44th Experimental Psychology Conference
2017

Image - "Photo of Boat Harbour, Port Stephens"
by Stuart Marlin (used with permission)
Organising Committee

Darren Burke: Conference Chair
Kerry Chalmers
Simon Dennis
Ami Eidels
Emily Freeman
Frances Martin

Thanks to student assistants

Kylie Campling
Jacob Dye
Paul Garrett
Zach Howard
Reilly Innes
Johanne Knowles
Joshua Makin
Allyson Ray
Laura Wall
Hyungwook Yim

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Sponsors

The organising committee would like to thank the Faculty of Science and the School of Psychology at The University of Newcastle for their support.
Travel and Accommodation

Shoal Bay is in Port Stephens, about 60km north-east of Newcastle, NSW. The scenic blue water wonderland of Port Stephens is a popular tourist area with a range of activities on and off the water.

The area is famous for its dolphin and whale watching cruises, while koalas and other wildlife can be found on the many natural bushwalks surrounding the town. Those seeking a physical challenge may like to tackle the two-hour Tomaree Headland Summit Walk featuring historical World War II gun emplacements and stunning panoramas of the surrounding waterways.

Further south, Newcastle is one of Australia's oldest and most interesting cities. Containing a quirky blend of new and old architecture, a rich indigenous history, a working harbour (currently the largest coal exporter in the world) and fabulous beaches; Newcastle is known as unique and eclectic.

The land and waters of Newcastle and the Hunter are acknowledged as the country of the Awabakal and Worimi peoples, whose culture is celebrated in community events, place naming, signage and artworks.

Getting to Shoal Bay

Flying

Newcastle Airport has direct flights to and from Sydney, Melbourne and Brisbane. There are indirect flights between Newcastle and Adelaide, Hobart, Perth and Darwin. The airport is located approximately 35 minutes from Shoal Bay and 30 minutes the Newcastle CBD. Airport transfers can be arranged at the airport or through your preferred accommodation provider. See Newcastle Airport for more information.

From Sydney by car

Shoal Bay is in Port Stephens, about a one hour drive north of Newcastle. Newcastle itself is approximately two hours north of Sydney and is accessible from the M1 Motorway (formally F3), Pacific Highway, New England Highway and Golden Highway. Follow the signs to Nelson Bay. At the roundabout just before Nelson Bay turn right and follow Dowling Street to Shoal Bay Road and continue to Ramada Resort near the intersection with Tomaree Road.

From Sydney by train

Return services run daily from Sydney to Hamilton (Newcastle) every hour. Travel time is approximately three hours. For timetables and fare information visit Transport Info or call 131 500.

From Hamilton, Port Stephens Coaches provide regular services to Shoal Bay with its 130 and 131 routes. Port Stephens Coaches uses Opal cards.
The venue

The conference will be held in the Whitesands Conference Centre located at the Ramada Shoal Bay Resort. The address is 35-45 Shoal Bay Road, Shoal Bay NSW 2315. Please see previous page for travel directions.
Image - “View of Shoal Bay from Mount Tomaree, Port Stephens”

by Emily Freeman (used with permission)
## Wednesday

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<tr>
<td>800</td>
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<td>Learning and Attention Chair: Alex Holcombe</td>
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<td>Encouraging rule-based transfer in human contingency learning</td>
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<td>930</td>
<td>Alex O. Holcombe, Charles J. H. Ludowici</td>
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<td>Juno Kim, Masakazu Ohara, Kowa Koida</td>
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<td>Learning and attention under uncertainty: evidence for an 'attentional habit'?</td>
<td>Using the Oculus Rift to understand the perception of shape</td>
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<td>1010</td>
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*Note: The asterisks indicate the presenting author for the session.
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<td><strong>Factors affecting face judgements</strong>&lt;br&gt;Chair: Michael Nicholls</td>
<td>Lucy Albertella and Mike E. Le Pelley&lt;br&gt;&lt;br&gt;<em>Selective attention moderates the relationship between attentional capture by signals of nondrug reward and illicit drug use</em>&lt;br&gt;Presentation author: Daniel J. Carragher, Nicole A. Thomas, Michael E.R. Nicholls&lt;br&gt;&lt;br&gt;<em>I get more attractive with a little help from my friends</em>&lt;br&gt;Presentation author: Annabelle Lee Cheong Lern, Justin Harris, and Evan Livesey</td>
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<td>Enrique Mergelsberg, Ottmar Lipp &amp; Patrick Clarke&lt;br&gt;&lt;br&gt;<em>A Closer Look at the Repetition Assumption in Training Selective Attention</em>&lt;br&gt;Presentation author: Belinda Craig, Nicole Nelson, &amp; Barnaby Dixson&lt;br&gt;&lt;br&gt;<em>Beards Influence Emotion Recognition</em>&lt;br&gt;Presentation author: Colagiuri, B. &amp; Quinn, V. F.</td>
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<td>Oriane Landry, Sarah J. Fleming, Katherine A. Johnson, Sheila G. Crewther &amp; Philippe A. Chouinard&lt;br&gt;&lt;br&gt;<em>Orienting impairments in Autism Spectrum Disorder are motoric not attentional</em>&lt;br&gt;Presentation author: Samantha L. B. O’Brien, Bruce K. Christensen, Stephanie C. Goodhew&lt;br&gt;&lt;br&gt;<em>The Effect Shifting Criterion Has on Affect: Its Reduction and Exacerbation</em>&lt;br&gt;Presentation author: Stephanie Quail, Richard Morris, &amp; Bernard Balleine</td>
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<td>Philippe A. Chouinard, Hayden J. Peel, Oriane Landry</td>
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<td><em>Action disposition influences responses towards aversive images of humans during early picture processing in male and female participants</em></td>
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| 1240  | Lunch                    |                                                                      | - 1400 Real World Bias  
Chair: Ian Johnston  
Eva Kemps, Marika Tiggemann and Ebony Stewart-Davis  
Attentional bias modification can inoculate people to withstand exposure to real-world food cues  
Perception  
Chair: Jason Bell  
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Functional effects of the McCollough effect and its relation with retinal and non-retinal vision  
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Suddenly I see: Presentation of a solution enhances ‘aha’ experience, particularly when the solution is unexpected |
| 1250  | Lunch                    |                                                                      | - 1420 Mei Peng, Sarah Adam, Michael Hautus, Myoungju Shin, Lisa Duizer, Huiquan Yan  
Cultural dependence on visual cues for predicting satiation and food intake  
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Chair: Jason Bell  
Shuai Er Han, Charry Kong, Randolph Blake and David Alais  
Why are dynamic Mondrian patterns unusually effective in inducing interocular suppression?  
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Exploring functions of working memory related to fluid intelligence: Coordination and relational integration |
| 1440  | Afternoon Tea            |                                                                      | - 1450 Melissa Rouel & Evelyn Smith  
Attentional bias in contamination aversion  
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Chair: Jason Bell  
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How can we tell if an aftereffect makes the world look different?  
Higher Order Cognition  
Chair: Gina Grimshaw  
Ruth Byrne, Mary Parkinson, Shane Timmons, & Tiago Almeida  
Moral diminishment: The effects of imagined counterfactual and semi-factual alternatives on moral judgments |
| 1500  | Afternoon Tea            |                                                                      | - 1510 Amy Perfors, Daniel Navarro, Arthur Kary, Scott Brown, Chris Donkin  
Extremists and echo chambers: Learning from each other in iterated transmission chains  
Perception  
Chair: Jason Bell  
Simon J. Cropper, Jason D. Forte & Ruirong Mao  
Preferred colours are not the same as preferred faces  
Higher Order Cognition  
Chair: Gina Grimshaw  
Marcellin Martinie, Piers Howe, Tom Wilkening  
Extensions to the Surprisingly Popular (SP) algorithm, a solution to the single-question crowd wisdom problem. |
| 1520  | Posts                    |                                                                      | - 1530 Free time  
Posts  
Higher Order Cognition  
Chair: Gina Grimshaw  
Extensions to the Surprisingly Popular (SP) algorithm, a solution to the single-question crowd wisdom problem. |
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Keynote Speaker: Ross Day Plenary lecture

Professor Andrew Heathcote
University of Tasmania

Andrew Heathcote is an ARC Professorial Fellow in the Division of Psychology. He uses mathematical and computational techniques to model cognitive processes and their links to behaviour and the brain, particularly with respect to learning and memory and making rapid decisions. In 2012 he was elected to the Australian Academy of Social Sciences and to the Executive of the Society for Mathematical Psychology, and as its Vice-President in 2014. He is a past Associate Editor of the Journal of Experimental Psychology: Learning, Memory & Cognition and currently in that role at Psychonomic Bulletin and Review and Journal of Mathematical Psychology.

Andrew graduated from the University of Tasmania with a BSc majoring in physics and psychology in 1993, and obtained a 1st Class Honours in Psychology in 1984. As a Commonwealth Postgraduate Fellow he completed a PhD at Queen's University in Canada with Professor Doug Mewhort, in 1990 and in 1991 was a Postdoctoral Fellow with Professor Roger Ratcliff at Northwestern University in Chicago. In 1992 he returned to Australia to take up a position at the University of Newcastle, where over the next 22 years he held nine ARC Discovery Projects grants and was Deputy Head and then Head of the School of Psychology and was promoted to Professor. During that time he founded the Newcastle Cognition Laboratory (NewCL.org), which has grown to become a leading centre for Mathematical Psychology and Cognitive Science in Australia. In 2015 he took up a research chair at University of Tasmania (80%) and University of Newcastle (20%), founding the Tasmanian Cognition Laboratory (TasCl.org).

Professor Heathcote's lecture is entitled: Accumulating Evidence about Psychological Processes
Event 1

Forum: Emerging research in cognition, emotion, and motivation

Meeting on Wednesday 19th April 2017 12-5 pm

Organisers: Eva Kemps (eva.kemps@flinders.edu.au) and Steven Most (s.most@unsw.edu.au)

The forum on “emerging research in cognition, emotion, and motivation” will hold its meeting immediately preceding the 2017 Australasian Experimental Psychology Conference. We invite all researchers at the interface of cognition, emotion, and motivation to participate. The forum program is designed to be interactive and will include plenty of audience participation. It provides a valuable opportunity to network and explore collaborations, to share and hear about developing lines of research, and it will be a great way to kick off the conference.

Event 2

Personal Analytics and the Future of Psychological Research

Professor Simon Dennis (University of Newcastle)

In the history of psychology, there have been three fundamental changes. The first of these was the realization that the scientific method could be applied to human behaviour. The second was the understanding that behaviour could be modelled using mathematics. The third was the development of techniques to examine the neural underpinnings of behaviour. We are on the cusp of the fourth major change. The ability to monitor human behaviour and context in the wild over periods of months and years will have a profound effect on the way we conduct our science.

In this workshop, I will describe the unforgettable.me experience sampling system. In addition to the unforgettable.me app which captures accelerometry, GPS, audio and images continuously, the system can stream data from 359 other sources, such as wearables, social media, financial services, appliances and cars. I will discuss machine learning and dynamic systems methods for analysing the large volumes of data that are collected. I will demonstrate the personal memory system that we are constructing and show how we are using the data to reimagine what an account of human memory might look like. I promise it will be an unforgettable workshop.
ABSTRACTS

Image - “Shoal Bay, Port Stephens”

by Kerry Chalmers (used with permission)
**Pink Cricket Balls May Be Visually Challenging at Sunset**

Adie, Joshua M., & Arnold, Derek H.

*Perception Lab, The University of Queensland.*

Cricket is one of the world’s most popular sports, followed by hundreds of millions of people. It can be dangerous, played with a hard ball flying at great velocities, and accidents have occasionally been fatal. Traditionally, cricket has been played during the day, using a dark red ball. Since the late 1970s, a shorter form of one-day cricket has been played both during the day and at night under floodlights. To overcome visibility issues, one-day cricket uses a white ball, and players wear coloured clothing. There is now a desire to play a traditional form of cricket during the day and at night, using a ‘pink’ ball while players wear white clothing. Concerns regarding visibility, and player and umpire safety, have been raised in this context. Here, we report that these concerns have a sound basis. Further, we will discuss the findings of a lab-based study in which we mimic these conditions.

joshua.adie@uq.net.au

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**Selective attention moderates the relationship between attentional capture by signals of nondrug reward and illicit drug use**

Lucy Albertella and Mike E. Le Pelley

*UNSW*

We examined whether cognitive control moderates the association between (non-drug) reward-modulated attentional capture and use of alcohol and other drugs (AOD). Participants were 66 university students who completed an assessment including questions about AOD use, a visual search task to measure value-modulated attentional capture, and a goal-directed selective attention task as a measure of cognitive control. The association between the effect of value-mediated attentional capture and illicit drug use was moderated by level of cognitive control. Among participants with lower levels of cognitive control, value-modulated attentional capture was associated with illicit drug use. This was not the case among participants with higher levels of cognitive control, who instead showed a significant association between illicit drug use and self-reported impulsivity, as well as alcohol use. These results provide support for models that view addictive behaviours as resulting from interaction and competition between automatic and more reflective processes and have important implications for understanding the development and maintenance of substance use disorders and potentially their treatment and prevention.

l.albertella@unsw.edu.au
Mirror neuron system activation differs in golfers watching videos of golf compared to novel sports depending on conceptual versus motor familiarity

Georgina A. Amos., Philippe A. Chouinard
La Trobe University

In this preliminary fMRI study, we examined the responsiveness of the mirror neuron system in athletes watching videos of their sport (golf), a novel sport with similar movements (ice hockey), and a novel sport with completely different movements (ballet). Experienced golfers (N = 8) watched videos of golf, ice hockey, and ballet. We analysed the data based on a general linear model. We modelled the time course for each of the three conditions, estimated the model, and extracted the parameter estimates (beta weights) from different regions-of-interest (ROI) as defined by an independent functional localiser for the mirror neuron system. ANOVA demonstrated a main effect approaching significance in the left ventral premotor area \( F(2,20) = 3.81; p = .064 \) driven by greater BOLD activation from watching golf compared to the other sports. Correlation analyses performed in the left superior temporal sulcus demonstrated that BOLD from watching golf correlated positively with BOLD from watching ice hockey \( r(6) = .94, p < .001 \) but not ballet \( r(6) = .63, p = .095 \). Taken together, different nodes of the mirror neuron seem to vary in their responsiveness to the conceptual familiarity of a sport as well as similar movements across different sports.

g.amos@latrobe.edu.au

Parafoveal semantic preview benefit depends on both preview plausibility and target predictability

Sally Andrews & Aaron Veldre
University of Sydney

Recent eye movement studies have shown that preview benefit can be obtained from a parafoveal word that is a plausible continuation of the sentence, regardless of its semantic or orthographic relatedness to the target word. This study tested whether this plausibility preview benefit is modulated by the contextual constraint of the sentence. Participants’ eye movements were recorded as they read sentences in which target words that were either highly predictable or unpredictable in the sentence were replaced by identical, predictable, unpredictable or implausible previews until the reader’s eyes passed an invisible boundary immediately before the target word location. Target predictability significantly interacted with identity and plausibility preview effects: Identical previews yielded significantly more benefit than plausible previews for highly predictable targets, but for unpredictable targets a plausible preview was as beneficial as an identical preview. These findings shed light on the role of contextual predictability in early lexical processing and suggest that readers activate a set of contextually compatible words prior to the presentation of the target word.
sally.andrews@sydney.edu.au
Postural sway is affected in schizotypal personality disorder

Deborah Apthorp, Amanda R Bolbecker, Lisa Bartolomeo, Brian F O’Donnell, William P Hetrick
Australian National University

One of the strongest components in psychiatric disorders such as schizophrenia and bipolar disorder is motor abnormalities such as increased neurological soft signs, sensorimotor synchronization, oculomotor disturbances, and so on. However, it is unclear how many of these symptoms might be attributed to the effects of medication or other substance abuse issues that often accompany these disorders. To address these concerns, we sought out a group of patients in a group at risk for developing schizophrenia, but with no other neurological abnormalities or substance abuse disorders. We measured postural sway using force plates in 28 individuals with schizotypal personality disorder (SPD) and 28 carefully matched controls, along with 28 patients clinically diagnosed with schizophrenia. In all conditions (eyes open and closed, with feet together or apart), the SPD group swayed significantly more than the controls, as measured by path length and sway area, but was not distinguishable from the schizophrenia group. Non-linear measures did not show these effects, and there were no significant two- or three-way interactions between group and any of the conditions. This suggests that simple postural measures may represent a significant biomarker of schizophrenia risk in the general population.
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Sex and context: facial expression processing depends on the company you keep

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The Happy Face Advantage (HFA) is a phenomenon where faces are categorised faster if they are displaying a happy expression. We have previously provided evidence that the HFA interacts with stimulus sex for female participants. Questions remaining include how male participants react (in RT and ERPs) to the same stimuli and how identical faces (male Caucasian) might produce differing responses, depending on the task context in which they are presented. Twenty-two male participants completed two expression categorisation tasks where faces varied by sex or race. These results were compared to those of a previous sample of 24 females. A significant interaction between participant group, expression, and stimulus sex for reaction time revealed that, unlike female participants, male participants had a HFA for female faces but no such advantage for own-sex faces. The ERP components, N170 and P3b, showed similar group differences. In context analyses both groups showed a HFA for male Caucasian faces when presented with male African American faces, but not female Caucasian faces. Attention to expression varied for participant and stimulus sex across the different contexts. These results suggest that sex of the participant should be considered in studies investigating facial processing in humans.
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Napping helps maintain toddlers’ memory novel words

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Toddlers are proficient at determining the meaning of novel words for novel objects when they are presented with known-name objects. However, they are typically poor at retaining novel word-object associations. Sleep enhances declarative memory in adults and children and this study looked at the effect of napping following toddlers’ exposure to novel word-object associations. Forty 2.5-year-old children were asked to determine the meaning of four novel words twice in the context of known-name objects. Half of the toddlers subsequently napped and the other half stayed awake prior to a follow-up retention test. Toddlers were also tested the follow morning after a night of sleep. The toddlers who napped failed to demonstrate an enhancement in memory typically reported in the literature, but instead appeared to show a steady maintenance in memory with little change in retention scores post-nap and the following morning. Nap duration was also associated with better retention scores. The toddlers who did not nap instead showed a steady decline in retention scores across the three testing sessions and significantly lower retention scores compared to the nap group. This suggests that napping following exposure to novel-word object associations could help in maintaining memories for word-object associations and limit decay.
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Processing of shape really can be global!

