e. identical in the frequency of task-switches). Notably, these contexts differed only in participants' expectations regarding the need for flexibility.

Specifically, we provided explicit cues about upcoming changes in task-switch frequency. When these cues were valid, participants decreased their task-switch cost when task-switch frequency increased. Strikingly, even when these cues were not valid and task-switch frequency was fixed and intermediate (50%), participants still made subtle performance adjustments in line with their expectations. Moreover, we found these expectation-driven adjustments were not dependent on nor modulated by reward incentives. We conclude that people dynamically adjust their cognitive flexibility based on both contextual experience and expectation.

ID: 388 / **Poster session 1: 100**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Language

I see, you see: An event-related potential Study of Theory of Mind in a Naturalistic VR Environment

Lukas Kunz[1,2], Ashley Lewis[1,3], Rinus Verdonschot[3], Peter Hagoort[1,3], Fenna Poletiek[2,3]
[1]Donders Institute for Brain, Cognition and Behaviour, Netherlands, The; [2]Cognitive Psychology Unit, Leiden University; [3]Max Planck Institute for Psycholinguistics, Nijmegen; lukas.kunz@mpi.nl

Effective communication involves recognizing the disparity between our own perspective and that of the recipient, influenced by factors such as stereotypes and accents. The extent to which Theory of Mind (ToM), the ability to ascribe beliefs to others, plays a role in this process is uncertain. We anticipate individuals to speak in line with their beliefs, but what if their words conflict with our expectations? To investigate, we devised a virtual perspective-taking experiment where we manipulated a virtual agent's beliefs. Electroencephalography data were collected as participants listened to statements from the agent that either aligned or clashed with their true or false beliefs. We focused on the N400, an event-related brain component linked to word unexpectedness. As hypothesized, statements inconsistent with the agent's true beliefs triggered more pronounced N400 responses compared to matching statements. Furthermore, we anticipated that when the agent held a false belief, this knowledge would factor into interpreting their statements. Neither statements aligned with nor those diverging from the agent's false beliefs evoked N400 responses. This can be taken as evidence that participants did take the agents perspective into account. These results strongly support the role of Theory of Mind in language comprehension.

ID: 390 / **Poster session 1: 101**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Perception & Sensory Integration

Crossmodal art perception: A behavioral and fMRI study

Funda YILMAZ[1], Tessa van Leeuwen[1,2], Umut Güclü[1], Yagmur Güclütürk[1], Rob van Lier[1]
[1]Donders Institute for Brain, Cognition and Behaviour, Netherlands, The; [2]Department of Communication and Cognition, Tilburg School of Humanities and Digital Sciences, Tilburg University, the Netherlands; funda.yilmaz@donders.ru.nl

We studied behavioral and neural underpinnings of crossmodal emotional congruency on art perception. Paintings and music excerpts were first piloted and rated as happy or sad. In the experiment, the paintings were presented without music (unimodal condition) or with music (crossmodal condition). In the crossmodal condition, the music could be emotionally congruent (e.g. happy painting, happy music) or incongruent with the

painting. We included Fourier scrambled versions of the paintings to control for the effect of semantics. We tested 20 participants with fMRI while they rated the presentations. Liking ratings for modality (crossmodal or unimodal) x semantics (normal or Fourier-transformed paintings) were notably stronger for unimodal presentations compared to crossmodal presentations (p<.001). Similarly, liking ratings were higher in congruent condition than incongruent condition, with a significant interaction effect with semantics (p<.001). fMRI results showed that the crossmodal-unimodal contrast predominantly activated auditory and emotion-processing regions, including the Heschl Gyrus, Superior Temporal Gyrus, and Insular Cortex. Further, congruent and incongruent presentations showed marked differences in related sensory areas. Congruency x Semantics revealed heightened activation in emotion-related regions, specifically the Right Putamen and Amygdala. These findings highlight the complex relationship between semantics and emotion processing during multisensory art perception.

ID: 391 / **Poster session 1: 102**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Perception & Sensory Integration

Examining Navon-task-implementations by comparing their internal local-global bias relations

Felix Schweigkofler[1], Sjoerd Stuit[1], Leendert van Maanen[1], Johan Wagemans[2], Tanja Nijboer[1], Stefan van der Stigchel[1]
[1]Utrecht University, Netherlands; [2]Katholieke Universiteit Leuven, Belgium; f.schweigkofler@uu.nl

Whether a person perceives information from the local or the global level of a hierarchical compound figure more quickly/accurately i.e., if they have a local or global bias, depends on figure and task design. Thus, similar local-global tasks (like different Navon-task implementations) may capture different constructs. With the increase in group-differences and individual-differences research, the need for a consensus on local-global tasks has become apparent. Moreover, the Navon-task contains two conceptually distinct local-global biases: 'basic' *precedence* of one level, and *interference* through figure-incongruence that acts more strongly from one level to the other than vice versa. We calculate these two local-global biases for participants from a simple letter Navon task (online data collection, two sessions one week apart) and find them to be neither correlated nor retest-reliable *in this task setup*. To provide more clarity for the use of local-global tasks in past and future research we suggest a common approach based on a clear conceptual demonstration of which bias metrics capture the theoretical local-global constructs best. We apply these metrics to existing data from different local-global task implementations to compare the internal consistency in the relation between these metrics to assess whether different implementations might capture different bias constructs.

ID: 392 / **Poster session 1: 103**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Language

Perceiving through a Language Lens: A Scoping Review of Experimental Approaches in Research on Language and Colour Perception

Owen Kapelle, Monique Flecken, Conrado Arturo Bosman
University of Amsterdam, Netherlands, The; o.e.j.kapelle@uva.nl

The popularity of colour perception as a vehicle to investigate language-perception interactions has led to a large body of experimental work. Recently, studies have focused on investigating what the underlying cognitive and neural mechanisms of the effect of language on colour perception are. Due to substantial variation in experimental designs, in which the underlying mechanistic differences even between two experimental conditions are not always clear, evaluating and comparing the evidence reported in these studies remains complex. This is problematic, because the language-perception interaction is found to manifest differently across various cognitive contexts. More careful task design regarding the task's cognitive demands is required. To this aim, we conducted a scoping review on 72 experimental papers and assessed the various experimental approaches taken. Assessing different cognitive processing demands in experimental tasks may shed light on the cognitive contexts in which language interacts with perception. Based on this review, we conclude that it is necessary to commit more strongly to an interdisciplinary approach, for example by using the available knowledge in the field of predictive coding research. We also provide specific examples on how future research can carefully elucidate the relationship between cognitive load, attention, working memory, and verbal label access.

ID: 393 / **Poster session 1: 104**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Development

Early-life stress accelerates neuro-endocrine control of emotional actions during early adolescence

Anna Tyborowska[1,2], Fleur van Ruller[2], Roseriet Beijers[1,3], Simone Kühn[4,5], Karin Roelofs[1,2], Carolina de Weerth[3]
[1]Behavioural Science Institute, Radboud University, Nijmegen, The Netherlands; [2]Donders Centre for Cognitive Neuroimaging, Donders Institute for Brain, Cognition and Behaviour, Radboud University, Nijmegen, The Netherlands; [3]Department of Cognitive Neuroscience, Donders Institute for Brain, Cognition and Behaviour, Radboud University Medical Center, Nijmegen, The Netherlands; [4]Lise Meitner Group for Environmental Neuroscience, Max Planck Institute for Human Development, Berlin, Germany; [5]Clinic and Policlinic for Psychiatry and Psychotherapy, University Clinic Hamburg-Eppendorf, Hamburg, Germany; anna.tyborowska@donders.ru.nl

Adolescence is a critical period involving intense neuro-endocrine and social-emotional changes. During early adolescence, rising testosterone levels likely facilitate neural reorganization, particularly in emotion circuits, making brain development particularly sensitive not only to ongoing

stressors, but also to the emergence of incubated effects of early-life stress. Using an fMRI-based Approach Avoidance task, this study 1) identifies neural control of emotion actions, as a function of pubertal development (indexed by testosterone) in 12-year-old children (n=92); and 2) qualifies differences in aPFC and amygdala engagement with respect to early-life stress. Higher testosterone levels were related to increased amygdala activity, but aPFC activity during emotion control was not yet modulated by testosterone levels. Critically, this relationship was moderated by early-life stress: 12-year-old adolescents with high testosterone and more early-life stress (0-5 years) exhibited increased aPFC engagement during emotion control – a pattern previously seen during mid-adolescence. The same testosterone-modulated aPFC effect was replicated for higher prenatal stress. These findings show that the relationship between early-life stress and engagement of emotion control regions may be highly dependent on pubertal development. In fact, early-life stress, and even prenatal stress, may accelerate testosterone-moderated aPFC recruitment, during a time of neural reorganization at the onset of puberty.

ID: 394 / **Poster session 1: 105**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Consciousness

Exploring the Relationship between Human Arousal and Feedforward vs. Recurrent Processing

Margot C.E. Steijger[1], **Samuel Noorman**[1], **Lola Beerendonk**[1], **Timo Stein**[1], **Johannes J. Fahrenfort**[1,2], **Simon van Gaal**[1]
[1]University of Amsterdam, The Netherlands; [2]Vrije Universiteit Amsterdam, The Netherlands; m.c.e.steijger@uva.nl

According to the famous Yerkes-Dodson law, performance and arousal have an inverted U-shaped relationship where performance is optimal at intermediate levels of arousal. Despite the conflicting findings that have been reported over the years, we recently found a clear relationship between task performance and arousal, as measured by pupil size, that follows the Yerkes-Dodson law. Moreover, a recent study in mice suggests that pupil-linked arousal impairs recurrent visual information processing, but not feedforward processing. Although promising, how different stages of neural processing are affected by arousal fluctuations is still severely underspecified, especially in humans. The current study investigates the relationship between pupil-linked arousal, perceptual performance, and neural processing in humans further through the analysis of EEG, behavioural and pupil data. We measure arousal through pre-stimulus pupil dilation and pre-stimulus (EEG) alpha-band power and link these measures to the decoding of different visual features (contrast, collinearity, and the Kanizsa illusion), which serve as markers for different neural processes (feedforward, horizontal, and recurrent). Data analysis is still in progress at the time of writing, but we expect feedforward processing to be unaffected by arousal fluctuations, while arousal and recurrent processing are expected to have an inverted U-shaped relationship, mimicking the arousal-performance relationship.

ID: 395 / **Poster session 1: 106**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Attention

Targeting attentional disengagement from threat as an alternative attentional bias modification training paradigm: An online study

Mario Carlo Severo, **Manon Mulckhuyse**
Leiden University, Netherlands, The; m.c.severo@fsw.leidenuniv.nl

Dysfunctional attention to threat is one of the key characteristics of anxiety disorders. In recent years, computerized treatment methods aimed at altering this attention bias, known as attentional bias modification (ABM) training, have been proposed as a practical and cost-effective treatment for anxiety symptoms. However, commonly employed ABM training task has produced inconsistent outcomes. In this study, we devised an alternative task designed to enhance attentional disengagement from threat. We recruited 200 participants in an online experiment where they completed a go/no-go-like visual search task, while being exposed to either an angry or a happy face. Critically, reaction times (RT) and accuracy rates for these emotional faces were compared during pre- and post-training phases in a linear mixed model. Moreover, the structure and relationship of task performance with the psychometric indices of trait anxiety and attention bias were examined using structural equation modeling. Our results revealed faster RTs and improved accuracy post-training relative to pre-training, but equally so for both emotional faces. Additionally, task performance did not show strong relationship with trait anxiety and attention bias. Overall, although the proposed task offers a promising alternative to the currently used ABM training task, further improvements are necessary to establish its viability.