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The shape of an object is an important cue to its identity but early receptive fields are small and consequently can only signal local properties of most objects. The visual system needs to combine this local information to produce a global shape estimate so that it can operate on objects rather than local features. There has been an active research field investigating how this combination of information occurs and, in particular, how global integration of contour information is achieved. One method compares the rate of improvement in discrimination, as more contour information is added, to what would be predicted from using solely local information (probability summation). This method has supported global integration of contour information but recently the theoretical underpinnings of that method have been challenged, raising doubt about the previous conclusions. We revisit global integration of contour for shape discrimination and show that, even using the new method, the evidence supports global integration, given appropriate stimuli. Further we will show that when the evidence supports global integration other methods also support global processing of the shape. Examples will be presented using visual search and two interval x two alternative forced discrimination and identification of shape.
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Task dependent effects of head orientation on perceived gaze direction

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The perceived direction of gaze has been shown to be influenced by the orientation of the head. Head rotation causes the visible part of the sclera to change in a similar way to the rotation of the eyes in the opposite direction, causing a repulsive effect of head orientation on perceived gaze direction. At the same time, the direction of the head can act as a coarse scale spatial cue to the direction of gaze, causing an attractive effect of head orientation on perceived gaze direction. In comparing measurements based on single- and two-interval task designs we typically observed a repulsive effect in the single-interval task, but, in the two-interval task we observed significantly more of an attractive effect. Furthermore, when the observer was only shown the eye-region of the stimulus, rather than the full head, there is no significant difference between measures across the single- and two-interval tasks. This suggests that the way information from the head is incorporated into the perception of gaze direction might be dependent on the task at hand.

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Exploring functions of working memory related to fluid intelligence: Coordination and relational integration

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Two hypothesized functions of working memory coordination (ability to maintain unrelated storage loads during processing) and integration (ability to integrate multiple elements into a higher-order relation) were explored and compared to fluid intelligence (Gf). In Experiment 1, 130 participants completed a modified Latin-Square Task (LST) which experimentally added or reduced storage load associated with the task. Results suggested that pure integration (with no storage load) could predict Gf. Experiment 2 employed the Arithmetic Chain Task (ACT), again with modifications to storage load. Results support replication of LST findings - a distinction was found between coordination and integration when storage material could not be easily rehearsed. Findings from both experiments support a distinction between coordination and integration in understanding the WM-Gf association.

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The unexpected killer: Effects of stimulus threat and negative affectivity on inattentional blindness

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Inattentional blindness (IB) occurs when observers fail to detect unexpected objects or events. Despite the evolutionary importance of detecting unexpected threats, relatively little research has examined how stimulus threat influences IB. The current study was designed to explore the effects of stimulus threat on IB. Past research has also demonstrated that individuals with elevated negative affectivity have an attentional bias towards threat-related stimuli, so the study also examined whether state and trait levels of negative affectivity predicted IB. Here 111 participants aged 17-40 years completed an IB task that included both threat-related and neutral unexpected stimuli, while their eye movements were tracked. Participants were significantly more likely to detect the threatening stimulus than the neutral stimulus. Neither state nor trait levels of negative affectivity were significantly associated with IB. These results suggest observers are more likely to detect threat-related unexpected objects, consistent with the threat superiority effect observed in other paradigms. However, most observers were blind to both unexpected stimuli, highlighting the profound influence of expectations and task demands on our ability to perceive even potentially urgent and life-threatening information.

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Conjunction Search is Relational: Behavioral and Electrophysiological Evidence

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Attention selects behaviourally relevant stimuli for further capacity-limited processing. With respect to the factors that determine this selection process, a wide-spread view is (1) that stimuli need to differ from other stimuli in an elementary feature (or have a large feature contrast) to attract attention, and (2) that attention is top-down biased to the specific feature value of a sought-after target item (e.g., vertical, red, medium). By contrast, the present study found that irrelevant conjunction cues that were presented only briefly also automatically attracted attention, even though they did not have an elementary unique feature or any feature contrasts. Critically, attentional capture by a conjunction cue was completely independent of its physical similarity to the target, and depended only on whether it matched the relative features of the target (e.g., bluer, larger). As evidenced by behavioural validity effects and the N2pc in the EEG of participants, conjunction cues that matched only the relative target features (e.g., bluer, larger) but had a different size and colour and size from the conjunction target still attracted attention, while cues that were identical to the target failed to attract attention when they did not match the relative attributes of the target. These results demonstrate that attentional orienting to conjunction stimuli is determined by a mechanism that can rapidly extract information about feature relationships and guide attention to the stimulus that best matches all relative attributes of the target. These results are difficult to reconcile with extant feature-specific accounts or object-based accounts of attention and argue for a relational account of conjunction search.

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Number estimation requires distinct groups not separate surfaces

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Humans possess a remarkable ability that allows the rapid judgment of large numbers, even in situations where counting is prevented, this is known as our number sense. So far, research has largely examined numerical processing within a two-dimensional (2D) context, despite the fact that the natural world is three-dimensional (3D). Therefore, this study aimed to explore whether 3D information is used when estimating the number of elements in separated groups. Observers completed a two-alternative forced choice task, comparing the perceived numerosity between test and reference dot patterns. Stimuli were viewed through a custom Wheatstone mirror stereoscope to simulate a 3D percept. Experiment 1 examined whether observers could separately estimate the number of elements on two surfaces that differed in depth. Results indicated that number judgments could be made for each surface, suggesting that 3D information is used for numerical estimations. Following this, Experiment 2 explored whether separate estimations requires separate surfaces, or whether separate groups are sufficient. Results indicated that assigning elements to distinct surfaces is not necessary, separate number judgments can be made when elements form distinct groups separated only in depth. These findings have implications for previous research conclusions and for models of numerosity estimation.

The Effect of Task-Type and Target Finger on Localising Manual Tactile Stimuli

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Despite the long history of the tactile sense being studied psychophysically, and the frequency with which we use our hands every day, very few studies have concerned identifying the location of tactile stimuli at the hand. As recently as 2014, Trojan et al. contended that even fewer studies have concerned localising tactile stimuli at the volar fingertips. The current study used vibrotactile stimuli applied to the volar fingertips, and concerned performance on three localisation tasks (single touch, temporal order judgment, and random sequence). The ability to localise a stimulus was overall worse on the random sequence task than the temporal order judgment task, which in turn was worse than the single touch task. Within each task, performance varied as a result of target finger. In the single touch and random sequence tasks, errors were greater and more widely spread across neighbouring fingers when the target finger was in a central location compared to a peripheral location. These results indicate that the perceptual abilities of the fingers are not equal, favouring the peripheral perhaps indicative of their somatotopic representation and/or frequency of use.
A move in the right direction: effects of dynamic face pitch on perceived attractiveness, dominance and dimorphism

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Burke and Sulikowski (2010) showed that faces depicted pitched backwards were perceived as more masculine and those pitched forwards were perceived as more feminine, which also affected the attractiveness of female faces. Face pitch also affects perceived dominance. Whether these effects are a consequence of the perspective-induced change in perceived face shape produced by the pitch or because variation in face pitch is a dynamic social signal has not yet been determined. In the current study, participants were presented with stationary stimuli similar to those used previously, as well as a new type of dynamic stimulus which depicted faces moving through a range of pitch. Participants were asked to rate both types for perceived dimorphism, attractiveness, and dominance. The results with stationary images replicated previous findings, and results from dynamic stimuli, but the results from the dynamic stimuli differed depending on the direction of movement (forwards or backwards), suggesting an important role for dynamic social signalling.

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Moral diminishment: The effects of imagined counterfactual and semi-factual alternatives on moral judgments

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Evaluations of the morality of an action are affected by thoughts about whether the outcome could have turned out differently. We report experiments on a ‘moral diminishment’ effect: a tendency for moral judgments to be diminished when people think about semi-factual alternatives in which an outcome would have turned out the same ‘even if’ an agent had acted differently, compared to when they think about counterfactual alternatives in which the outcome would have turned out differently ‘if only’ the agent had acted differently. The first set of experiments show the moral diminishment effect occurs for judgments about morally bad actions in which an agent carries out an action intended to harm another person: people judge that the agent should be punished less when they imagine a semi-factual alternative compared to a counterfactual one. The second set of experiments show the moral diminishment effect occurs for judgments about morally good actions in which an agent carries out a noble, self-sacrificial action intended to save another person: people are less morally inspired by good deeds when they imagine a semi-factual alternative compared to a counterfactual one. The results have implications for alternative theories of the cognitive processes that underlie moral reasoning.

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I get more attractive with a little help from my friends

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In popular culture, the ‘cheerleader effect’ refers to the observation that individuals are perceived as more attractive when in a group than alone. We tested whether the cheerleader effect extends to trustworthiness judgments, and whether individual or group-level attributes influence this effect. In Experiment 1, participants made attractiveness or trustworthiness judgments for faces shown both in a group and alone. Faces were significantly more attractive and trustworthy when in a group compared to when presented alone, replicating the ‘cheerleader effect’. The attractiveness increase when seen in a group was unrelated to attractiveness when seen alone. In contrast, the trustworthiness increase in a group was negatively correlated with individual trustworthiness. Experiment 2 investigated the influence of group composition by showing target faces in both high and low trait attribute groups, and alone. Faces were more attractive and trustworthy in a group compared to alone, regardless of whether the group was high or low in attractiveness or trustworthiness. Our findings show trait evaluations of both attractiveness and trustworthiness are influenced by the presence of others. Furthermore, these findings suggest that group-level attributes do not influence the cheerleader effect; instead it is simply the presence of others that increases perceived attractiveness and trustworthiness.

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Functional effects of the McCollough effect and its relation with retinal and non-retinal vision

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The McCollough effect is a phenomenon that can lead to a phantom non-retinal colour experience, without voluntary control. Previous studies mainly focused on its generation mechanism. In the current study, we investigated the functional effect of the McCollough colour on subsequent colour rivalry perception, and how the contrast of the inducing-patterns influenced the bias on subsequent rivalry perception. Using the same binocular rivalry paradigm, we also measured the functional effects of other forms of retinal and non-retinal vision, including passive perception, voluntary visual imagery, and involuntary neon phantom colour. Results showed that McCollough effect induced phantom colour experience could bias the subsequent colour binocular rivalry perception, and the direction of this bias was related to the contrast of the McCollough effect inducers. Furthermore, the bias led by McCollough effect was significantly correlated with that produced by colour imagery, but not with neon phantom colour. The bias induced by perceptual colour was not correlated with any of the three forms of phantom colour experience. These results suggest that there may be shared mechanisms across different forms of phantom vision, both voluntary and involuntary.

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Mechanisms of Facial Emotion Processing in High Autistic Traits: Evidence from Eye Tracking

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The present study sought to examine the contribution of configural and featural processing strategies during facial emotion recognition in autistic traits. Individuals with high and low autistic traits were administered a delayed emotion matching task with a gaze-contingent viewing manipulation. In this, participants were required to match faces based on their emotional expressions under three viewing conditions. The first restricted viewing to a gaze-contingent window revealing only one facial feature at a time. The second restricted viewing with a gaze-contingent mask, thus encouraging the processing of the configural information of whole face but not the fixated feature. The third viewing condition allowed for full-view of the faces. Participants with high, compared to low, autistic traits were found to have reduced emotion matching accuracy under the full-view condition, while no autistic trait group differences in emotion matching performance were evident for the window or mask viewing conditions. Analysis of fixation time suggested that emotion modulated gaze to the eye and mouth regions for high, but not low, autistic trait individuals. The findings suggests that autistic traits may be associated with a deficit in emotion recognition, and a tendency to process emotional faces based on salient facial features.
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Optimising Perceptual Training for the Detection of Hip Fractures in X-ray Images

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Diagnosing fractures on X-ray images can be a difficult task, usually taking years to master. Typically, students are trained to diagnose X-ray images in a primarily rule-based fashion. Our study investigated whether students can more rapidly learn to diagnose X-ray images via perceptual training, without having to learn an explicit set of rules. One hundred and thirty-nine students with no prior training in diagnosing X-ray images were shown a sequence of plain film X-ray images of the right hip and for each image were asked to indicate whether a fracture was present. Students were told if they were correct and the location of any fracture, if present. No other feedback was given. The data was analyzed using linear regression. The more able students achieved the same level of accuracy as board certified radiologists at identifying hip fractures in X-ray images in 52 minutes of training; the average student achieved this level of accuracy in about 100 minutes of training. Perceptual training is an effective way of helping novices learn to identify hip fractures in X-ray images, and should supplement the current education program for students.
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An eye-tracking study of the vertical-horizontal illusion.

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The vertical-horizontal illusion consists of a vertical line rising from the center of a horizontal line. Although both lines are of equal length, the vertical line appears longer. Nobody has performed an eye tracking experiment to determine where attention is directed and how this contributes to the illusion. Thus, could a relationship exist between how spatial attention is directed to one line and its perception of length? To answer this question, the perceived length of the two lines were measured in 20 participants (6 males, mean age = 23.2 years, age range = 18 - 38 years) while eye tracking was recorded in 10. The stimulus display was presented in different sizes and orientations, which varied illusion strength. We confirmed the presence of the illusion with large effect sizes (Cohen’s d across conditions: mean = 1.11; range = 0.56 - 1.44) and revealed that the amount of susceptibility to the illusion in a given condition correlated with the amount time spent gazing along the vertical meridian (r(14) = 0.71, p = .001). The results demonstrate that the vertical line captures people’s attention and suggests that the brain might treat it as a linear perspective cue, causing a perceptual rescaling in size.

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Paired-Pulse Transcranial Magnetic Stimulation in the Stop Signal Task

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Short-interval intra-cortical inhibition (SICI) is a popular measure of inhibitory activity in the brain. SICI manifests as a reduction in a motor evoked potential (MEP) elicited by a pulse of Transcranial Magnetic Stimulation (TMS), that is immediately preceded by a weak ‘conditioning’ pulse separated by a short interval (2-5 ms). This reduction reflects the activity of inhibitory interneurons triggered by the conditioning pulse. The aim of our research was to investigate whether SICI can distinguish individuals who have good or poor behavioural inhibition, by looking for a relationship between SICI and Stop Signal Reaction Time (SSRT). Results revealed a significant correlation between resting-state SICI and SSRT (measured separately), such that those with longer SSRTs had weaker SICI. n = 32, r = 0.7, p<.0001. Thus, resting-state SICI may predict how quickly an individual can stop a response. Future experiments are planned to build on this by measuring SICI ‘online’ during the stop signal task. After estimating SSRT in an initial phase, participants will complete the stop-signal task whilst receiving single and paired pulses at fixed time points after stop signal onset. We will test whether the magnitude of SICI during attempted inhibition is lower in individuals with longer SSRTs.