ID: 397 / **Poster session 1: 107**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Language

Dendrites support the formation and recall of lexical memories

Alessio Quaresima[1], **Peter Hagoort**[1,2]
[1]Max Planck Institute for Psycholinguistics, the Netherlands; [2]Donders Institute for Brain, Cognition and Behaviour, the Netherlands; alessio.quaresima@mpi.nl

Phonological word forms are maintained in long-term memory and rapidly accessed during speech. However, the neural mechanisms that support the acquisition, maintenance, and recollection of word-form memories remain unclear. Starting from the hypothesis that dendrites and cell assemblies are the neural substrate for associating phoneme sequences to words, the present study investigates the dynamics of lexical access in a biologically constrained network model and compares it to the computational

principles of human spoken word recognition.

The model is a spiking recurrent network of dendritic neurons with realistic physiology and connectivity. The network implements unsupervised plasticity in the excitatory and inhibitory synapses, resulting in stable associations between phonemic and word representations.

The activity of word assemblies indicates that, first, lexical representations are activated incrementally; second, lexical neighbors delay correct lexical access with both cohort and rhyme groups reactivated; and third, partial phonemic mismatch degrades word recognition. We also derive the model's predictions on the lexical bias effect and show that it is consistent with the hypothesis of offline feedback, providing a plausible mechanism for perceptual learning.

In conclusion, we show that the dendrites could be the missing link between the perceptual space of phonemes and the mental lexicon.

ID: 398 / **Poster session 1: 108**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Attention

Combined eye-tracking & EEG: Understanding visual, nonvisual, and cognitive influences on eye movement-related brain responses during natural viewing

Olaf Dimigen
Rijksuniversiteit Groningen, The Netherlands; olaf.dimigen@rug.nl

Fixation-related potentials, brain-electric responses aligned to the end of saccades, are a promising tool to study attention and cognition under naturalistic viewing conditions. However, basic properties of the scalp-recordable EEG signal following eye movements are still poorly understood. Here I present results from an ongoing project which aims to understand the visual, nonvisual, and cognitive contributions to the fixation-related EEG signal during free viewing. Eye movements and EEG from 40 participants were recorded while they searched for a target stimulus in (1) images of natural scenes, (2) phase-scrambled versions of the same scenes, or (3) total darkness. Deconvolution modeling (Dimigen & Ehinger, 2021) was used to disentangle the overlapping neural responses from subsequent fixations and to isolate the linear or nonlinear effects of about a dozen predictors on the fixation-related neural response. Significant predictors include incoming saccade amplitude and direction, horizontal/vertical fixation location, local image features at the currently foveated location (e.g., local luminance contrast), and the presence/absence of the target stimulus (P300). For Scenes, the model currently explains ~20% of the spontaneous EEG variance over occipital sites. Although the fixation-related response is primarily visually-driven, the data also revealed a significant saccade-related modulation of visual cortex in total darkness.

ID: 399 / **Poster session 1: 109**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Emotion and motivation

Does the Anterolateral Prefrontal Cortex play a role in the regulation of defensive responses? A TMS study

Joke Baas[1], Sanne Rodenburg[1], Marián Boor[1], Floris Klumpers[2], Leon Kenemans[1]
[1]Utrecht University, Experimental Psychology and Helmholtz Institute, the Netherlands; [2]Radboud University, Experimental Psychopathology and Donders Institute, the Netherlands; j.m.p.baas@uu.nl

Chronic anxiety may result from ineffective downregulation of defensive responses after the termination of threat. Previous neuroimaging research demonstrated that the anterolateral prefrontal cortex (alPFC) might play a role in the downregulation of fear after threat offset. The role of the right alPFC was explored by temporarily inhibiting neural activity in this area with continuous theta burst stimulation (cTBS). Two samples of healthy participants (N=28, N=30) completed an instructed fear task after receiving active (right alPFC) and control (vertex) cTBS. Responding was assessed using fear potentiated startle (FPS, focus of this presentation), subjective fear, SCR and EEG. FPS was measured during the (threat and safe) cues, and at offset of these cues. In the first sample startle magnitudes were increased after cTBS stimulation of the right alPFC. In contrast to our hypothesis, this effect was not restricted to the offset of the threat cue (significant main effect of cTBS and interaction cTBS*Threat condition). These findings were not replicated in the second sample, but the samples also did not differ significantly from each other. In conclusion, even though a role of the alPFC in the regulation of defensive responses cannot be ruled out, evidence is preliminary at best.

ID: 386 / **Poster session 1: 110**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Emotion and motivation

Involvement of the alPFC in fear processing and fear downregulation and the oscillatory mechanisms that underlie these processes: a TMS-EEG study

Marian Boor, Sanne Rodenburg, Irene van de Vijver, Leon Kenemans, Joke Baas
Utrecht University, Experimental Psychology and Helmholtz Institute, the Netherlands; m.boor1@students.uu.nl

The anterolateral prefrontal cortex (alPFC) has been found to play a role in fear downregulation. Fronto-medial theta oscillations are shown to be involved in fear expression, while alPFC-theta has been associated with emotional control. By applying continuous theta burst stimulation (cTBS) over alPFC, we investigated the involvement of alPFC in fear downregulation and the effect of cTBS on the underlying oscillatory mechanisms.

Participants completed an instructed fear task before and after receiving active (aIPFC) and control (vertex) cTBS. We found no effect of cTBS on theta oscillations. Against our hypothesis, there was no difference between the threat safe condition after cue onset in the theta range. We found higher delta power following threat versus safe cue. After cue offset, higher theta power was found in the threat condition. In conclusion, we did not find theta oscillations to be involved in fear expression, but they might be associated with fear downregulation after cue offset. Our study provides evidence for the involvement of delta oscillations in fear processing. It remains unclear whether the absence of cTBS effect was caused by an insufficient involvement of aIPFC in fear processing or if brain changes induced by the cTBS were not captured by brain oscillations.

ID: 400 / **Poster session 1: 111**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Emotion and motivation

The effect of awe on attentional scope

Chenxiao Zhao, Marret. K Noordewier, Michiel van Elk
Leiden university, the Netherlands; c.zhao@fsw.leidenuniv.nl

Awe is an emotional response to perceptually vast stimuli that transcend one's current frames of reference. Previous studies found that awe could facilitate global and holistic processing and thus broaden our attentional scope. However, recent studies suggest that awe can be differentiated in terms of positive-awe and threatening-awe, each with different neural mechanism. Also, considering previous research showed that positive vs. negative emotions affect the attentional scope differently, in the current study, we aim to clarify whether positive-awe and threatening-awe exert different effects on attentional scope. In Experiment 1, we independently evoked positive-awe and threatening-awe using videos and subsequently measured their effects on attentional scope with Navon task. Our results suggested positive-awe and threatening-awe affect attentional scope similarly. Experiment 2 replicated these effects after controlling stimulus size. Currently, Experiment 3 is in progress, aiming to measure attentional scope during awe-inducing instead of after awe-inducing.

ID: 403 / **Poster session 1: 112**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Perception & Sensory Integration

Gaze-based global form perception in children with CVI, ADHD and Dyslexia

Marinke Jacobien Hokken[1,2], Y.J. van der Zee[2], J.J.M. Pel[1], M.J.G. Kooiker[1,2]
[1]Erasmus MC, Netherlands, The; [2]Royal Dutch Visio, Netherlands, The; m.hokken@erasmusmc.nl

By the age of five, children can exhibit global visual selective attention (VSA) by integrating local visual elements into a coherent whole. Kanizsa illusory contours (KICs) offer an objective measure of global VSA. Existing clinical research on KICs has often focused on children with autism spectrum disorder (ASD), yet little is known about KICs perception in children with Cerebral Visual Impairment (CVI), ADHD, or dyslexia.

We introduce a novel gaze-based KICs assessment with varying task demands, to eliminate the need for verbal or motor responses. Afterwards, participants answered three questions to assess the degree of conscious KICs perception. We included 19 children with CVI (mean age 9.65 ± 0.48), 34 children with ADHD (mean age 10.39 ± 0.34), 30 children with Dyslexia (mean age 10.35 ± 0.20), and 39 neurotypical children (mean age 9.22 ± 0.31).

Preliminary data indicate notable deficits in accuracy, reaction time, and visual search area in children with CVI, particularly when task demands increase. These findings align with daily observations of CVI symptoms. This study adds that gaze-based KIC tasks may serve as a valuable tool for assessing global VSA in children with CVI, potentially aiding in differential diagnosis between CVI and ADHD or Dyslexia.

ID: 428 / **Poster session 1: 113**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Cognitive control and executive function

Bilingual language control involves effectively switching between languages

Ningjing Cui
Leiden University, Netherlands, The; ningjing.cui@gmail.com

Bilingual language control involves effectively switching between languages, inhibiting non-intended language use, and continuously monitoring speech. It is controversial concerning whether language control operates similarly to cognitive control processes in non-linguistic domains (domain-general) or if it is exclusive to language processing (domain-specific). As midfrontal theta oscillations have been considered as an index of cognitive control, examining whether a midfrontal theta effect is evident in tasks requiring bilingual control could bring new insights to the ongoing debate. Thus, we reanalysed the EEG data from two previous studies where Dutch-English bilinguals named pictures based on colour cues. Our primary focus was on three key control processes in bilingual production: language switching, inhibition of the nontarget language, and monitoring speech errors. Theta power increase was observed in switch trials compared to repeat trials, with a midfrontal scalp distribution. However, this midfrontal theta effect was absent in switch trials following a short sequence of same-language trials compared to a long sequence, suggesting a missing modulation of inhibitory control. This increased midfrontal theta power was also observed when participants failed to switch to the intended language compared to correct responses. Altogether, these findings tentatively support the involvement of

domain-general cognitive control mechanisms in bilingual switching.

ID: 429 / **Poster session 1: 114**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Perception & Sensory Integration

Uncharted territory: Exploring the human auditory TRN

Sonia Balan
Maastricht University, Netherlands, The; s.balan@student.maastrichtuniversity.nl

While the thalamic reticulate nucleus (TRN) has an essential role in filtering incoming sensory information, its auditory part remains relatively unexplored in humans due to its small size and the limited spatial resolution of non-invasive imaging methods. We used ultra-high field (7 Tesla) magnetic resonance imaging (MRI) to characterize the human auditory TRN anatomically and functionally. We manually segmented the TRN in a publicly available in vivo quantitative T2* dataset (0.35 mm3 isotropic)[1], and validated these segmentations using a post mortem dataset [2]. We observed substantial overlap between the in vivo and post mortem segmentations, supporting the feasibility of identifying the TRN based on in vivo anatomical data. We also noted considerable inter-individual differences in TRN shape and size. The functional MRI data [3, 4] a sound-responsive area in the anatomically-defined TRN, which may represent the auditory part of the TRN. However, the close proximity of this region to the thalamic medial geniculate body, along with the previously noted inter-individual variability in TRN shape and size, necessitates follow up confirmation.

ID: 434 / **Poster session 1: 115**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Methods and modelling

Syntactic dependencies in transformers and their relation to the brain

Abraham Jacob Fresen
Universiteit van Amsterdam, Netherlands, The; brammenovichela@gmail.com

Transformers have demonstrated exceptional linguistic performance. However, it is still debated how much these language models correspond to the human brain. Here, we investigated how the accurate representation of syntactic dependencies in transformers influences their correspondence to the brain during language processing. We used the fMRI data from the Mother of All Unification Studies in which participants read sentences with varying syntactic complexity. The same sentences were fed through monolingual and multilingual transformer models. Next, representational similarity analysis was performed between the transformer embeddings and the fMRI data extracted from the LpMTG. This resulted in a representational similarity score for each layer of the transformer models. We then established the accuracy of the dependency representations in the transformers with a labelled structural probe. Then, we compared the representation similarity scores with the accuracy of the dependency representations. Our analysis revealed three key findings: 1) Models that accurately represent dependency information show greater similarity to the brain, 2) Monolingual models outperform multilingual models in both brain similarity and accuracy of dependency representations, and 3) The relationship between brain similarity and accuracy of dependency representations is mediated by syntactic complexity. These results are preliminary, analysis of the complete fMRI dataset is ongoing.