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Individuals with Clinically Significant Insomnia Symptoms are characterised by a Negative Sleep-Related Expectancy Bias: Results from a Cognitive-Experimental Assessment

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Cognitive models of insomnia consistently suggest that negative expectations regarding the consequences of poor sleep contribute to the maintenance of insomnia. To date however, no research has sought to determine whether insomnia is indeed characterised by such a negative sleep-related expectancy bias, using objective cognitive assessment tasks which are more immune to response biases than questionnaire assessments. Therefore, the current study employed a reaction-time task assessing biased expectations among a group with clinically significant insomnia symptoms (n=30) and a low insomnia symptoms group (n=40). The task involved the presentation of scenarios describing the consequences of poor sleep, and non-sleep related activities, which could be resolved in a benign or a negative manner. The results demonstrated that the high insomnia symptoms group were disproportionately fast to resolve sleep-related scenarios in line with negative outcomes, as compared to benign outcomes, relative to the low insomnia symptoms group. The two groups did not differ in their pattern of resolving non-sleep related scenarios. This pattern of findings is entirely consistent with a sleep-specific expectancy bias operating in individuals with clinically significant insomnia symptoms, and highlights the utility of cognitive-experimental assessment tasks to provide objective assessments of biased patterns of cognition in insomnia.

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Anticipatory arousal as a mechanism of the nocebo effect’s resistance to extinction

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Placebo and nocebo effects reflect fascinating psychobiological phenomena in which an individual’s expectancies can enhance or impair their health. Whilst both placebo and nocebo effects are considered to arise from the same fundamental learning processes, emerging research indicates that there are critical differences in their underlying psychological mechanisms. One of most interesting of these is their apparent differential sensitivity to extinction. Placebo effects are relatively short-lived, whereas nocebo effects are resistant to extinction. The current study examined why this discrepancy occurs.

Using a pain-based model, we tested whether nocebo treatment, but not placebo treatment leads to heightened anticipatory anxiety and critically, whether this heightened anxiety accounts for the nocebo effect’s resistance to extinction. Using a conditioning procedure, we successfully induced both placebo and nocebo effects (in separate groups of participants) and confirmed that the nocebo effect was resistant to extinction. Most interestingly, we found that nocebo treatment led to heightened anticipatory anxiety (both self-reported and autonomic) and that the higher an individual’s anticipatory autonomic arousal, the less likely they were to extinguish. These findings provide novel evidence that anticipatory autonomic arousal is a key mechanism in the nocebo effect’s failure to extinguish.

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A diffusion model analysis of target detection in near-threshold visual search

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When searching for a target briefly presented among distractors how do people combine information to make a decision? Research in near-threshold visual search has often had difficulty distinguishing between competing models which make similar predictions about target detection accuracy. Detailed analyses of response times in visual search have largely been confined to response-terminated, suprathreshold tasks. Here we used the diffusion model to analyse data from four near-threshold visual search experiments, treating both accuracy and response time as the result of evidence accumulation to a decision criterion. We examined two alternative decision models: One pooled the information in the display into a single evidence accumulation process, and the other accumulated evidence in parallel about each stimulus individually. Asymmetries between the drift rate estimates on target present and target absent trials were consistent with a sample-size model which assumed that decisions on target present trials were based predominantly on evidence from a single stimulus but on target absent trials all of the stimuli were processed. This finding supports two-stage models of search in which preattentive filters select the most target-like stimuli into visual short-term memory, but in the absence of a target, memory resources are shared among all items in the display.

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Beards Influence Emotion Recognition

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Beards are a sexually dimorphic masculine facial feature. The presence of a full beard on the face has been found to increase explicit ratings of aggressiveness and dominance; however, research is yet to investigate whether and how beards influence the recognition of facial emotional expressions. To address this, participants categorised facial expressions of happiness and anger (Experiments 1 and 2) or sadness (Experiment 3) as quickly and accurately as possible. These expressions were posed by the same individuals photographed with at least four weeks of untrimmed facial hair growth and again when clean-shaven. Participants were faster to categorise expressions of anger than happiness on bearded faces, but faster to categorize expressions of happiness than anger when the faces were clean-shaven. In a subsequent study, participants were faster to categorise happiness than sadness on bearded faces, but were no faster to categorise happiness or sadness on clean-shaven faces. These patterns suggest that beards influence our earliest impressions of others; enhancing expressions of aggression but concealing sadness. These findings provide evidence to that beards may be a signal of that increases perceived dominance and formidability even in the early stages of face processing.

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Bidirectional Gender Face Aftereffects: Evidence Against Normative Facial Coding

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Facial appearance can be altered, not just by restyling but also by sensory processes. Exposure to a female face can, for instance, make subsequent faces look more masculine than they would otherwise. Two explanations exist. According to one, exposure to a female face renormalizes face perception, making that female and all other faces look more masculine as a consequence - a unidirectional effect. According to that explanation, exposure to a male face would have the opposite unidirectional effect. Another suggestion is that face gender is subject to contrastive aftereffects. These should make some faces look more masculine than the adaptor and other faces more feminine - a bidirectional effect. Here, we show that face gender aftereffects are bidirectional, as predicted by the latter hypothesis. Images of real faces rated as more and less masculine than adaptors at baseline tended to look even more and less masculine than adaptors post adaptation. This suggests that, rather than mental representations of all faces being recalibrated to better reflect the prevailing statistics of the environment, mental operations exaggerate differences between successive faces, and this can impact facial gender perception.
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Preferred colours are not the same as preferred faces

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It has been suggested that eye-movements both betray and influence the chosen stimulus in judgment of facial attractiveness. Here, we examine the universality of this result. Two colour patches were presented 4deg either side of fixation. The suprathreshold patches were defined along vectors in CIE space between ‘red’ and ‘green’, centred on ‘yellow’; the stimuli were either modulated in colour or luminance. In separate blocks of the same stimulus set, subjects were required to decide if the patches were the same or different, which was redder, which was brighter, and which they preferred. Stimuli remained on the screen until the decision was made and eye-movements were recorded for the duration. The pattern of eye-movements, in terms of position, number and duration of fixations, are uniquely related to the task at hand. Eye-movements were influenced both by the difficulty of the task and whether it was a judgment of colour or luminance difference. When the task was one of preference, the eye-movements did not reflect the pattern seen for facial attractiveness. We conclude that eye-movements do provide insight onto the underlying processes of stimulus analysis and decision, but in a way that reflects an ongoing interaction between stimulus- and task-based influences.
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Using experience sampling technologies to understand how people determine the day on which events have occurred

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Participants wore a smartphone, which collected GPS, audio, accelerometry and image data, in a pouch around their necks for a period of two weeks. After a retention interval of one week, they were asked to judge the specific day on which each of a selection of images was taken. To account for people’s judgements, we proposed a mixture model of four processes - uniform guessing, a signal detection process based on decaying memory strength, a week confusion process, and a event confusion processes in which the sensor streams were used to calculate the similarity of events. A model selection exercise testing all possible subsets of the processes favoured a model that included only the event confusion model. GPS similarities were found to be the most significant predictors, followed by audio and accelerometry similarities and then image similarities.

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You know nothing about face recognition, Jon Snow

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The mechanisms underlying individual heterogeneity in face recognition skills remain unclear. Research has focused on highly familiar faces, where individual exposure to faces is uncontrolled; or used novel faces in uneccological tasks that emphasise perceptual discrimination (e.g., Cambridge Face Memory Test). Further, tests are usually unchallenging for superior recognisers. We developed a highly challenging task that resolves these issues by exploiting the series Game of Thrones, which introduced numerous unknown actors over 6 years. We showed headshots of 90 actors with different exposure levels in the show, mixed with 90 foils, to participants who had watched the entire series. They made familiarity judgments and reported semantic information. To test the robustness of facial representations, we varied the similarity of the actors’ headshots to their character’s appearance. Recognition rates increased linearly with exposure levels but interestingly, were affected by similarity throughout. Crucially, scores to the CFMT did not predict hits but only false recognitions of foil; frequenter in poor recognisers than in good ones. Further, poor and superior recognisers committed identification errors to the same extent. We show that benchmark tests do not capture the intended skills and that person recognition involves a range of cognitive skills that vary across individuals.

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Thresholds for rhythmic perception of timbral events

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Most research so far has tried to approach timbre by focusing on the perceptual and acoustical properties of sounds. However in a musical context it is rare to notate or create based on perception or acoustical-properties. Examples that do use such systems are basses in EDM songs or a Guitar-Drone/Pads in Post-rock scenarios, which sometimes rely almost entirely on timbral changes. Such systems, however, are often controlled by instrument- and production-specific manipulation parameters with seemingly arbitrary values. The present study examines how timbre-changes that are based on acoustic parameters affect the perception of tonal events. To this end two experiments investigate perception thresholds for five instantly and continuously changing acoustic properties using a self-built, additive synthesizer. Preliminary results reveal perceptual asymmetries in the direction of stimulus change and notable sensitivity to phase position of partials (in particular in stimuli with slightly inharmonic partials). These findings contradict the common assumption of the ears’ phase-deafness. Additionally the thresholds appear to be strongly dependent on the starting-value of the chosen parameter. Overall, the results advance our understanding of sound-perception and inform future compositional systems that use timbre-changes to develop musical pieces.

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Encouraging rule-based transfer in human contingency learning

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The ability to recognise relational rules and transfer this knowledge to novel contexts is critical for higher-level cognition. Yet people often fail to learn about abstract relations, and instead rely on more superficial features. Previous work has suggested that the sequence of learning instances is important for rule abstraction, but may interact with individual differences. Here we investigated the effect of trial sequencing on rule abstraction and transfer in human contingency learning tasks. Participants learned a series of cue-outcome contingencies that followed an abstract rule. In a patterning discrimination, two cues individually predicted one outcome, while their compound predicted the opposite outcome (A+/B+/AB-). In a biconditional discrimination, four cues were presented as four pairwise compounds: two reinforced (AB+/CD+), and two non-reinforced (AC-/BD-). Participants were then asked to predict outcomes for new combinations of previously experienced cues, where feature- and rule-based learning predict different patterns of responding. Patterning discriminations tend to be acquired readily, and show moderate rates of rule transfer, whereas biconditional discriminations tend to be more difficult to learn, and show low rates of rule transfer. We found that manipulations of trial sequencing had different effects depending on discrimination difficulty and individual differences in cognitive reflection.

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A new experimental design to test the reliability of empirical effects

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Many empirical effects in psychology are turning out to not be as robust as we once believed. Some folks suggest direct replications as a panacea. Critics, however, complain that direct replications yield relatively little information, because a good theory predicts effects that generalize across a range of experimental designs. Meta-analyses offer a way of testing the robustness of empirical effects in a literature, but publication bias severely distorts such analyses. We propose a new way of doing experiments, where you treat most factors in your experiment as random effects. The key independent-variables take on values that are held constant for the entire experiment and thus define an effect of interest. However, we propose that most other variables need not be set at particular values. Allowing most variables to differ (across participants, or blocks of trials) yields effect size estimates that span a large space of experimental designs. A random-effects meta-analysis then tells you whether the effect of interest is robust, without having to worry about the impact of publication bias. Post-hoc analyses can also provide insight into a rich tapestry of moderators and boundary conditions for the effect.

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Are you sure about that? Eliciting confidence ratings may influence both reasoning and learning

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Confidence ratings (CR) have often been integrated into reasoning and intelligence tasks as a means for assessing metacognitive processes. Although it is often assumed that eliciting these judgements throughout reasoning tasks has no effect on the underlying performance outcomes, this is yet to be established empirically. The current set of studies examines whether eliciting CR from participants during a fluid-reasoning task influences their performance and how this effect is moderated by their initial self-confidence in their own reasoning abilities. In a first experiment, we found that participants performing CR during Raven’s Progressive Matrices significantly outperformed a control group who did not provide ratings. Additionally, a second experiment demonstrated that CR only facilitated performance in participants who have a high level of initial self-confidence in their reasoning ability, whereas they were detrimental to participants low in self-confidence. Our subsequent experiments have shown that how participants react to performing confidence ratings may depend on the nature of the outcome, with performance outcomes benefiting from providing CR, whereas learning/mastery outcomes are impaired. The changed-goal hypothesis, whereby CR direct a participants goal towards performance and away from mastery, is argued to explain such effects.

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Are there two processes in reasoning? The dimensionality of inductive and deductive inferences

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Single-process accounts of reasoning propose that the same cognitive mechanisms underlie inductive and deductive inferences. In contrast, dual-process accounts propose that these inferences depend upon two qualitatively different kinds of processes. In order to distinguish between these accounts, we derived a set of single-process and dual-process models based on an overarching signal detection framework. We then used signed difference analysis to test each model against data from an argument evaluation task, in which induction and deduction judgments are elicited for a set of valid and invalid arguments. We applied the approach both to data from Singmann and Klauer (2011, Thinking & Reasoning, 17(3), 247-281) and to a larger database of argument evaluation studies. The results were remarkably consistent across both sets of analyses: While we were able to reject relatively simple signal detection models, we found that a three-parameter single-process model and a three-parameter dual-process model were able to account for all existing results. We conclude that despite the popularity of dual-process accounts, current results from the argument evaluation task are consistent with at least one single-process model.

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The onset of uncertainty facilitates the learning of new associations

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Past research in animals has suggested that attention is distributed in a way that allows for both the exploitation of known relationships between stimuli (e.g., Mackintosh, 1975) and the exploration of stimuli whose consequences are uncertain, in order to gain further knowledge (e.g., Pearce & Hall, 1980). Moreover, the resulting changes in attention influence how animals learn new information involving those stimuli. While there is strong support for exploitative attention and its effects on novel learning in humans, the evidence for exploratory attention is less well developed. Two experiments examined whether preferential allocation of attention (as measured by eye-gaze) to cues associated with uncertainty leads to more rapid learning about these cues in the future. Participants who experienced a sudden onset of uncertainty showed a higher rate of learning about novel information and spent a greater proportion of time attending to cues. The second experiment built on the first by replicating the critical findings and demonstrated that extending the length of Stage 1, enhances the effect of relative uncertainty on associative learning. We argue that this represents evidence for an effect of exploratory attention on rate of learning in humans.

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Awe opens a doorway to prosociality among the closed in the right symbolic context

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The fact that monumental structures are widespread within religious and political systems has been attributed to the capacity of those structure to elicit awe and, consequently, cooperation (i.e., prosocial behaviour). Awe has been hypothesised to promote cooperation because the vast stimuli that people find awe-inspiring overshadow personal needs. This study examined whether awe-inspiring stimuli must be conceptually (i.e., symbolically) connected to higher powers to exert a prosocial effect (through a sense of small self or otherwise). Voluntary prosocial behaviour following an awe-inspiring, neutral or amusing video of nature was examined among non-religious people (n=79), and religious people - that is, people who presumably associate awe-inspiring nature scenes with higher powers (n=95). Individual differences in facets of openness to experience - a trait hypothesised to positively relate to awe-proneness - were also considered. Religious people with lower openness to feelings displayed more prosociality in the awe-inspiring condition as compared to both others. For all other participants, the reverse was true. Thus, results were consistent with the symbolic model, although specifically among people with lower openness to feelings. We conclude that, at least in voluntary tasks holding little personal meaning, awe promotes cooperation only among more closed religious people who might fear supernatural punishment.

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Optimising the balance between caution and urgency

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Organisms making repeated simple decisions are faced with a tradeoff between urgent and cautious strategies. While animals can adopt a statistically optimal policy for this tradeoff, findings about human decision-makers have been mixed. Some studies have shown that people can optimise this speed-accuracy tradeoff, while others have identified a systematic bias towards excessive caution. These issues have driven theoretical development and spurred debate about the nature of human decision-making. We investigate some potential resolutions to the debate, based on two factors that routinely differ between human and animal studies of decision-making: the effects of practice, and of longer-term feedback. Our study replicated the finding that most people, by default, are overly cautious. When given both practice and detailed feedback, people moved rapidly towards the optimal policy, with many participants reaching optimality with less than one hour of practice. Our findings have theoretical implications for cognitive and neural models of simple decision-making, as well as methodological implications.

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Fixation patterns predict response times for arithmetic and dot enumeration

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The reported relationship between dot enumeration and arithmetic abilities likely depends on the number of items/subsets to be combined in computing answers. We have previously found that when dot enumeration and arithmetic displays are constructed with four subsets there is a strong correlation in RTs, suggesting a common underlying numerical process. It has been proposed that eye movements reflect the computational processes used to enumerate dot displays, reflected in a high correlation between eye fixation number and dot enumeration RTs. If eye movements do reflect a common computation process for dot enumeration and arithmetic, we would expect number of eye fixations to correlate with the time taken to compute arithmetic answers. To test this hypothesis, 50 undergraduates enumerated sets of dots and added numbers with totals from 1 to 16. We manipulated the computational complexity of dot enumeration and arithmetic displays and measured RTs while recording eye position. As predicted, the number of eye fixations was highly correlated with arithmetic RTs for both dot enumeration and arithmetic displays regardless of computational complexity. Our findings provide strong support for the claim that dot enumeration and arithmetic uses the same computational processes.

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Remembering Surprises

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Since Darwins’ work on emotion, surprise has been studied as a ubiquitous phenomenon implicated in many areas of cognition (from learning, to hindsight bias, to creativity). Folk theories of surprise see it as a response to low probability outcomes and, so-called, probabilistic theories adopt a similar view. However, recently, Foster & Keane (2015, Cognitive Psychology, 81, 74-116) have advanced an explanation-based theory of surprise, which sees surprise as a function of the amount of cognitive, explanatory work that needs to be done to ‘make sense’ of a surprising event. Several predictions from this theory, using simple stories, have been empirically confirmed; showing that explanatory aspects of surprise are much better predictors of people’s surprise judgements than probabilities. This paper uses the same surprise-story materials to assess a long-standing prediction from educational research, that surprise increases learning by making materials more memorable. By manipulating the outcomes of simple scenarios, making them more, or less, surprising, our study shows that surprising-outcomes tend to be remembered more accurately than unsurprising or known outcomes; though no differences were found between known and unsurprising outcomes. The implications of these findings for the role of surprise in learning are interpreted and discussed from a sense-making perspective.

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How can we tell if an aftereffect makes the world look different?

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Much of what we know about how our sensory systems operate comes from studying aftereffects. Prolonged and repeated exposure to a constant stimulus (adaptation) can impact responses to subsequent test stimuli, compared to non-adapted (baseline) responses. Researchers often infer, based on changes to response patterns, that sensory encoding has been changed by adaptation. But behavioural methods are limited, and this type of result could equally be explained by changes to decision processes. In some instances, judgements about our sensations might change, but the underlying sensory encoding might not be impacted. In this talk, I will propose a method for detecting whether an aftereffect results partially or entirely from changes to decision processes as opposed to sensory coding. I suggest that measures of confidence have diagnostic value in determining the underlying cause of different types of aftereffects.

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Music for Mood Regulation in People with Dementia

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Quality of life is a critical area of research in relation to dementia given the incurability of the neurological conditions that come under this umbrella. Ensuring psychological wellbeing is a crucial part of improving quality of life, with depression being the main factor associated with a decline in quality of life in people with dementia and their carers. Music can have a powerful effect on mood and is one of the few resources that maintains its ability to reach people when cognitive functioning is impaired. However, studies of music listening in people with dementia show mixed results, having failed to account for the complex interaction of personal and musical variables. This paper will present the results of a factorial experiment in which mode, tempo and lyrical content were experimentally manipulated in order to compare the effects of various musical features on people with dementia. The results serve to further an understanding of how music can be used more effectively to improve quality of life in people with dementia and their carers.

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No lexical competition without priming: Evidence from the Picture-Word Interference Paradigm

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Over the past 40 years, researchers assumed that semantic interference effects in picture naming reflect competition among lexical candidates during retrieval. This assumption is challenged by recent demonstrations of facilitated naming in categorically related versus unrelated contexts using the picture-word interference (PWI) paradigm. In this study, we examined the role of the familiarization phase (participants are shown the target pictures and required to rehearse the appropriate names before the PWI paradigm is performed). We compared PWI performance with and without familiarization while using matched stimuli and task parameters. Results showed the typical semantic interference effect following familiarisation. However, naming latencies did not differ significantly between related and unrelated distractors without familiarisation. This result is consistent with a lexical competition account in which familiarization ‘flags’ members of the response set so that activation may spread along relevant conceptual to lexical connections. However, it is problematic for post-lexical accounts that attribute semantic interference to decision mechanisms operating according to category-level properties of production-ready responses, as category membership is not dependent on familiarisation. We conclude that familiarization plays an important role in determining semantic interference in PWI, most likely via raising lexical competitor activation by priming links between targets and related concepts.

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Spacing exemplars disrupts relational category learning in preschool children

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There are very few results in psychology that could possibly be referred to as a ‘law,’ but if there were any, the ‘spacing effect’ (that spacing out the study of items improves memory for them) is about as close as it gets. Ebbinghaus’ original demonstration of the spacing effect is over 100 years old, and in Hastie’s recent ranking of the effect-sizes for all effects in education research, spacing was first among the interventions pertaining to instructional or learning methods. However beyond improved memory, there are recent claims that spacing out exemplars of a category improves the discovery of the underlying generalisation defining their category membership, for both adult and child learners. On the other hand, the literature on analogical learning suggests that children often require simultaneous presentation of multiple exemplars to discover their underlying commonalities. How can these contradictory findings be explained? We present a series of experiments showing that when the category-defining generalisation is about the extrinsic relations between objects (and not in the intrinsic features of individual objects), then spacing exemplars can drastically disrupt learning in young children. We contrast our findings to the previous research which showed spacing benefits for categories defined by intrinsic object features.

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Object individuation is invariant to attentional diffusion: Changes in the size of the attended region do not interact with object-substitution masking

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When the human brain is confronted with complex and dynamic visual scenes, two pivotal processes are at play: visual attention (the process of selecting certain aspects of the scene for privileged processing) and object individuation (determining what information belongs to a continuing object over time versus what represents two or more distinct objects). Here we examined whether these processes are independent or whether they interact. Object-substitution masking (OSM) has been used as a tool to examine such questions, however, there is controversy surrounding whether OSM reflects object individuation versus substitution processes. The object-individuation account is agnostic regarding the role of attention, whereas object-substitution theory stipulates a pivotal role for attention. There have been attempts to investigate the role of attention in OSM, but they have been subject to alternative explanations. Here, therefore, we manipulated the size of the attended region, a pure and uncontaminated attentional manipulation, and examined the impact on OSM. Across three experiments, there was no interaction between the size of the attended region and the magnitude of object-substitution masking. This is inconsistent with the object-substitution theory of OSM. This, in turn, tells us that object-individuation is invariant to the distribution of attention.

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On Naturalized Creativity: a complex hypothesis on the neural correlates of creative process

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Creativity is what enables the progress of human thought, both in science and art. However, a systematic study of creative cognition is quite recent. There is a general consensus among scholars in defining the creative process as that which produces something original and at the same time useful. This definition is necessary but insufficient, because it does not provide any information about his ontological referent. In the neuroscientific literature, creativity is the result of distributed cortical activities of large-scale brain networks, especially from the interaction of default mode network and executive control network. In this paper, applying the concepts of Complexity Theory to the brain function, we claim that creativity can be modelled as a self-organizing process and therefore it is an intrinsic property of highly organized matter, rather than just a feature of brain function. Evidence to this conceptualization comes from several studies on divergent thinking using non-linear analysis of EEG showing how EEG complexity increase during divergent thinking an decrease during convergent thinking. We provide a naturalized definition of the creative process as a dissipation-driven process and its limits and implications are discussed for future research, with the hope of contributing to the nascent science of creativity.

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Associative memory and explicit knowledge in cue competition effects

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Error correction models of learning posit that the discrepancy between expectancy and experience is an important determinant of the strength of learning. Perhaps the most compelling evidence that such processes operate in human causal learning is the presence of cue competition effects like blocking. Associative learning operates over expectancies derived from direct experience with cue-outcome contingencies, yet there is also evidence from human conditioning studies that explicit expectancies induced by verbal instruction alone can be substituted for actual experience. An important question then, is whether and how these two sources of expectancy interact to produce cue competition effects? Across a number of experiments we examined the relative contributions of associative memory and explicit knowledge (provided via instruction) to the control of prediction error in a causal learning task. Despite evidence of interaction between consciously mediated and experience-driven expectancies, associative memory (indexed by cue-outcome recall) remained largely protected from externally derived expectancies. Implications for theories of causal and associative learning will be discussed.

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Outcome predictability biases human learning

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Three experiments are presented in which the associative history of to-be-predicted "outcome" stimuli were manipulated. The effect on subsequent learning of novel cue-outcome associations was measured. An outcome stimulus’ associative history was shown to bias subsequent learning in a manner comparable to that of a cue’s associative history. Additional experiments demonstrate that this learning bias is associative in nature, and that it is unlikely to be a direct product of ‘context blocking’ mechanisms. Implications of these findings for formal models of associative learning are discussed.

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Contrasting reactive and proactive control of emotional distraction

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Attending to emotional stimuli is often beneficial, because they provide important social and environmental cues. Sometimes, however, current goals require that we ignore them. Participants completed a simple letter discrimination task while ignoring emotional or neutral images. We manipulated the proportion of trials in which images appeared, in order to encourage use of either reactive control (rare distractors) or proactive control (frequent distractors). Whether distractors appeared centrally (Experiment 1) or peripherally (Experiment 2), both negative and positive images were more distracting than neutral images when they appeared on only 25% of trials. However, when distractors appeared on 75% of trials, distraction by both emotional and neutral images was strongly attenuated (Experiment 1) or eliminated (Experiment 2). In Experiment 3, participants saw frequent distractors, but they were intact images only one third of the time, and were meaningless scrambles on the remaining trials. Emotional and neutral images were again distracting, suggesting that proactive control was triggered by the meaning, and not the mere presence, of distracting images. Our findings argue against simple bottom-up or top-down explanations of emotional distraction, and instead show how the flexible use of cognitive control supports adaptive processing of emotional distractors.

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Sequential effects in prediction

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In a phenomenon known as ‘sequential effects’, reaction times (RTs) have been found to depend on the previous sequence of trials, even if the sequence is random. Such effects are thought to be driven by a sensitivity to randomly occurring runs of alternations and repetitions in local patterns i.e., patterns occurring in the few trials preceding the current one. This study (N = 21) explored sequential effects in a situation where one has to predict, rather than react to, the next stimulus. We performed a systematic analysis of sequential effects in prediction and used a novel approach based on principal components analysis to examine the extent to which sequential effects in prediction and RT are produced by the same mechanisms. We found that sequential effects in prediction do occur, but that, in a reversal of what is seen in RT, these effects indicate a tendency to expect that the next event violates local runs of repetitions and alternations. The observed sequential effects had the same generative mechanisms as sequential effects in RT. We consider the implications of our findings for literature on the subjective perception of randomness and gambling.
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Why are dynamic Mondrian patterns unusually effective in inducing interocular suppression?

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In continuous flash suppression (CFS), a dynamic sequence of Mondrian images presented at a typical rate of 10 Hz suppresses a static target in the other eye for several seconds at a time. The strong and effective suppression has seen the prevalent use of the Mondrian in studies of unconscious visual processing, but the reasons contributing to its potency remain unclear. To this end, we examined the temporal frequency tuning of CFS using narrowband filtered noise maskers and manipulated the temporal and pattern structure of the Mondrian. Our findings suggest that the Mondrian's effectiveness may be contributed by binocular rivalry and visual masking processes.

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Determining the role of approach-avoidance memory associations in the performance of exercise

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There is increasing evidence to suggest that the performance of regular exercise is guided by both implicit and explicit cognitive processes. This study investigated whether exercise engagement is associated with biased approach-avoidance memory associations. Participants (N = 118) completed an approach-avoidance variant of the Implicit-Association Test and explicit measures of exercise engagement and motivation. As predicted, exercise engagement was positively associated with an implicit bias to associate exercise cues with approach, versus avoid behavioural responses, indicating an implicit approach bias for exercise. Approach bias strength was also found to positively correlate with intrinsic exercise motives, positive affective attitudes, and higher levels of perceived behavioural control. Decomposing the interaction effect of a moderated regression analysis revealed that bias strength moderated the intention-behaviour relation, such that intentions were not significantly associated with prospective exercise behaviour when approach biases were strong. This suggests that the development of an implicit approach bias for exercise may make engaging in exercise less reliant on explicit intentions. These findings support current dual-process perspectives of health-behaviour and demonstrate the relevance of implicit approach-avoidance memory associations in the exercise domain. Moreover, they highlight approach-avoidance memory associations as a potential candidate for intervention as a way of increasing exercise engagement.

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Decision urgency in behaviour and brain

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Deciding between multiple courses of action often involves an increasing need to do something as time passes - a sense of urgency. Previous research has indicated that under standard conditions, people don't experience decision urgency; the presence of urgency depends on task-specific paradigms or procedures, such as extensive task practice or delayed feedback protocols. Here, we examined one such moderator of urgency - the speed with which decision-relevant information is presented - to evaluate the behavioural and neural evidence for an "urgency signal" in perceptual decision making. As the duration of the decision-making process increased, participants made choices based on less evidence for the selected option. Furthermore, the variability in this effect across participants covaried with activation in the striatum, a brain region previously associated with the ability to adapt to the competing demands of decision speed and accuracy. We conclude that various paradigms and procedures can lead decision makers to adopt qualitatively different decision strategies, and individual differences drive the extent to which one uses urgency-related decision strategies.

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Sampling frames, Bayesian inference and Category-based inductive reasoning

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We outline and test a Bayesian model of the effects of evidence sampling on property induction. Our model assumes that people are sensitive to the effects of different sampling frames applied to sampled evidence. Three studies tested the model by comparing property generalization following exposure to samples selected because they belong to the same taxonomic category (category-based sampling) or because they share a salient property (property-based sampling). All studies found that category-based sampling led to broader generalization than property-based sampling. In line with model predictions, these differences were attenuated when a mixture of positive and negative evidence was presented (Experiment 1), when category-property relations were probabilistic rather than deterministic (Experiment 2) and when categories that did not appear in the evidence sample had a low base rate (Experiment 3).

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Implicit Recognition of Chaos: An analysis of Performance in a Visual Tracking Task using CrossCorrelation and Multifractal Analysis

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Visual tracking tasks are useful for measuring our ability to implicitly recognise a temporal sequence. Using a digitising pen, 31 participants tracked changes in the horizontal and vertical location of a point over 12 trials, each lasting two minutes with a 1-min inter-trial break. Unbeknown to the participants, stimulus motion was determined by one of four chaotic sequences, Hénon, Ikeda, Logistic or Lorenz, chaos being quantified by the maximum Lyapunov exponent. The results showed that the area under the cross-correlation function for stimulus and response sequences in both directions increased significantly with the amount of chaos in the series, indicating sensitivity to the amount of chaos in a stimulus sequence. When the stimulus-response activity and tracking accuracy series were analysed using a Gaussian multiplicative cascade process, the derived entropy measure was generally greater for the data series than for linear comparison series. This provided some evidence for multifractality in human visual tracking. The advantage of using multifractal analysis in tracking tasks is its ability to represent person-environment interactions that occur simultaneously over many time scales.

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When do cues work by summoning attention to a target and when do they work by binding to it?

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In exogenous cuing experiments, a cue such as a circle flashes at one of several locations, any of which might contain a target soon after. Accuracy is near chance when the cue is presented simultaneously with the target, but improves rapidly for longer lead times between the cue and the target. The curve tracing this out has positive skew, consistent with a rapid (~80 ms, with variability) shift of attention. We will report evidence that exogenous cues can also facilitate performance by binding to a buffered representation of the target, obviating the need for attention to shift to the location. We presented rapid streams of letters (RSVP) concurrently in multiple locations. A random letter in a single stream was briefly cued by a circle and participants tried to report the cued letter. Analysis of the errors reveals binding, as indicated by 1) participants reporting non-targets that were presented shortly before the cue nearly as often as items after the cue; 2) the distribution of the times of the non-targets reported was mirror-symmetric rather than positively skewed. Our results suggest that more than eight letters were activated and buffered simultaneously before the cue even appears.

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The Logic Sense: Exploring the role of executive functioning in belief and logic based judgments.

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The Default Interventionist (DI) account of reasoning suggests that, inhibiting a Type 1 belief response for a logical output requires cognitive effort (Type 2) and our inclination towards frugal processing means we often respond according to beliefs. Recent research, however, has shown that in some instances belief judgments take longer, are more prone to error and are more impacted on by cognitive load. One interpretation is that logical inferences can be available automatically and require intervention in order to successfully respond according to beliefs. This paper investigates the effortful nature of belief judgments and whether logical inferences are available early by increasing the inhibitory demands of a task. In two experiments, we asked participants to make judgments of conclusion validity, believability and either font colour or font style, to increase the number of competing responses. Both experiments showed that belief-logic conflict impacts more on the believability of the conclusion and when inhibitory demands are increased, logic has more of an impact on belief judgments. Nevertheless, logic judgments take longer to complete which we conjecture can be explained in terms of there being ‘Two Routes’ to a logical output, discussed in the context of a new Parallel Dual Processing model.