ID: 174 / **Poster session 1: 116**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Learning & Memory

The rise and fall of memories: Temporal dynamics of visual working memory

Andre Sahakian, Surya Gayet, Chris Paffen, Stefan Van der Stigchel
Experimental Psychology, Helmholtz Institute, Utrecht University, The Netherlands; a.sahakian@uu.nl

Visual working memory (VWM) is a cognitive system, which temporarily stores task-relevant visual information to enable interactions with the environment. VWM is typically studied in temporally rigid paradigms that keep inspection (i.e., encoding) and retention times fixed. In everyday VWM use, however, these two temporal components are highly variable, and depend on various internal (e.g., strategy, resources) and external factors (e.g., stimulus availability). Here, we ask how the recall performance of VWM content develops across these two orthogonal temporal dimensions: how do memories build up over inspection time and how do they decay over retention time? We employed a copying task, in which participants were tasked to recreate an “example” arrangement of items in an adjacent empty “workspace”. We tracked their unconstrained viewing and copying behavior at the level of individual item inspections and placements. Our results show that performance monotonically increased for inspection times up to one second (per item), but asymptoted afterwards. Interestingly, while inspections exceeding one second did not improve performance for short (two second) retention times, inspections beyond one second did improve performance for longer retention times. We conclude that useable representations are produced quickly, while longer inspections make representations more robust against decay.

ID: 175 / **Poster session 1: 117**

Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Language

Electrophysiological properties of the concise language paradigm (CLaP): Benchmark and application in stroke neuroplasticity

Natascha Marie Roos[1], Julia Chauvet[2], Vitória Piai[1,3]
[1]Radboud University, Donders Institute, The Netherlands; [2]Max Planck Institute for Psycholinguistics, Nijmegen, The Netherlands; [3]Radboud university medical center, Donders Institute for Brain Cognition and Behaviour, Department of Medical Psychology, Nijmegen, The Netherlands; natascha.roos@donders.ru.nl

Studies investigating language commonly isolate one language modality/process, focusing on comprehension or production. We aim to combine both in the CLaP, tapping into comprehension and production within each trial. The trial structure is identical across conditions, presenting an auditory sentence (constrained, unconstrained, reversed) followed by a picture to name (normal, scrambled), reducing task-related confounds between conditions. Next to constrained and uncosntrained picture naming (context effect), we examined ERPs locked to sentence and picture onset comparing neural responses to auditory versus time-reversed speech as well as recognition of real versus scrambled objects. We tested 21 healthy speakers with EEG and replicated the context effect of power decreases in the alpha-beta frequency range (8-25 Hz) during the pre-picture interval in left hemisphere language areas. Picture-locked ERPs showed that visual evoked potentials (VEPs) significantly differ between conditions, especially in the P2 component (200-300ms). Sentence-locked ERPs revealed auditory evoked potentials (AEPs) in response to normal speech (240-400ms) after sentence onset, significantly differing from time-reversed speech. By virtue of the well-matched contrasts across conditions, the CLaP shows promising opportunities to be used with EEG to further investigate language comprehension and production, and their relationship, in a well-controlled setting in neurotypical and neurological populations.

ID: 176 / Poster session 1: 118
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Perception & Sensory Integration

Similar perceptual repulsion effects for lifelong and recently learned expectations.

Matan Mazor[1,2,3], Nicholas Simpson[1], Kirsten Rittershofer[1], Emma K. Ward[1], Clare Press[1,2]
[1]School of Psychological Sciences, Birkbeck College, United Kingdom; [2]Wellcome Centre for Human Neuroimaging, UCL; [3]Department of Experimental Psychology, University of Oxford; nsimps02@student.bbk.ac.uk

Perception is typically biased towards what we expect, consistent with Bayesian accounts of veridical perception in a noisy sensory world. However, opposite, repulsive effects of expectation on perception have also been reported. For example, Phan, Harris and Kim (2022) found that perception of vertically accelerating objects is negatively biased by gravitational expectations, whereby objects are perceived as less accelerating when moving downward, compared to upward. Here we asked whether this repulsive perceptual effect was due to gravitational priors being acquired early in life and remaining relatively fixed, unlike arbitrary learned expectations in typical studies of perceptual expectation effects, which more commonly give rise to attraction effects. In a pre-registered design (N=100), we replicated the vertical gravitational repulsion effect observed by Phan et al. Critically, we additionally found a repulsive bias in the gravitationally neutral horizontal plane by inducing expectations to see objects accelerating more often in one direction and decelerating more often in the other. This bias was driven by expectations learned in a 20-minute online study, rather than by lifelong expectations of gravitational forces. We conclude that both recently learnt and stable, lifelong expectations can generate perceptual repulsion effects, and discuss potential accounts of attraction and repulsion expectation biases.