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Natural Scenes Can Be Identified As Rapidly As Individual Features

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Can observers determine the gist of a natural scene in a purely feedforward manner or does this process require deliberation and feedback? Observers can recognise images that are presented for very brief periods of time before being masked. It is unclear whether this recognition process occurs in a purely feedforward manner or whether feedback from higher cortical areas to lower cortical areas is necessary. The current study revealed that the minimum presentation time required to determine the orientation or colour of an isolated line was no different from that required to identify or to determine the gist of a natural scene. Conversely, a visual task that would be expected to necessitate feedback (determining whether a image contained exactly six lines), required a significantly greater minimum presentation time. Assuming that the orientation or colour of an isolated line can be determined in a purely feedforward manner, these results indicate that the identification and the determination of the gist of a natural scene can also be performed in a purely feedforward manner. These results challenge theories of visual recognition that require feedback. I propose a tentative theory of how observers are able to perform these feats.

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A Behavioral Measure of Cognitive Capacity

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The accurate and objective measurement of cognitive capacity is important in many aspects of psychological research. The Detection Response Task (DRT) is a well-validated method for measuring cognitive capacity that has been used extensively in applied tasks, for example to investigate the effects of fatigue and phone usage on driving. Given its success in applied tasks, we investigated whether the DRT could be used to measure cognitive capacity in a standard laboratory situation. We had participants perform a multiple object tracking task while simultaneously performing a DRT. We manipulated the cognitive load of the multiple object tracking task by changing the number of dots to be tracked. Measurements from the DRT were sensitive to changes in the cognitive load, establishing the efficacy of the DRT in this in-lab situation. In a follow-up experiment, we established similar efficacy for a cheaper and more convenient version of the DRT, suitable for online-only testing.

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How long is an Aussie sentence? Prosody-based prediction of utterance length by native and non-native listeners

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Efficient conversation requires on-time turn-taking, which is helped when prosodic cues in an interlocutor’s utterance signal upcoming phrase or sentence boundaries. In prior research on both American English and German, native listeners, but not non-native listeners, efficiently used such cues. Here, sentences with a simple noun-verb-noun structure followed optionally by one or two prepositional phrases (James fixed the lock / on the door / of the car) were presented incrementally to 40 listeners (20 native, 20 non-native); after each of eight fragments per sentence, listeners judged whether they were hearing the shortest, midlength, or longest version of the sentence, and signalled their judgement confidence. Performance for both listener subgroups showed increasing accuracy and confidence across utterances, with the sharpest increase occurring at the boundary between shortest and midlength options. Though American English listeners were reported to perform above chance at distinguishing midlength from longest version even at the end of the shortest option, our listeners could not do this; nor did we - again in contrast to earlier literature - find a difference between native and non-native accuracy. We suggest that the high frequency of rising intonation contours in Australian English may have reduced listeners’ ability to accurately interpret prosodic juncture cues.

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Allocentric and egocentric navigation strategies: We'd be lost without them.

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Navigation is a form of spatial cognition related to how it is that people find their way through space. Agents represent this space using reference frames. These involve representing space relative to the agent (egocentric) or to the environment (allocentric). The aim of this project was to assess how these different reference frames are simultaneously acquired and used. For this a novel maze using stereoscopic virtual reality technology was designed. The maze was based on the Morris water maze, and participants could solve it simultaneously using allocentric, intrinsic information-based, and/or sequential response-based navigation. The experimental results showed participants could consistently navigate allocentrically after little training, while self-referential knowledge took more time to produce success. Allocentric knowledge was strongly centred on environmental landmarks, overshadowing other cues, while egocentric knowledge was idiothetic. Conflict tests showed a strong preference for allocentric. These results provide further evidence for the multiple types of spatial information that people can independently acquire and utilise to navigate. The strong correspondence between these results and the real world navigation behaviours of humans and non-human animals also suggest the virtual reality setup used here as a promising way to assess navigation in the future.

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The word frequency effect in post-cued serial recall and serial recognition.

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Verbal short-term memory (VSTM) theories have traditionally argued that long-term, abstract representations are actively involved in the retrieval of to-be-remembered verbal information. This claim has been supported by findings from experiments utilising immediate serial recall (ISR), and to a lesser extent, serial recognition. Indexed by lexico-semantic variables such as word frequency, ISR typically demonstrates an advantage with high, relative to low frequency words, but the effect is reduced in serial recognition where retrieval is obviated. However, more recently it has been argued that these task-based differences are part of a larger complex of findings across visual and auditory presentation modalities that implicate differences in the encoding of stimuli as a function of task demand. This approach links task performance with the embodiment of speech-motor processes, rather than the reflection of more central memory processes involving long-term representations. The present study investigated the possibility of encoding difference by post-cueing either ISR or serial recognition, in two experiments testing auditory and visual presentation, respectively. Across two presentation rates, the findings fail to support the encoding account but are consistent with the proposition that the involvement of abstract representations is important in the recall of verbal information over the short-term.

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Cognitive decline in older adults is mediated by cardiovascular health.

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Both ageing and cardiovascular risk factors (e.g., hypertension, hypercholesteremia, diabetes) are associated with increased risk for cognitive decline and dementia. However, it remains unclear whether the increased incidence of cardiovascular risk factors with increasing age can account for the relationship between age and cognitive decline. In a cross-sectional sample, we have previously shown that (a) the relationship between brain white matter health and global cognition is stronger in older adults who report one or more cardiovascular risk factors, and (b) the relationship between age and cognition can be accounted for by variability in white matter health (Jolly et al. 2016 Psychophysiol 10.1111/psyp.12565). This paper will firstly present a replication of the finding that, in older adults with no cardiovascular risk factors, age and brain white matter health are not associated with cognitive decline in an independent cross-sectional Taiwanese cohort. Secondly, it will present longitudinal data from a subset of our original cohort that examines whether changes in brain blood pulsatility mediate the relationship between brain white matter health and cognition in older adults. The implications for theories of cognitive ageing will be discussed.

Comparing Responding on Gamified and Paper Surveys Under Interruptions from Social Media

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Recent worldwide failures in polling (e.g., Brexit, US Presidential Election) have underscored the disruptive challenges facing the market research industry. One recent response to these challenges has been to frame surveys as online games; e.g., brand-product surveys can be run as charade, word-guessing games to elicit people’s associations to a product. However, arguably, these ‘gamification’ solutions raise new problems such as technological distraction (e.g., from social media on the delivery device). We have performed controlled experiments comparing a traditional survey, presented on paper, with a ‘gamified’ survey, presented on a tablet, under conditions of technological interruption (e.g., from social media posts presented on a separate laptop). Using a number of different measures -- accuracy of responses and response time -- we found that the game survey performed better than the paper survey under conditions of interruption and that, overall, response rates were faster in the former than in the latter. Theoretically, these results are explained by the simplicity of the focal goal for the game and its corresponding reduction in satisficing behaviour, relative to the paper survey. The significant implications of these findings for the market research industry are discussed.

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Self-other integration and segregation is modulated by congruency of shared goals in musical joint action

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Musical ensemble performance is a class of joint action that highlights the ability of groups of individuals to pursue shared goals by coordinating their actions with high levels of temporal precision and flexibility. Such coordination requires self-other merging (integration) while maintaining the distinction between self and other (segregation). Two studies of piano duos investigated how the balance between self-other integration and segregation is modulated by the congruency of co-performers’ goals related to tempo. In one study, small incongruencies in tempo goals (induced via instructions that biased each performer towards a slightly different tempo) encouraged self-other segregation. In the other study, large incongruencies in tempo (induced via instructions for one performer to accelerate while the other decelerates and vice versa) led to co-performers compromising their individual goals in favor of self-other integration. Together, these findings demonstrate that there is a threshold at which it becomes necessary to revise and modify one’s own goals in order to achieve precise interpersonal coordination. The balance between self-other integration and segregation is thus influenced by the degree to which individual goals differ. The size of this difference may be affected by factors including musical experience and idiosyncratic preferences regarding musical expression.

Attentional bias modification can inoculate people to withstand exposure to real-world food cues

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In line with dual-process models, evidence shows that attentional bias modification can reduce unhealthy food intake. An important practical consideration is whether such modification can inoculate people to resist real-world food cues, such as advertising. Using a modified dot probe paradigm, we trained undergraduate women to direct attention toward (‘attend’) or away from (‘avoid’) chocolate pictures. Following one or five training sessions, participants viewed television advertisements of chocolate or control products. Attentional bias for chocolate was measured before and after training. Chocolate consumption was measured by a taste test and habitual chocolate craving by self-report. Attentional bias increased in the ‘attend’ condition and decreased in the ‘avoid’ condition; however, the reduction in bias following exposure to chocolate advertisements was statistically significant only after five training sessions. Habitual chocolate craving moderated the effect of attentional bias modification on chocolate consumption, such that individuals with lower levels of chocolate craving ate less chocolate following the training, whereas those with higher levels of craving actually ate more. Thus, attentional bias modification holds promise as a technique for helping people to overcome the temptation from real-world appetitive cues. However, more extensive training may be required for individuals with high levels of food craving.

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Priors, informative cues and ambiguity aversion

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Ambiguity aversion, or the preference for options with known rather than unknown probabilities is a robust finding within the decision making literature (see Camerer & Weber, 1992, for a review). There are some suggestions this averseness is due to participants inferring differences in the prior distribution for the ambiguous option (GŸney & Newell, 2015). In this study we investigated the relationship between prior distributions and experienced information cues on decision making and participants judgements of underlying distribution. We used three different prior cues; positive (suggesting a positive underlying distributional cue), neutral (no distributional cue) and negative (suggesting a negative underlying distributional cue) and five different information cues, varying both the bias of the information and the degree of ambiguity. Whilst we found that both prior and information manipulations had the expected impact for participants’ judgements of underlying distributions, they only impacted the decisions participants made some of the time. There were also interesting interactions between the two for decision and not judgements. We discuss the implications for this.

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Blind Minds: A lack of phenomenal and sensory visual imagery in congenital aphantasia

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For most people the use of visual imagery is pervasive in daily life, but recent findings suggest that for a small group of people the experience of visual imagery is entirely unknown. Research based on subjective phenomenology indicates that otherwise healthy people can completely lack the experience of visual imagery, a condition now referred to as congenital aphantasia. To date aphantasia has been based on subjective reports, and as such it remains unclear whether participants are really unable to imagine visually, or if they have very poor metacognition. Here we measured self-diagnosed aphantasic’s low-level sensory imagery, using the binocular rivalry paradigm, as well as measuring their self-rated object and spatial imagery with multiple questionnaires (VVIQ, SUIS and OSIQ). The experimentally naive aphantasic’s showed almost no imagery-based rivalry priming, while a large sample from the general population showed significant priming. Additionally, Aphantasic participant's self-rated visual object imagery was well below average, however their spatial imagery scores were not. These data suggest that aphantasia is a condition involving a lack of sensory and phenomenal imagery, and not a lack of metacognition.

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Using the Oculus Rift to understand the perception of shape

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How do we effortlessly untangle complex mashes of image structure to visually infer the shape of 3D objects? We explored whether visual motion cues from different surface optics improve global shape perception. We created virtual objects varying in relief and convexity along the viewing axis. Observers viewed simulations on the Oculus Rift of these objects oscillating horizontally. They adjusted the shape of a circle to match the perceived global shape of oscillating 3D surfaces by either elongating it like an Aussie football or squashing it like a pancake. We found that global surface convexity was perceptually overestimated for ‘flat’ specular surfaces compared with diffusely-shaded surfaces (similar to Mooney and Anderson, 2014). However, we further found that ‘flat’ oscillating refractive objects generated percepts of shape that were closer to veridical. We also found that elongated surfaces were underestimated in global convexity overall, but oscillating smooth elongated specular surfaces were perceived closer to veridical than either refractive or diffusely-shaded objects. The amplitude of oscillation improved shape discrimination for both smooth and bumpy surfaces. These results reveal a form of seesaw effect, whereby errors in perceived shape of objects differentially depends on motion cues from multiple forms of surface optics as curvature increases.

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Mora or more? The phonological unit of Japanese word production in the Stroop colour naming task

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In English, Dutch, and other European languages, it is well-established that the fundamental phonological unit in word production is the phoneme; in contrast, recent studies have shown that in Chinese it is the (atonal) syllable and in Japanese the mora. The present study investigated whether this cross-language variation in the size of the unit of word production is due to the type of script used in the language (i.e. alphabetic, morphosyllabic, or moraic). Capitalizing on the multiscriptal nature of Japanese, and using the Stroop colour naming task, we show that the overlap in onset mora between the colour name and the written distractor facilitates colour naming independent of script type (syllabic kana vs. single logographic kanji character mapping onto a multi-moraic word). The results confirm the mora as the phonological unit of word production in Japanese, and also establish the Stroop colour naming task as a useful task for investigating the fundamental (‘proximate’) phonological unit used in speech production.

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Absolute not relative extremeness of outcomes sway risky decisions from experience

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Recent experimental evidence in experience-based decision-making suggests that people are more risk seeking in the gains domain relative to the losses domain. This critical result is at odds with the standard reflection effect observed in description-based choice and explained by Prospect Theory. The so-called reversed-reflection effect has been predicated on the extreme-outcome rule, which suggests that memory biases affect risky choice from experience. To test the general plausibility of the rule, we conducted two experiments examining how the magnitude of prospective outcomes impacts risk preferences. We found that while the reversed-reflection effect was present with small magnitude payoffs (similar to the ones used to establish the rule in previous research), using payoffs of larger magnitude brought participants’ behavior back in line with the standard reflection effect. Our results suggest that risk preferences in experience-based decision-making are not only affected by the relative extremeness, but also by the absolute extremeness of past events.

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Intermanual transfer of skills as a function of gender and handedness: Implications for corpus callosal connectivity and lateralization of functions

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Intermanual transfer of skills from dominant hand to non-dominant hand has been observed in a wide variety of tasks. Such a transfer is of interest for its link to brain organization and as a tool to study specialization of functions and corpus callosal connections. The present study investigated the magnitude of intermanual transfer of skills from dominant to non-dominant hand on a mark making task and hand steadiness task. Forty six left-handed (24 males and 22 females) and sixty eight right-handed (30 males and 38 females) of the age range 18-22 years participated in the study. It was hypothesized that there would be greater intermanual transfer for left handers as compared to right handers and also it was expected that transfer would be greater for females as compared to males. The results of the study confirmed the hypotheses. Left-handed females and left-handed males exhibited better intermanual transfer of skills as compared to right-handed males and females in the mark making task. However, in the case of hand steadiness task left-handed females showed better performance as compared to other three groups. Findings are explained in terms of the corpus callosal connectivity and lateralization of functions in the brain.

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Strength and weight: Two dimensions of evidence in choice and confidence

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In simple tasks, the information we consider when making a decision or judgment can be dissociated into two components: the proportion of samples that favor one alternative over another (strength) and the total number of samples overall (weight). Most computational models assign a single value to the quality of evidence, implicitly assuming that evidence is a multiplicative function of these two components. However, we show that people’s stored evidence responds more to manipulations of strength / sample proportion than to manipulations of weight / sample size. This is apparent both in their distributions of probability ratings in a judgment task and their distributions of response times and accuracy in a decision task. We show that this can be at least partially attributed to imprecision in people's estimates of sample size as the weight of evidence increases (i.e., people estimate large quantities with greater variability). In addition, the effects of these manipulations on response times suggest that decision thresholds may change dynamically within a trial based on incoming stimulus information.

Orienting impairments in Autism Spectrum Disorder are motoric not attentional

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The study examined the temporal properties of endogenous orienting in two tasks, measuring a button press response and eye-tracking. 32 participants with and without Autism Spectrum Disorder (ASD mean age = 10.78 years, Typically Developing (TD) mean age = 10.99 years). were matched on raw scores for the Raven’s Progressive Matrices, age and gender. Two experimental tasks were completed: a traditional Posner (1980) arrow cuing task with forced-choice button press responses, and an overt orienting task in which participants were instructed to saccade to the target. Both tasks included valid (75%) and invalid (25%) cues at six cue-target SOAs (150ms - 900ms). A 2x2x6x2 Mixed ANOVA was used to examine performance. A congruency by SOA interaction was found, F(1,150)=6.89, p<.001, confirming a standard orienting pattern, however this did not interact with group (p=.103) nor task (p=.413), thus the phenomenon of orienting did not differ between groups, nor did it differ across tasks. A significant task by group interaction was also found, F(1,30)=6.77, p=.014; no differences were found between groups in saccadic RT, however the ASD group were slower than the TD group on manual responses. We conclude that motoric slowing may confound previous reports of attentional impairments in ASD.