ID: 177 / Poster session 1: 119
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Learning & Memory

Goal-dependent use of distinct spatial frames for immersive working memory following self movement

Babak Chawoush[1,2], Dejan Draschkow[3,4], Freek van Ede[1,2]
[1]Institute for Brain and Behaviour Amsterdam, Netherlands, The; [2]Vrije Universiteit Amsterdam, Netherlands, The; [3]Department of Experimental Psychology, University of Oxford, United Kingdom; [4]Oxford Centre for Human Brain Activity, Wellcome Centre for Integrative Neuroimaging, Department of Psychiatry, University of Oxford, Oxford, United Kingdom; babak.chawoush@gmail.com

Working memory enables us to hold onto relevant visual information in service of anticipated future behaviour. Consequently, the goal for which information is retained can crucially drive the way we retain information in working memory. In the current study, we investigated whether distinct spatial frames serve working-memory retention for different tasks in moving participants, even when memorising identical visual information. Participants encoded two oriented bars (left and right) in working memory, then turned around (rotated 180 degrees) before being cued to either reproduce the orientation of the cued item (report blocks) or manually reach back to the cued item (reach blocks). The 180-degree participant rotation uniquely enabled us to disentangle two spatial frames used for working memory: an encoding-centred visual frame (2D picture-like snapshot of the visual information perceived before rotation) and an external-environment frame (keeping track of where the items are in the external 3D world). Reporting and reaching data together with patterns of fixational gaze behaviour unveiled the use of distinct spatial frames for the two tasks. This reveals how a foundational aspect of working memory retention — the spatial frame in which memory content is retained — is critically shaped by the nature of the anticipated task.

ID: 178 / Poster session 1: 120
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Cognitive control and executive function

Dopaminergic Modulation of striatal Activity during Working Memory Input- and Output-gating

Natalie M. Nielsen[1,2], Rebecca D. Calcott[1,2], Ruben van den Bosch[1], Roshan Cools[1,2]
[1]Donders Institute, Nijmegen, The Netherlands; [2]Radboudumc, Nijmegen, The Netherlands; natalie.nielsen@donders.ru.nl

Working memory (WM) enables adaptive transitions between cognitive flexibility and stability. In stimulus-rich environments, dopamine-dependent gating mechanisms ensure that only goal-relevant information is maintained in WM and can therefore influence actions and attention. Yet, precise mechanisms involved remain unclear. This double-blind, placebo-controlled pharmacological neuroimaging study with a 400mg oral dose of the selective D2 receptor antagonist sulpiride, investigates dopamine's role in selective WM gating. According to the dopamine-dependent prefrontal cortex basal-ganglia working memory model (O'Reilly & Frank, 2006), we predict a critical role for the striatum in sulpiride's effects on selective gating. To distinguish input-gating (filtering incoming information to WM) from output-gating (selecting stimuli within WM for action and attention guidance), we employed a cued delayed response task. Participants received pre-cues (before encoding) or retro-cues (post encoding) instructing them to focus selectively on faces or scenes, or globally on both. Behavioural results confirmed a successful gating manipulation, with increased performance during selective gating. Correspondingly, MRI analyses revealed enhanced stimulus-selectivity in visual association cortex during input- and output-gating. Notably, neuroimaging analyses suggested greater effects of sulpiride on striatal BOLD signal during input-gating, raising the possibility (to be confirmed in future studies) that dopamine has a stronger influence on input- than output-gating.

ID: 179 / Poster session 1: 121
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Social Cognition

Political ideology predicts individual variations in neural dynamics when watching non-political movies

Mohammad Hamdan[1,2], Gijs Schumacher[3], H. Steven Scholte[1,2], Frederic R. Hopp[2,4]
[1]Department of Psychology, University of Amsterdam, Amsterdam, Netherlands; [2]Amsterdam Brain and Cognition (ABC), University of Amsterdam, Amsterdam, Netherlands; [3]Department of Political Science, University of Amsterdam Amsterdam, Netherlands; [4]Amsterdam School of Communication Research, University of Amsterdam Amsterdam, Netherlands; hamdans.mohammad@gmail.com

Mounting evidence demonstrates partisan biases in the neural processing of political information. In this study, we asked whether such “neural polarization” extends beyond political content to everyday mundane experiences. Using a large functional magnetic resonance imaging (fMRI) dataset (*N* = 928), we examined whether neural responses during a naturalistic viewing paradigm of non-political clips were more similar for participants who held similar political beliefs. Specifically, we used intersubject representational similarity analysis (IS-RSA) to explore whether intersubject variations in identity-based and issue-based ideology map onto neural dynamics during clip watching. We find that individuals with similar views of political issues (issue-based ideology) also displayed more similar neural activation, specifically in the insula, temporal pole, and cerebellum. Notably, this result did not emerge for identity-based ideology. In contrast, issue-based ideology also explained a substantial fraction of the stimulus-related variance in the total fMRI signal. Moreover, conservative individuals displayed the most idiosyncratic neural activation patterns which were dissimilar to other conservatives as well as to liberals. We discuss these findings in view of ongoing debates linking ideological differences in threat perception and intolerance of uncertainty to increasing societal divides.

ID: 180 / Poster session 1: 122
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Cognitive control and executive function

A novel cognitive test battery for remote online testing to disentangle subcortical and cortical subtypes of Parkinson’s disease

Filip Grill[1], Romain Ligneul[2], Roshan Cools[3], Rick Helmich[1]
[1]Radboud University Medical Center, Department of Neurology, Donders Institute for Brain, Cognition and Behaviour, Nijmegen, The Netherlands; [2]Champalimaud Research, Champalimaud Center for the Unknown, Lisbon, Portugal; [3]Radboud University Medical Center, Department of Psychiatry, Donders Institute for Brain, Cognition and Behaviour, Nijmegen, The Netherlands; filip.grill@donders.ru.nl

The canonical symptoms of Parkinson’s disease (PD) concern the control of movements. It is becoming increasingly clear that PD is a heterogenous disease also impacting behavioral and clinical domains. PD symptom heterogeneity has been leveraged to describe subtypes of the disease ranging from mild-motor-predominant to diffuse-malignant types that show differential disease progression/severity. The cognitive element of subtyping has largely focused on global cognitive processing, leaving more specific questions regarding cortical versus subcortical cognitive profiles unexplored. We developed a cognitive test battery with a set of more differentiated cognitive tests to disentangle reinforcement learning, associated with mesolimbic/nigrostriatal dopamine projections, from higher-order cognitive functions including working memory and control belief estimation, associated with mesocortical dopamine projections. This novel cortico-subcortical dimension will be used to stratify analyses of functional and structural neural connectivity, measured with MRI in the same participants. Data will be collected online in the Personalized Parkinson’s Project cohort (N = 520). We present the feasibility and results from pilot data with 9 PD patients and 30 older healthy controls. The data show that the PD patients perform on par with healthy controls confirming feasibility and that the collected variables have high

dimensionality which is promising from a subtyping stand point.