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Asking about sentence acceptability: task assumptions, sources of variability, and sample sizes

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Popular measures for sentence acceptability include Likert scales, forced-choice judgments, and magnitude estimation, but they make different assumptions and have different properties. We examine their test-retest reliability at different sample sizes, also considering a novel measure based on Thurstonian modelling which is interesting for the way it connects comparison responses to scale-like data. We find that despite their drastically different assumptions, Likert ratings and Thurstonian acceptability estimates are highly consistent, suggesting that plausible objections to the specific assumptions made by each are not limiting in practice. Contrasting between and within participant reliability shows the extent to which the different tasks are sensitive to individual differences and item neighborhood effects, which contribute to between-participant variability only. We find that the different measures are differently vulnerable to these sources of variation, with magnitude estimation particularly sensitive. Contrasting varying sample sizes shows the relative efficiency of each method. We find that targeted forced-choice comparisons have extremely high power, but are also more likely than other methods to include sign errors among the differences identified. Taken together, these results help show not just that these methods for measuring sentence acceptability are different, but how and why they are different.

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Miss it and miss out: Counterproductive nonspatial attentional capture by task-irrelevant, value-related stimuli

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Recent studies of visual search suggest that learning about valued outcomes (rewards and punishments) influences the likelihood that distractors will capture spatial attention and slow search for a target, even when those value-related distractors have never themselves been the targets of search. This effect is termed value-modulated attentional capture (VMAC). In the current study we demonstrate a related effect in the context of temporal, rather than spatial, selection. Using a Rapid Serial Visual Presentation we show impaired identification of a target that follows a reward-related but task-irrelevant distractor. These findings show that the influence of reward on attentional capture extends to temporal selection, and demonstrate that value-related distractors can interfere with conscious perception of subsequent target information. Subsequent evidence suggests that the size of the nonspatial VMAC effect is influenced by both automatic (capture) and goal-directed (control) processes: given sufficient motivation and information, participants are able to use cognitive control processes to overcome the effect of reward on capture.

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Effects of Explicit Relational Knowledge in Probabilistic Sequence Learning

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The presence or absence of an effect of explicit knowledge on sequence learning has been used to argue in favor of sequence learning being explicit or implicit respectively. However, this knowledge is usually comprised of chunks of the sequence itself and thus whether participants can retain and apply this knowledge is largely determined by the complexity of the sequence. The current series of experiments explored to what extent a hint about a simple relational rule describing probabilistic contingencies in a three-choice serial reaction time (SRT) task could affect performance and transfer to novel situations. The results showed differential effects of the hint on different subsequences during training and surprisingly, a detrimental effect on performance in a transfer phase when the contingencies were removed. The results suggest that the interaction between relational knowledge and sequence learning is complex, and highly dependent on the properties of the sequence. Implications for the implicit status of sequence learning are discussed.

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Testing the contribution of associative and non-associative processes to the Perruchet effect

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The Perruchet effect refers to a dissociation between the conscious expectancy of an event and the strength or speed of responding to that event. This dissociation is considered to be the best evidence for multiple learning processes with expectancy governed by participants’ explicit beliefs and conditioned responding driven by the associative history of the event. Versions of the effect that replace the conditioned response with a voluntary speeded action have shown a similar dissociation between expectancy and response priming, suggesting that associative learning mechanisms may be broadly dissociable from conscious expectancy under the right conditions. Recently, however, there has been some debate as to whether the trends seen in both conditioned responding and response speed are truly due to associative learning. An alternative non-associative explanation is that the trends in responding are the result of recent experience with the same event (i.e., repetition priming based on event recency). Using a differential conditioning paradigm, we teased apart the influence of associative learning and repetition priming in a choice reaction time task. We found that while repetition priming might contribute to the Perruchet effect, it is insufficient to explain the response trends. Implications for theories of learning and action selection will be discussed.

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Attractiveness moderates the happy face advantage

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In speeded emotion categorization, a ‘happy face advantage’ (i.e. happy faces are categorized as happy faster than angry faces as angry) has repeatedly been demonstrated. Other facial cues, such as sex or race moderate the happy face advantage in evaluative congruent ways. Female and own-race faces are evaluated more favorably than male and other-race faces and the happy face advantage is larger for female and own-race faces than for male and other-race faces respectively. We investigated whether facial attributes unrelated to social categories such as attractiveness would moderate the happy face advantage consistent with the evaluative congruence account. Across three experiments participants categorized attractive and unattractive faces as happy or angry as quickly and accurately as possible. As predicted, when female faces were categorized separately, a happy face advantage emerged for the attractive females but not for the unattractive females. Corresponding results were not found for male faces. This pattern was confirmed when female and male faces were categorized together, indicating that attractiveness has a stronger influence on emotion perception for female faces. The usual sex effect was not found indicating that effects of social category cues in emotion categorization may be moderated by subjective evaluations of face pleasantness.

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A Cross-Cultural Investigation of the Influence of Facial Race and Sex cues on Emotion Recognition

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The magnitude of the happy categorisation advantage, the faster recognition of happiness than negative expressions, is influenced by facial race and sex cues. Previous studies have investigated these effects using predominantly Caucasian samples. To determine whether these influences generalise across cultures, Caucasian (Experiments 1 and 2) and Chinese participants (Experiment 2) categorised happy and angry expressions displayed on own-race male faces presented with emotional other-race male, own-race female, and other-race female faces in separate tasks. Although results suggested some differences across cultures, the task specific influence of social category cues on the happy categorisation advantage on own-race male faces was not influenced by participant ethnicity. The happy categorisation advantage was present for own- and other-race female, but not own-race male faces when they were categorised together, and present for own-race male faces when they were encountered with other-race male faces. Results suggest cross-cultural similarity in the influence of social category cues on emotion categorisation.

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Comparison of magnitude estimations of pitch change in amusic and non-amusic individuals

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Background: Just-Noticeable-Difference (JND) is a measurement that reflects the psychological distance between two pitches to be noticeable. Given that individuals with musical training are more sensitive than untrained individuals to small changes in pitch, it is possible that the JND is used as a yardstick for estimating interval size. In other words, the number of JNDs between two pitches of any interval may predict its perceived interval size. We refer to this hypothesis as the JND dependence model. Aims: To test this hypothesis, the present study examined individuals with congenital amusia, a disorder that affects one’s fine-grained pitch perception. For amusic individuals, their JNDs are usually larger than those of non-amusic individuals. Based on the JND dependence model, it predicts that the perceived size of supra-threshold intervals should also be smaller for amusic individuals than non-amusic individuals. However, there is a lack of direct evidence supporting this claim. Methods: Eight amusic participants and their matched controls were presented with pairs of tones presented sequentially, and asked to provide magnitude estimations (i.e., the interval size) between two given pitches. Results: Contrary to the prediction of the JND dependence model, the results revealed that the perceived amount of pitch change is equivalent between the two groups ($p > 0.05$), suggesting that perceived interval size is independent of the number of JND, when the separation between two tones exceeds their thresholds for pitch discrimination. Conclusions: The finding indicates that amusic individuals have similar perceptions of interval size with non-amusic once pitch changes are noticeable, suggesting that impairments for supra-threshold pitch changes often reported for individuals with congenital amusia may not be an outcome of their elevated thresholds for pitch discrimination. These results are compatible with the JND independence model of the perceived interval size between pitches, in that judgements of the size of supra-threshold interval were unrelated to the perceiver’s JND for pitch.
Differential valence acquired during evaluative conditioning is sensitive to reinstatement

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During evaluative conditioning, a neutral conditional stimulus (CS; e.g. a picture of a shape) acquires negative valence if it is repeatedly paired with an unpleasant unconditional stimulus (US; e.g. an unpleasant picture). If the CS is then presented without the US (extinction), negative conditional valence eventually reduces. In fear conditioning, presenting the US unexpectedly after extinction (reinstatement manipulation) leads to a return of conditional responding (i.e. relapse). We examined whether relapse would also occur in evaluative conditioning if the unpleasant pictures were presented unexpectedly after extinction. During conditioning, one shape (CSU) was followed by unpleasant pictures; while a different shape (CSN) was followed by neutral pictures. Participants acquired differential valence evaluations throughout conditioning, such that the CSU was evaluated as less pleasant than the CSN. During extinction, the CS shapes were presented alone and differential valence reduced. The unpleasant pictures were presented after extinction as a reinstatement manipulation and differential valence returned. This confirms that, as in fear conditioning, valence acquired during evaluative conditioning is also subject to relapse (via reinstatement).
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Can SFT identify a model's processing characteristics when faced with reaction time variability?

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The Systems Factorial Technology (SFT) analysis technique, in conjunction with appropriately-designed behavioural experiments, can reveal the architecture, stopping rule and capacity of information processing systems. Researchers have typically applied SFT to simple decisions with little variability in processing demands across stimuli. How effective is SFT when the stimuli vary in their processing demands from trial-to-trial? For instance, could it be used to investigate how humans process written words? To test SFT’s performance with variable stimuli, we modelled parallel limited-, unlimited- and super-capacity systems using linear ballistic accumulator (LBA) models. The LBA models’ parameters were estimated for individual participants using data from a lexical decision experiment - a task that involved a set of stimuli with highly variable, stimulus-specific response times. We then used these parameters to simulate experiments designed to allow SFT to identify the models’ capacities, architecture and stopping rule. SFT successfully identified system capacity with <600 trials per condition. The probability of correctly identifying the LBA’s architecture and stopping rule increased with the number of trials per condition. However, even with 2000 trials per condition (8000 trials in total), the power of these tests did not exceed .6. SFT appears promising for investigating the processing of stimuli sets with variable processing demands.
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Selection Across a Bilateral Visual Field: Simultaneous vs Sequential Selection Mechanisms

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Recent investigations have shown that stimuli in a dual stream Rapid Serial Visual Presentation (RSVP) task can be perceived at very brief presentation intervals even when appearing in two different visual fields. Here we investigated whether this occurs via fast-moving, left-to-right covert attention or true simultaneous selection of non-contiguous visual stimuli. Since previous research has shown that right field dual RSVP performance is affected markedly despite preserved left field performance, we hypothesized that an increase in perceptual noise would result in even poorer right field performance if processing occurs sequentially, whereas simultaneous processing would result in a net reduction across both fields. Using a within-subjects design, we presented 27 participants with 2 blocks of single and dual stream RSVP tasks with the second block using stimuli embedded in 1/F noise. Performance in identifying a target letter was poorer across all conditions with embedded noise; however, right field dual stream showed the greatest reduction relative to the left field. Here we suggest that noise embedded stimuli increased left field processing time at the expense of a decaying iconic trace in the right, and thus is evidence of a sequential rather than simultaneous processing mechanism for perception of non-contiguous stimuli.

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Left-handers know what’s left is right: Handedness and object affordance

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We live in a right-handers’ world, and left-handers are forced to adapt. For example, objects afford action more easily when the handle is oriented toward the dominant hand. We investigated how handedness influences preference ratings, based on object handle orientation and also measured eye movements to determine whether attention differed based on handedness and object affordance. Across three experiments, participants viewed advertisements of everyday objects and rated aesthetic appeal, purchase intention, and perceived value. Left and right-handers found advertisements more aesthetically pleasing when the handle was aligned with their dominant hand. Furthermore, participants fixated the lower left more when the handle was oriented leftward and the lower right more when it was oriented rightward. Experiment 2 revealed that left-handers rated advertisements higher on all rating scales when the handle was leftward. Right-handers did not show similar preferences. In Experiment 3, the text was removed from the advertisements. Eye movements were identical to Experiment 1 and ratings were consistent with Experiment 2. Left-handers might be more aware of their handedness, and consequently object affordances, as a result of living in a right-handed world. These findings highlight the importance of considering product orientation, particularly when advertising to left-handers.

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The effects of transient attentional shifts and sustained attentional dwelling on awareness of irrelevant distractors.

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Visual attention selects important information, and is believed to be instrumental for awareness. Yet, implicit measures of attention and explicit measures of awareness often failed to correlate highly; possibly because the implicit measure commonly comprises two processes: transient shifts of attention and sustained attentional dwelling. The present study examined whether awareness is more strongly mediated by transient or sustained attention, by asking participants to search for a colour target among irrelevant distractors. In Experiment 1, eye movements to the distractor were measured; in Experiment 2, we measured the N2pc in EEG. Awareness was measured by probing participant’s knowledge of the distractor location on a small portion of trials. The results showed that both attentional capture by the distractor and prolonged dwelling influenced awareness, whereby the probability of selecting the distractor had a stronger impact. Similarly, the distractor that was selected more frequently in the eye movement experiment also elicited a larger and earlier N2pc, indicating that the N2pc primarily indexes transient attention shifts. Interestingly, a salient distractor did not elicit any eye movements to its location, or a significant N2pc, but still showed high levels of awareness. Awareness is more strongly modulated by early attentional processes, rather than sustained attention.

Extensions to the Surprisingly Popular (SP) algorithm, a solution to the single-question crowd wisdom problem.

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The notion that crowds’ predictions consistently outperform that of individuals has become ubiquitous in the field of forecasting. While recent research has primarily focused on developing methods for optimally combining forecaster responses, most successful approaches have required the use of multiple questions (i.e., training data) in order to be able to derive such weights. In practice, such a requirement can be time consuming and cost prohibitive. The SP algorithm (Prelec, Seung, & McCoy, 2017, Nature, 541, 532) has been proposed as a solution for deriving accurate forecasts in the single-question scenario, where each forecaster predicts only one event, so there is no training data. The algorithm is grounded in a Bayesian framework, assuming ideal Bayesian respondents who can reason both factually and counterfactually, and accurately predict others’ forecasts in both factual and counterfactual worlds. We present a replication of one study, demonstrating the robustness of the algorithm even when respondents do not behave in this manner. We propose an extension of this model that generates probabilistic predictions under the same basic framework, and examine how different models perform as a function of forecaster confidence and bias.

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Background. The cue-validity effect, the shortening of RT to targets presented in pre-cued locations in simple reaction time (RT) tasks has been suggested to reflect on attentional processes. Hence, these tasks have been modified in order to measure and train selective attention. Methodology. Three studies were conducted to modify covert selective visual attention using different visual probe tasks and conditions. In these experiments, a simple RT task, the basic Dot-probe task (DPT) with two neutral stimuli, was slightly altered to determine the effect of cue-validity on RT performance. In experiment 1, a probe discrimination task was administered comprising a T-P-T-P-T sequence of Test blocks with 50% cue validity and Predictive blocks of 95% valid cue trials. Experiment 2 employed the same basic procedure, but omitted the first test block to assess the influence of pre-exposure to a set of non-predictive trials. In experiment 3, the task was changed from a probe-discrimination to a probe-location task that required either location matched or location non-matched responses. RTs and proportions of errors (PEs) were calculated. Results. A significant cuing effect emerged only in the second predictive block of Experiments 1 and 2. In contrast to the probe-discrimination task, a cuing effect in the probe-location task was evident only in PEs. Furthermore, participants who were aware of the contingency made fewer errors on some task blocks compared to those who were not explicitly aware. However, this effect was not consistent across the three experiments. Conclusion. The current results suggest pre-exposing participants to a set of non-predictive trials does not impair performance on a subsequent simple cueing task as a cue-validity effect emerged only in the second predictive block of Experiments 1 and 2. Awareness scores do not reliably predict performance. Finally, the cue-validity effect in the probe-location task occurred in errors and not in RT scores, whereas it was evident in both in the probe-discrimination task.

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Action disposition influences responses towards aversive images of humans during early picture processing in male and female participants

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The imminence of potential threat implied by scenes of humans armed with weapons suggests these stimuli trigger more rapid shifts in attention allocation than other aversive images of humans. In the present study, we systematically varied the context in which images of injured humans and humans armed with handguns were viewed. Electroencephalography data was recorded from 40 participants (20 males) as they completed a modified Flanker task. Attention allocation during early picture processing was indexed by N1 activity derived from anterior and occipital regions. Occipital N1 modulation indicated that Flanker arrays with injury targets required additional processing compared to those with aimed handgun targets, except in conditions where handgun images were presented with injury images as targets or Flankers. N1 activity from anterior regions showed that participant sex also moderated this effect, as arrays with mismatched injury and aimed handgun images influenced the magnitude of the anterior N1 for male, but not female, participants. These results suggest that responses towards humans armed with weapons are more efficient during early picture processing; however, the role of contextual and individual-level factors must also be considered when these scenes are employed as negative stimuli in picture processing research.