ID: 181 / Poster session 1: 123
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Perception & Sensory Integration

Oral Numerosity Perception

Garmt Bernard Dijksterhuis[1], Hendrik Gunawan[1], Krista Overvliet[1], Jan van Erp[2]
[1]University of Utrecht, Experimental Psychology & Helmholtz Institute; [2]TNO, Soesterberg, Human Machine Teaming & University of Twente, Human Media Interaction; g.b.dijksterhuis@uu.nl

Numerosity is normally assessed by processes of enumeration (subitizing, counting, estimation). This can be done using different sensory modalities, like vision, audition or (manual) haptics. It can also be done orally, by feeling how many objects there are in one's mouth.

In this study we asked 25 participants to orally enumerate 1-9 candies. We asked for an immediate response (to determine the subitizing range) and a delayed response which enabled counting or estimating. The results show that enumeration is possible in the mouth. Oral subitizing resulted in 24 participants correctly mentioning one to three candies. This is approximately the same as the limit of haptic subitizing, as it is indeed the haptic sense that feels objects in the mouth.

Counting/estimating resulted in 16 participants correctly mentioning one to four candies. The task thus appeared more difficult than visual or (manual) haptic counting.

Oral numerosity perception has no evolutionary use that we can think of. From the fact that humans possess this skill to some extent we tentatively conclude that subitizing is such a basic cognitive skill that we can apply it on virtually any sensory input. Counting/estimating appears more difficult in the mouth, and may draw on higher cognitive processes.

ID: 182 / Poster session 1: 124
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Perception & Sensory Integration

Changes in population receptive field location with artificial scotoma; topographic remapping or nonlinear responses?

Marcus Daghlian[1,2,3,5], Mayra Bittencourt[1,2,3,5], Frans Cornelissen[5], Serge Dumoulin[1,2,3,4]
[1]Spinoza Centre for Neuroimaging; [2]Netherlands Institute for Neuroscience, Royal Netherlands Academy of Sciences; [3]Vrije Universiteit; [4]Utrecht University; [5]Laboratory for Experimental Ophthalmology, UMCG; m.daghlian@spinozacentre.nl

Patients with retinal damage often remain unaware of scotomas, perceiving them as "filled-in" by their surroundings. Research in both animal models and patients suggests that (population) receptive fields ((p)RFs), near scotomas undergo remapping. It has been argued that this remapping is an example of adaptive plasticity, with pRFs shifting towards spared parts of the visual field. However, there is also evidence of non-adaptive remapping outside the scotoma-projection zone, even in healthy individuals exposed to artificial scotomas. We investigate whether these shifts can be explained by a divisive normalisation PRF model. Simulations reveal that scotomas can asymmetrically affect the activating and normalising pRFs leading to apparent changes in position preference to stimuli. In our study, we recorded activity in the visual cortex of five participants using 7T fMRI while they viewed standard retinotopic mapping stimuli, both with and without an artificial scotoma. We replicate previous findings of apparent shifts in PRF location, and, in line with our simulations, we find that these apparent shifts are smaller with the divisive normalization model than for the linear (single Gaussian) model. This suggests that scotoma induced "shifts" can be partially explained by nonlinear responses, rather than cortical plasticity.

ID: 188 / Poster session 1: 125
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Attention

Predicting lapses of attention: Frontal P3 as a supramodal marker of human susceptibility

Evan Canny[1], Damian Koevoet[2], Leon Kenemans[2]
[1]Amsterdam Law School, University of Amsterdam; [2]Experimental Psychology, Helmholtz Institute, Utrecht University; e.canny@uva.nl

Throughout our daily lives, we often need to pay attention for long periods of time. Lapses of sustained attention have serious consequences like traffic accidents. Predicting such lapses would be of theoretical and practical importance. Previous research suggested that the EEG/ERP frontal P3 wave (fP3) may be a sensitive marker of human susceptibility. We adopted the Continuous Temporal Expectancy Task (CTET) to replicate the previously reported predictive value of fP3 for visual-target detection. Additionally, we added an auditory version of the task. Participants (total n = 56) viewed a continuous stream of rotating checkerboards (800ms), with occasional targets being presented for 1120ms (yielding an approximate 60% hit rate). The auditory version involved alternating pitches. As expected, each new rotation or pitch alternation elicited a clear fP3 with peak latencies 200-300ms following stimulus onset. In three experiments, lower fP3 amplitudes predicted missing of visual CTET

targets about 2.5 seconds ahead. In experiment 3, an analogous result was found for the fP3 in relation to auditory targets. In sum, lapses of sustained attention were associated with reduced fP3 amplitudes 2.5 seconds prior to the lapse. This shows that the fP3 is a supramodal and sensitive index of human susceptibility.

ID: 226 / **Poster session 1: 126**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Social Cognition

Confidence-related effects on the behavioral and neural integration of social information

Lieke Hofmans, Wouter van den Bos
Universiteit van Amsterdam, The Netherlands; l.hofmans@uva.nl

Social learning is a hallmark of human behavior, and entails the integration of others' behavior or ideas with one's own. Although social learning can accelerate the learning process by circumventing slow and costly individual trial-and-error learning, it is important for one to know when to use social information and whose information to use for it to be effective. Here, we investigated how individuals use social information depending on how confident they are themselves based on the current situation and how confident the other reports to be.

Seventy healthy adults performed a perceptual decision-making task while being fMRI-scanned. In this task, participants could adjust their initial decision in response to observing someone else's decision accompanied by their subjective confidence report. Own and other's confidence were manipulated by the amount of information that could be observed before making a decision.