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Limited capacity: Target processing efficiency in a visual dual-task

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Presenting two targets with identical meanings simultaneously produces faster detection and identification than presenting a single target alone, an effect known as redundancy gain. Due to this effect, design guidelines for visual displays endorse the use of redundant signals to enhance operator performance. However, research on redundant information coding in applied contexts has largely focused on multisensory cues, rather than redundant visual information, and has not examined the potential effects of dual-task load on redundancy gains. Thus, using measures of resiliency and workload capacity, we examined dual-tasking effects (Experiments 1 and 4) on redundant visual target processing. In addition, we examined how target salience (Experiment 2), distractor presence (Experiment 3), and visual field location (Experiment 5), influence task load effects. Participants performed a redundant target detection task and a manual tracking task concurrently. Despite finding redundancy gains, target processing was limited capacity in all experiments. Moreover, we found no credible difference in processing efficiency due to task load, nor any effects of salience, distractor presence, or visual field location on target processing. Our findings suggest redundant visual targets provide modest response time benefits, and factors such as target salience and location do little to drive processing efficiency for visual dual-tasks.

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None of the above: A Bayesian account of the detection of novel categories

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For each of us, the set of categories that we have encountered is continually expanding. We often recognize at a glance when an animal, a plant, a vehicle, a tool, or a consumer product is a member of a category that we have never previously seen. How do people solve this problem? In this talk we present four experiments that investigate how people form expectations about the probability of encountering a new category, and how we use these expectations when categorizing new entities. In doing so we develop and test a hierarchical Bayesian account of human novelty detection, and show that it outperforms a variety of other Bayesian, connectionist, exemplar and heuristic models.
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The impact of stress on executive function: Investigating the role of emotion regulation

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Stress is a global concern, and is known to interfere with various executive functions. Emerging research suggests that individual differences in emotion regulation (ER) strategies, such as cognitive reappraisal, may be important factors in the relationship between stress and executive functioning. The current study used a validated stress induction to investigate how acute stress impacts on task-switching performance - an index of cognitive flexibility. Whilst the stress induction increased cortisol (p<.001), heart rate (p=.028) and negative affect (p<.001) compared to controls, stress did not impact overall post-stress reaction time (RT) (p=.47) or accuracy (p=.65) on the task-switching task. When considering individual differences in trait reappraisal, analyses indicate that those in the stress condition show slower RT immediately following stress (p=.02), and reduced accuracy (p=.019), compared to the control condition. Importantly, this performance decrement was only observed in participants high in trait reappraisal - a generally adaptive ER strategy; in contrast, stress did not impact performance in participants low in trait reappraisal. These results indicate that the relationship between stress and executive performance may vary between people. Further, they highlight that a more nuanced understanding of how stress affects cognition, as well as the implications of this relationship for stress resilience, is required.
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Memory compression in visual working memory depends on explicit awareness of statistical regularities

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Visual working memory (WM) is a core cognitive ability that predicts broader measures of cognitive ability. Thus, there has been much interest in the factors that can influence WM capacity. Brady, Konkle & Alvarez (2009) argued statistical regularities may enable larger number of items to be maintained in this online memory system. In a WM task that required recall of arrays of colours, they included a patterned condition in which specific colours were more likely to appear together. There was a robust improvement in recall in this condition relative to one without the regularities. However, this is inconsistent with multiple other studies that have found no benefit of exact repetitions of sample displays in similar working memory tasks (e.g., Olson and Jiang, 2004). We replicated the benefit Brady et al. observed in the patterned condition in two separate studies, but we obtained larger samples of subjects and included an explicit test of memory for the repeated colours pairs. Critically, memory compression effects were observed only in the subset of subjects who had perfect explicit recall of the colour pairings at the end of study. This effect may be better understood as an example of paired associate learning.

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Striking a balance between the sexes and the effect of overt and covert sexism

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There is an unfortunate bias for females to be systematically underrepresented in everyday life, from extra scenes in movies to Lego figures. We sought to understand the origins of this social bias using the techniques of experimental psychology. Participants viewed a rectangular 30-item array containing various proportions of males and females and indicated whether the number of males and females was the same or not. If there is no bias in the representation of the sexes, the peak of ‘same’ responses should be centred around the point of objective equality. Instead of this, the peak was shifted towards more females. That is, there needs to be more females in the array for an observer to think they are the same. Over four experiments, we observed this shift for (a) faces, (b) faces with the hair removed, (c) full figures and (d) toilet sign icons. The bias occurred irrespective of whether the observer was male or female. The bias disappeared when participants determined the sex of hens and roosters. It therefore seems that the number of human females are systematically underestimated. We are currently determining whether this underestimation is related to overt or covert sexism.

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Psychometric functions for detection of very brief forward-masked Gaussian-shaped tone-pips: nonlinearity of relation between means and standard deviations

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A psychometric function shows, as a function of some physical stimulus property (such as intensity), an experimental subject’s characterization of the stimulus (such as its presence or absence, i.e. ‘detection’), in terms of percentages-correct. Percentages-correct can be obtained from blocks of characterizations within which the stimulus property remains constant (method of constant levels). Varying the stimulus property across-blocks then generates different percentages-correct, altogether yielding the most precise psychometric function. Ideally, psychometric functions are sigmoids, integrals of some probability-density equation having a mean (e.g., detection threshold) and a standard deviation (reflecting psychometric-function breadth). Presently, percentages-correct versus stimulus intensity were obtained, using the method of constant levels, for detection of Gaussian-shaped 2-kHz tone-pips of 1.25 ms equivalent rectangular duration, each occurring 3 ms after a 200-ms 2-kHz fixed-intensity ‘forward-masker’. Each forward-masker intensity (10–90 dB SPL) thus identified a psychometric function. Two highly-experienced subjects participated. Empirically, psychometric-function means and standard deviations increased for forward-maskers of 50 dB SPL and above. The means overlapped with detection thresholds known (from adaptive tracking) for tone-pips twice as long. But means barely differed from nonmasked pip-detection-thresholds, for 10-40 dB SPL forward-maskers; nonetheless, standard deviations doubled. This is surprising, and forces a re-assessment of theories of forward-masking.

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The Effect Shifting Criterion Has on Affect: Its Reduction and Exacerbation

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Individuals vulnerable to anxiety and depression consistently judge emotionally ambiguous stimuli as negatively valenced, which is known as an interpretation bias. The experimental manipulation of interpretation bias, using cognitive bias modification methodologies, has shown a reduction in symptomatology; supporting the notion of causality in the maintenance of such emotional disorders. However, little is known about the underlying mechanisms responsible. Here we posit that signal detection theory provides a useful framework for exploring such mechanisms, which has been applied to understand a related phenomenon: attentional bias (AB). The AB literature reveals that liberal criterion setting (and not sensitivity) accounts for the preferential processing of threat. In a similar vein, the current study proposes that criterion is the underlying mechanism responsible for negative interpretation bias, and as such, experimentally shifting criterion would result in changes in affect. A facial discrimination task, using differential rewards, was employed to shift criterion for judging facial expressions as threatening. Training was successful in differentially shifting criterion. Importantly, conservative criterion training resulted in significantly lower levels of negative affect post-training. These findings suggest that, like AB, interpretation biases are the result of anomalous criterion setting and highlight the potential for criterion to be targeted in treatment.

Flanking the happy face advantage

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The Happy Face Advantage (HFA) is the phenomenon where, in simple categorization tasks, happy faces are recognised faster than angry faces. However, aside from schematic faces, there has been little research into how an Erikson flanker task may elicit the HFA. The aim of this study was to investigate whether the flanker task could elicit the HFA and whether colour or greyscale stimuli were differentially processed. Twenty male participants completed a flanker task while EEG and behavioural measures were recorded. Participants were shown Caucasian faces with happy and angry expressions, either in greyscale or naturally coloured, and were asked to respond to the congruency of the expression of the central face with the flanking faces. Reaction time, P1, N170, and P2 amplitudes were analysed. A HFA was found; trials consisting of a happy target with happy flankers were responded to significantly faster than trials containing angry stimuli. Angry target faces had larger N170 peaks than happy target faces. The HFA was stronger with greyscale targets than coloured targets, primarily because the reaction time to greyscale angry faces was slower than to coloured angry faces. These results indicate that a flanker task can successfully elicit the HFA.

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Listener expertise enhances intelligibility of violent ‘Death Metal’ vocalisations

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Violent ‘Death Metal’ music comprises vocalizations with low fundamental frequencies, high distortion, roughness, and animalistic growls and screams associated with aggression and fear. However, it is not clear whether listeners perceive intelligible words in such ‘noisy’ vocalisations. The present study addressed this issue by asking: do experienced listeners (fans) of Death Metal music perceive vocalisations differently to non-fans, and does general musical expertise impact intelligibility? Sixty-four participants formed four groups (n=16) in a 2×2 between-subjects design (fans/non-fans, musicians/non-musicians). Participants were presented with 24 words sung in a Death Metal timbre from the band Cannibal Corpse and completed a four-alternative forced-choice word-recognition task. Intelligibility was above chance for all groups, yet significantly greater for fans relative to non-fans, and musicians relative to non-musicians. However, for fans, intelligibility between musicians and non-musicians was statistically similar; for non-fans, intelligibility was significantly greater for musicians relative to non-musicians. These findings show that fans and musicians have a general intelligibility advantage when perceiving noisy speech. When listeners do not have genre-specific experience, musical training affords an intelligibility advantage similar to experienced listeners. Results will be discussed in the context of perceptual learning and the benefits of expertise for decoding linguistic information in sub-optimum acoustic conditions.

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Effects of Radio Frequencies on alpha oscillations and Binocular Rivalry

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According to recent studies, radio frequencies (RF) emitted by mobile devices affect neural oscillations in the alpha range (8-12 Hz). Alpha is widely understood to play a suppressive role in visual processing, although most of the current literature reports alpha fluctuations as a consequence of particular visual processes, rather than as an influence on them. Our experiments investigate alpha in relation to binocular rivalry (BR), and ultimately whether alpha plays a causal role in rivalry processes. Rivalry rate and suppression depth were our measures of interest. In our first experiment, we correlated natural variation in resting-state alpha levels (using EEG) with rivalry performance, and displayed a strong negative correlation between relative alpha levels and rivalry rate. A within-subjects design then allowed us to introduce mobile RFs to examine the causal role alpha may be playing. As in previous studies, RFs were seen to significantly affect alpha levels; however, the direction of the influence was not systematic. Although alpha and rivalry rate were correlated in the same fashion as the first experiment, there was no causal relationship found i.e. within-subject alpha variations due to RF had no relationship to rivalry performance.

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EEG based Markers of Vection in Depth

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Globally coherent patterns of optic flow can induce compelling illusions of self-motion, known as ‘vection’. This study compared the event-related spectral perturbation (ERSP) data obtained during (and after) repeated exposures to two types of optic flow display: (1) a VECTON display (simulating constant velocity self-motion in depth); and (2) a CONTROL display (a spatially scrambled version of (1)). ERSP data were decomposed using time-frequency Principal Components Analysis (t-f PCA). Of the 52 retained t-f components, 7 were found to correlate significantly with observer vection strength ratings. Four of these vection-related components peaked during the actual visual stimulus motion which we speculate reflect a mix of activity (related initially to suppression of object motion perception, then later on to the onset of vection and the start of peak vection). The 3 remaining vection-related components all occurred directly after the display motion had ceased; presumably they represent vection/motion aftereffects as well as cognitive activity associated with verbal vection responding. These findings provide support for the notion that EEG can be used to provide objective markers of changes in both vection status (i.e., ‘vection/no vection’) and vection strength.

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Sweetness perception and cognitive performance: investigating effects of contrasting sweet substances on cognitive tasks associated with prefrontal lobe

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It is the prevailing view that human preference for sweetness is an innate trait, although the exact mechanism underlying its powerful appeal is largely unknown. Neuro-cognitive research has confirmed that glucose, as a main energy substrate for the brain, can momentarily benefit cognitive performances, particularly for memory function. This finding proposes a possible explanation to human attraction to sweetness. To date, relatively little knowledge available concerning (1) effects of common sugars (e.g., fructose, sucrose and glucose) on non-memory cognitive domains; (2) exclusive effect of sweetness on cognitive performances. To begin to bridge these gaps, the present study tested in 49 people the effect of three common dietary sugars on three well-studied non-memory cognitive tasks: simple response times, arithmetic, and Stroop interference. A double-blind, placebo-controlled, counterbalanced experimental design was used. Results revealed a clear effect of glucose and sucrose producing negative effects on the assessed tasks comparing to fructose and the placebo (p<.05), an effect particularly pronounced under conditions of fasting (compared to non-fasting; p<.001). Challenging commonplace understanding, these findings suggested that consuming glucose-containing sugars reduces efficacy of cognitive function associated with the prefrontal lobe, pointing to a domain-specific mechanism for glucose-mediated effects.

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Cultural dependence on visual cues for predicting satiation and food intake

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Perceptual cues, such as visual references, are shown to be able to dominate food intake decisions. However, these findings have been limited to only the Western culture. Our research group conducted the first cross-country study that investigated the link between dependence of visual cues and cultural dining approach in making food intake decisions. A total of 570 individuals across Canada, China, Korea, and New Zealand participated this study. The participants were asked to complete a computerised task which comprised questions about expected satiation and intake volume, accompanied with photographs of ten culturally diverse dishes presented on large and small plates. The results revealed some clear culture differences: participants from the Western countries reported significantly higher intake volume estimations than China or Korea (p<0.05), notwithstanding their estimated satiation being similar. More interestingly, the current study made a novel observation about cultural differences in using visual cues. Contrary to the Western culture, the size of the plate had minor impact on the Asian participants’ expected satiation, and virtually no impact on their intake decision (p>.05). Findings from this study highlighted the importance of learned perceptual cues and illuminated the perceptual processes involved in eating behaviour.

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Extremists and echo chambers: Learning from each other in iterated transmission chains

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How does the process of information transmission affect the cultural products that emerge from that process? This question is often studied experimentally and computationally via iterated learning, in which participants learn from previous participants in a chain. Much research in this area builds on mathematical analyses suggesting that iterated learning chains converge to people’s priors. Here I will discuss two studies that suggest that the reality can be far more complex. In the first, we use simulations and an experiment with people to demonstrate that when there are individual differences, the behaviour of the chain is systematically distorted by the learners with the most extreme biases. In the second, we show that if learners can choose what other learners to interact with, then if there are individual differences and differing levels of trust, the result is very often a set of echo chambers: rather than the entire population converging to a sensible answer, subgroups form in which each set of learners believe very different things and only learn from and interact with each other. This occurs even when the learners are rational Bayesian agents. Implications for real-world theories of subgroup formation and information transmission will be discussed.

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Chanting Promotes Altruism

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Chanting is a pervasive practice in almost every tradition all over the world. It has been found to improve attention and reduce depressive symptoms, stress and anxiety. The current study aimed to determine whether chanting ‘Om’ for 10 minutes would improve attention, positive mood and increase feelings of social cohesion. The effects of vocal and silent chanting were compared, as well as the effects of chanting for experienced and inexperienced chanters. It was hypothesised that vocal chanting would have a greater effect than silent chanting and experienced chanters would report stronger effects. Participants were 27 experienced (M = 38.22, SD = 14.31) and 45 inexperienced chanters (M = 25.11, SD = 13.07). They were randomly allocated to one of two conditions: vocal chanting or silent chanting. Prior to and following chanting, participants completed the Digit-letter Substitution task, the Positive Affect Negative affect Schedule, the Multidimensional Measure of Empathy and the Adapted Self-Report Altruism Scale. Following chanting participants also completed a Social Connectedness Questionnaire and a manipulation check. Results showed that positive affect and altruism increased more following vocal chanting than silent chanting. Overall, these results indicate that chanting has a positive effect on mood and cognition.

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Reversal of the endowment effect for undesirable choices

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The endowment effect (the finding that owning an item increases our valuation of it) is most often attributed to loss aversion, wherein we weigh the pain of losing what we own more than the pleasure of gaining something new. However, loss aversion is unable to explain recent findings that the endowment effect reverses (participants prefer the non-endowed option) when choosing between undesirable options. We look at the conditions of this reversal and test the role that comparison-processes play in whether choice effects reverse or not in undesirable choice scenarios.

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Neural correlates of excitatory and inhibitory specific Pavlovian-instrumental transfer in humans.