As expected, adjustments were larger when individuals themselves were less confident and the other was more confident. I will show how our computational modeling and fMRI results give more insight into the neural mechanisms of this behavior.

Finally, I will introduce our ongoing follow-up study and hypotheses on how these confidence-related effects develop during adolescence, based on a Bayesian reinforcement learning framework.

ID: 433 / **Poster session 1: 127**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Learning & Memory

Attentional guidance through episodic memory: Evidence from the attentional blink

Giulia Quagliozzi, Mark Nieuwenstein
University Groningen, Netherlands, The; g.quagliozzi@student.rug.nl

Episodic memories of previously experienced events may serve an adaptive function in allowing us to anticipate the occurrence of stimuli and outcomes in similar new events. Here, we ask whether the incidental retrieval of an episodic memory biases attention towards the elements comprising the earlier-experienced event. Episodic memories were induced by asking participants to vividly imagine a series of events in which they encountered a famous person with a certain object in a certain scene, each shown as pictures on the screen. Next, participants performed an attentional blink task in which the first target (T1) was a picture of a previously encoded face or object and the second target (T2) could be the associated scene, a non-associated scene, or a novel scene. Controlling for response biases, the results showed that the attentional blink was significantly reduced when T1 and T2 formed part of the same episodic memory, such that associated T2 scene images appeared to pop-out in the sequence of images. This finding suggests that the rapid, incidental retrieval of an episodic memory of a previously imagined event biases our attention towards the elements that occurred as part of that event.

ID: 102 / **Poster session 1: 128**
Abstract Submission for Poster / Talk
I would like to be considered for a talk.
Select best fitting topic: Attention

SSVEPs reveal dynamic (re-)allocation of spatial attention during maintenance and utilization of visual working memory

Samson Chota, Arnaud T. Bruat, Stefan Van der Stigchel, Christoph Strauch
Utrecht University, Netherlands, The; s.chota@uu.nl

Visual Working Memory (VWM) allows to store goal-relevant information to guide future behavior. Prior work suggests that VWM is spatially organized and relies on spatial attention during maintenance. Importantly, attention often needs to be dynamically redistributed between locations, e.g. for an upcoming probe. However, little is known about the temporal dynamics of attentional distribution during a VWM task.

We demonstrate EEG Steady-State Visual Evoked Potentials (SSVEPs) to successfully track the dynamic allocation of spatial attention during a VWM task. Participants were presented with to-be-memorized gratings and distractors at two distinct locations, tagged with flickering discs. This allowed us to dynamically track attention allocated to memory and distractor items via their coupling with space, by quantifying the SSVEP responses.

SSVEP responses did not differe between memory and distractor locations during early maintenance. However, shortly before probe comparison, we observed a decrease in SSVEP coherence over distractor locations indicative of a reallocation of spatial attentional resources. Reaction times were shorter when preceded by stronger decreases in SSVEP coherence at distractor locations, likely reflecting attentonal shifts from the distractor to the probe or memory location.

Our work, both provides a new tool to study, and reveals the dynamic distribution of attention within VWM.

ID: 402 / **Poster session 1: 129**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Consciousness

NMDA receptor antagonist memantine selectively affects neural feedback processing during visual perception

Samuel Noorman[1,2], Timo Stein[1,2], Jasper Zantvoord[3,4], Vlada Aslanov[5], Johannes J. Fahrenfort[1,2,5], Simon van Gaal[1,2]
[1]Department of Psychology, University of Amsterdam; [2]Amsterdam Brain and Cognition, University of Amsterdam; [3]Amsterdam UMC location University of Amsterdam, Department of Psychiatry; [4]Amsterdam Neuroscience; [5]Department of Applied and Experimental Psychology, Vrije Universiteit Amsterdam; v.aslanov@vu.nl

Many theories of consciousness posit that consciousness requires the integration of information through recurrent processing. While animal research has demonstrated that blocking NMDA receptors interferes with recurrent processing, establishing a causal link between recurrent processing and human perception has remained challenging. In this study, we capitalized on the physiological basis of recurrent processing to pharmacologically manipulate it in human participants. By administering memantine, we blocked NMDA receptors while decoding the processing of different visual features in the brain from EEG data. Decoding of stimulus luminance contrast served as a marker of feedforward processing. Decoding of the illusory surface of a Kanizsa triangle served as a marker of feedback processing. We found that memantine selectively affected the ability to decode the Kanizsa illusion, while leaving the ability to decode contrast largely unaffected. Interestingly, the results from an task-relevance manipulation suggest that memantine was only effective when the stimuli were attended and consciously perceived. These findings demonstrate that NMDA blockade selectively affects feedback processing and thereby provide a crucial step toward bridging animal and human research, shedding light on the neural mechanisms underpinning consciousness.

ID: 401 / **Poster session 1: 130**
Abstract Submission for Poster / Talk
I prefer to present a poster.
Select best fitting topic: Decision Making

Autonomy and sense of agency: the effect of personal choice on temporal binding

Josi Maria Anna Driessen, N. Akyüz, H. Aarts
Utrecht University/Donders Institute, Netherlands, The; j.m.a.driessen@uu.nl

Personal autonomy, i.e., the ability to make one's own choices and to organize one's own behaviors to realize desired outcomes, is a central component of human social conduct. It crucially depends on the sense of agency, which is commonly defined as the intrinsic experience of oneself being the author of one's own actions and its consequences. Studies have examined the relationship between autonomy and the sense of agency by studying the effect of personal choice on temporal binding, an implicit marker of the sense of agency that comprises the subjective compression of the temporal interval between a voluntary action and its consequence. The methodological characteristics of these studies seem to vary greatly, and the results are mixed. We conducted a meta-analysis aiming to systematically investigate the existing research on personal choice and temporal binding, identifying potential moderators that may contribute to the heterogenous outcomes observed across various studies.