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The ability to extract predictive information about the delivery of reward from the environment allows for behaviour to be appropriately and effectively guided. Although there has been increasing research assessing the ability for reward-paired stimuli to influence instrumental action-selection in humans and the neural correlates associated with this process, our understanding of the influence of stimuli predicting the absence of specific outcomes is less clear. To examine the influence of outcome-specific Pavlovian excitors and inhibitors on instrumental responding we used a feature-negative conditioned inhibition procedure to generate Pavlovian stimuli that predicted the delivery or absence of specific outcomes. The ability for these cues to influence action-selection was assessed through a Pavlovian-instrumental transfer test. In initial behavioural experiments inhibitory Pavlovian stimuli were found to produce an opposing bias in action-selection to excitatory stimuli. Exciters produced a specific transfer effect, promoting responding on the action associated with the same outcome the cue predicted the delivery of, whereas Inhibitors shifted responding away from the action associated with the outcome signaled unavailable by the cue. In the final experiment, the transfer test stage of this task was performed during fMRI acquisition, allowing for the neural substrates associated with these processes to be examined.
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Clinical implication of reversing maladaptive plasticity

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Brain plasticity is the ability of the brain to re-wire itself due to the connectivity of brain networks that are continuously shaped by recurrent experience-dependent adaptive processes, which has significant implications for learning and memory. Among the major causes of disability are cognitive impairments that are linked to maladaptive neuronal plasticity. The aim of this review paper is to summarize how it is possible to take action within each individual experience to re-normalize corrections for maladaptive neuronal plasticity. This is achieved by reviewing cognitive-behavioural therapy (CBT) and new neurofeedback techniques such as brain computer interfaces based on real-time fMRI (rtfMRI-BCI) that are designed to achieve self-regulation of the functional connectivity between different brain areas and of distributed brain networks. Recent acquisitions in the literature adopt a dominant paradigm that investigates change by comparing levels of brain activity between pre and post treatment. Specifically, by applying voxel-based morphometry (VBM) to fMRI and by using brain stimulation techniques, several studies make it possible to advance the hypothesis that CBT affects changes by decreasing activity in the limbic area while increasing dorsolateral frontal activity, thus reflecting re-established top-down control. These advances signify the beginning of a new age for plasticity-based research and practice.
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Happy face advantage as an indicator of attentional bias in implicit and explicit facial categorisation

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To many of us happiness matters and is associated with positive attributes, such as health, fulfilment, and attractiveness when viewed in others. The categorisation of happy facial expressions is faster and more accurate when compared to other expressions, and is known as the Happy Face Advantage (HFA). However, the magnitude of this advantage is not consistent for all identities. Nineteen participants completed an event-related potential (ERP) study which investigated the interactions between identity and expression through three categorisation tasks. The three tasks varied in attentional direction enabling comparison between the integrated (Atkinson & Adolphs, 2011) and the Independent Model (Bruce & Young, 1986) of facial processing. We found a stable HFA in both response times and ERP components (N170 - P8, LPP - Pz) across the expression, sex, and race categorisation tasks. In addition, race and sex modulated the HFA in LPP, whereas only race modulated the HFA in N170. These results provide evidence for the Integrated Model of facial processing and suggest happiness is not viewed equally in all faces.

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From Concrete Examples to Abstract Relations: A model-based neuroscience approach in how people learn new categories

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The ability to form categories based on the relations among objects that share few features in common is a hallmark of human cognition. However until recently, neuroimaging research largely focused solely on how people acquire categories defined by features. In the current electroencephalography (EEG) study, we examine how relational and feature-based category learning compare in well-matched learning tasks. Building on a previous functional magnetic resonance imaging study by our laboratory, we capitalise on the rich temporal information offered by EEG. Focusing on the neural dynamics of how people learn category memberships over individual trials in an experimental task, we investigate how these single trial dynamics modulate computational estimates from decision-making modelling frameworks. Specifically, by sorting participants’ individual trials by their position in the experimental sequence, we observe striking relationships between EEG dynamics (e.g., frontal theta oscillations and P300 component) and feature-based and relational categorisation behaviour.

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**Attentional bias in contamination aversion**

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Attentional bias, particularly a difficulty disengaging from threat, has been shown in the contamination fear subtype of obsessive-compulsive disorder (OCD). Previous research has only focused on direct disgust threats (e.g. vomit) and has not examined responses to other types of threats commonly avoided in OCD, such as indirect threats (e.g. money) or harmful substances (e.g. chemicals) The current study aims to investigate the presence of an attentional bias in contamination aversion for different types of threats. Fifty-four participants with subclinical or clinical contamination fear OCD symptoms completed a visual cueing task. Stimuli were neutral items, threats directly associated with disease, threats indirectly associated with disease, and harmful substances, presented for either 100 or 500ms. Attentional avoidance was found for direct threats at both exposure times, with evidence of difficulty disengaging attention when the stimulus was presented for 500ms. There was no attentional bias for indirect threats or harmful substances. This suggests that people with high contamination aversion avert attention away from direct contaminants briefly and have difficulty disengaging attention in the latter stages of processing these threats. However, this bias is limited to direct contaminants.

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**Collapsing across categories, contexts and cognitive tasks as an alternative to replication**

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Large scale efforts testing the reproducibility of research findings in psychological science (Klein et al., 2014; Open Science Collaboration, 2015) have given new life to an old discussion about our understanding of generality (Mooke, 1983), and what counts as a robust effect (Gilbert et al., 2016). At issue is the extent to which a replication need resemble the original experiment when are differences in sample, materials, task and setting useful for decontextualising an effect, and when do they threaten the robustness of the experiment as a second test of the same theoretical point? A common concern with research on visual categorisation, for instance, is the use of artificial or domain-specific materials to infer domain-general processes. We present a theoretical replication of two experiments measuring people’s sensitivity to visual structure. As in previous demonstrations, we manipulated visual structure using eight image resolutions (1x1, 2x2, 4x4 to 128x128), but we applied this manipulation across two cognitive tasks (memory and discrimination), and large sets of images from three categories (birds, faces and paintings). We propose building generality into the experiment design, by using varied tasks, settings, samples or materials, as an alternative a priori answer to questions of reproducibility and robustness.

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Modeling Learning, Cue Combination, and the Speed-Accuracy Tradeoff in Probabilistic Categorization

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In probabilistic categorization tasks, cues predict category outcomes with some level of uncertainty. The same stimulus will not always predict the same outcome. In these tasks, learning has been characterized primarily in terms of changes in choice probabilities over time, and performance has been well-described by error-driven associative learning models. Less attention has been paid to response times (RTs), which open up a number of different research questions. In this talk, I present three studies that address three key questions: (1) Are changes in RTs commensurate with changes in choice probabilities during learning? (2) To what extent are learning mechanisms separable from decision processes? (3) How do learners retrieve and combine information from multiple cues when making decisions based on previously learned associations? Study 1 shows that combining standard error-driven learning with a diffusion decision model provides a good characterization of choice-RTs across all stages of learning. Study 2 shows that learning and decision processes appear to be separable in a simple learning environment. Study 3 shows that responses to cue compounds can be predicted almost entirely from decision parameters derived from single-cue data, but that the composition of the compounds influences both retrieval dynamics as well as decision thresholds.

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Central delta and alpha power modulate subjective sleepiness and simple reaction time after sleep restriction

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Sleep is an essential function in humans and most animals, and loss of sleep can have important consequences on everyday functions, particularly those which require attention. Here we were interested in exploring the neural processes underpinning the effect of sleep on vigilant attention. Participants (n=24) undertook two EEG/behavioural task recording sessions, one after sleep restriction (5 hours’ sleep) and one after normal sleep, counterbalanced. Sleep was monitored out of the lab via actigraphy and a sleep diary. Participants had EEG recorded on a Compumedics Neuroscan NuAmps 40-channel EEG system during resting state, and during both Attentional Blink (AB) and Psychomotor Vigilance (PVT) tasks. Spectral analysis of the EEG resting state data showed both decreases in central alpha and increases in central theta activity after sleep restriction. Reaction times on the PVT were slower after sleep restriction, while the magnitude of the AB was unaffected. Interestingly, individual differences in both PVT reaction time and subjective sleepiness (measured by the KSS) were predicted by increases in right central theta and decreases in right central alpha. Reaction time differences and sleepiness score differences were also closely related to each other. This suggests resting-state EEG may provide a useful objective measure of alertness.

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Implicit learning in media multitaskers

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Media multitasking refers to the simultaneous use of different forms of media. Previous research comparing heavy media multitaskers and light media multitaskers suggests that heavy media multitaskers have a broader scope of attention. The present study explored whether these differences in attentional scope would lead to a greater degree of implicit learning for heavy media multitaskers. Ninety-four participants were divided into groups based on responses to the media use questionnaire, and completed the contextual cueing and n-back tasks. Results indicated that the speed at which implicit learning occurred was slower in heavy media multitaskers relative to both light and intermediate media multitaskers. There was no relationship between working memory performance and media multitasking group, and no relationship between working memory and implicit learning. A deficit in implicit learning observed in heavy media multitaskers is consistent with previous literature, which suggests that heavy media multitaskers perform more poorly than light media multitaskers in attentional tasks due to their wider attentional scope.

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Collaborative Search using Naturalistic Stimuli: Overcoming Signal Detection limitations using Bayesian Hierarchical Modelling

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Collaborative visual search requires multiple observers to reach a joint decision. The benefits of collaboration are often modest and provide little assurance that teams will outperform individuals in high-stakes, naturalistic tasks. Naturalistic stimuli, however, may not conform to the assumptions of the standard signal detection model commonly applied to visual search tasks. We used Bayesian Hierarchical modelling to both circumvent the limitations of signal detection analytics and to compare empirical collaborative performance to the optimal performance predictions of various decision-making models, in a naturalistic task. Sixteen pairs of observers were presented with a series of displays containing x-ray baggage images, and were asked to decide whether displays contained a target (e.g., a knife). Experiment 1 found that the collaborative performance of individuals, who completed the task in separate testing rooms, best matched a statistically optimal model. Experiment 2 ruled out differential motivation as a possible contributing factor to the collaborative benefit, as the results of Experiment 1 were replicated when individuals completed the task in the same testing room. Drawing on Bayesian Hierarchical modeling, we obtained collaborative search performance that approached optimality in a naturalistic task.
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The Influence of Contextual Colour Cues on Face Emotion Judgements

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The perception of colour has been suggested to influence, and be influenced by, contextual factors such as emotion. The Colour-in-Context (CIC) theory outlines six premises regarding the interactions between colour and context (Elliot & Maier, 2012). Here we consider the first three premises, namely that colour a) carries meaning, b) influences psychological functioning, and c) produces effects that are automatic (Elliot & Maier, 2012). We assessed whether colour influences positive/negative emotion judgments about emotionally ambiguous faces to determine if colour carries meaning in the absence of a clear context, and if it can influence affect decisions. Consistent with previous research, we hypothesized that red, due to inherent negative associations, would lead to greater negative affect appraisal than green. Faces on a red background were judged to be more negative than the same faces on a green background. This effect was present for long (700-ms) and short (250-ms) presentation durations suggesting that colour rapidly influences affect decisions. This is consistent with the proposed automaticity of colour effects. We also present data investigating if this effect is impacted by whether emotion judgments are speeded or unspeeded. These findings provide insight into colour emotion interactions as well as the validity of CIC theory.

A Two-Step Signal Detection Model of Belief Bias in Deductive Reasoning

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When asked to assess the deductive validity of an argument, people are influenced by their prior knowledge of the content. Recently, two competing explanations for this belief bias effect have been proposed, each based on signal detection theory. Under a response bias explanation, people set more lenient decision criteria for believable than for unbelievable arguments. Alternatively, believable and unbelievable arguments may differ in subjective argument strength for both valid and invalid items. Two experiments tested these accounts by asking participants to assess the validity of categorical syllogisms and rate their confidence. Conclusion-believability was manipulated either within- or between-groups. A two-step signal detection model was applied to examine the effects on the relative location of the decision threshold and the distributions of argument strength. Similar effects on validity judgments were found when believability was manipulated within- and between-groups, and were related to changes in decision threshold. This supports the view that the belief bias effect is due to response bias.

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Proactive and Reactive Control in Event-Based Prospective Memory

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Event-Based Prospective Memory (PM) requires remembering to perform intended deferred actions when particular stimuli or events are encountered in the future (Einstein & McDaniel, 1990). We propose a theory of the way control is maintained over the competing demands of prospective memory decisions and decisions associated with ongoing task activities using Braver’s (2012) proactive and reactive control framework. The theory is instantiated in quantitative ‘Prospective Memory Decision Control’ (PMDC) architecture, which uses linear ballistic evidence accumulation (Brown & Heathcote, 2008) to model PM and ongoing decision processes. Prospective control is exerted via decision thresholds, as in Heathcote, Loft and Remington’s (2016) ‘Delay Theory’ model of the impact of PM demands on ongoing-task decisions. However, PMDC goes beyond delay theory by simultaneously accounting for both PM task decisions and ongoing task decisions. We apply PMDC to experiments manipulating PM target focality (i.e., the extent to which the ongoing task directs attention to the features of PM targets processed at encoding, Einstein et al., 2005) and the importance of the PM task.

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Decision-making in liberals and conservatives

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Conservatives exhibit greater fear and disgust sensitivity than do liberals and compromised reasoning ability strengthens endorsement of conservative views. We propose that dual-process models of moral judgements can explain these findings, with conservatives relying more on system 1 (fast, emotional) and liberals on system 2 (slow, reasoned) processes. To test this theory, liberal and conservative participants responded to moral dilemmas under cognitive load or with no load. As predicted, cognitive load increased liberals' response times, indicating a reliance on controlled reasoning processes, but did not affect conservatives’ response times. This result was not due to group differences in logical reasoning or working memory. Instead, as predicted, logical reasoning ability predicted the time that liberals, but not conservatives, took to respond to the dilemmas. Differential reliance on systems 1 and 2 may, therefore, be a fundamental aspect of left-right political orientation.

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Probability estimation in decisions from experience

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When making uncertain decisions from experience, people’s choices suggest that they underweight the occurrence of small probability events. Intriguingly, however, when they are also asked to provide a probability estimate for such rare events, they tend to overestimate them compared to their objective probability of occurrence. In the current study, we investigated whether this seemingly paradoxical dissociation of choices and beliefs is the result of a general inattention to the probability estimation task. To test this, we manipulated the incentives for participants’ performance on the estimation task. The results, besides replicating previous findings of simultaneous underweighting in choices and overestimation in probability judgements, show that people’s overestimation of the rare events decreases when they are incentivized for the estimation task. Implications for explanations and models of the simultaneous underweighting and overestimation of rare events in decisions from experience are discussed.

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How is Long-Term Memory for Visual Scenes Built Up?

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The so called Hebb-Effect shows how long-term memory for sequentially presented lists is gradually acquired and how it is used in a working-memory test. Previous studies examining the equivalent of the Hebb-Effect with visual scenes failed to demonstrate long-term learning. In Experiment 1, we tested the hypothesis that a recall test but not a recognition test prompts the build-up of representations of configurations of colors. We additionally examined whether memory acquired in a recall test might also be used in a recognition test. We modelled the recall data with the three-parameter mixture model by Bays et al. (2009) in a hierarchical Bayesian framework. Mixed modelling on the latent parameters showed that memory for the repeated configurations was better but slightly less precise than for the non-repeated. However, there was no evidence for memory to become better over number of repetitions. Further, the better memory was not used in a recognition test. In Experiment 2, we focused on the recall test and repeated only one configuration. We replicated the better but slightly less precise memory for repeated configurations and found tentative evidence for memory to increase with repetitions. The experiments suggest that recalling is important in building up visual long-term memory.

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Emotional responses to violent music among fans and non-fans of ‘Death Metal’

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Although negative emotions are usually avoided, people often appreciate sadness when conveyed within music and the other arts. The present study investigated listeners’ subjective emotional experiences induced by music conveying aggression and violence. We also investigated whether the tendency to appreciate violent music is associated with particular personality traits, empathic tendencies, and mood regulation strategies. 48 fans and 97 non-fans of violent ‘Death Metal’ music were presented with eight 1-min excerpts of Death Metal and reported their experiences and aesthetic responses to the music. They also completed the ‘Big-Five Personality Inventory’, the ‘Interpersonal Reactivity Index’ of empathy, and the ‘Brief Music in Mood Regulation Scale’. Results show that relative to non-fans, fans of violent music were significantly less agreeable and conscientious, but more open to experience; less inclined to show concern and sympathy for unfortunate others; and more inclined to use music to help release negative emotions. Fans also reported significant increases in positive affect and decreases in negative affect while listening to violent music. For example, increases in ‘Wonder’, ‘Power’, ‘Peacefulness’, ‘Happiness’, ‘Joyful Activity’, and ‘Engagement’, and decreases in ‘Tension’, ‘Anger’, and ‘Fear’. Results will be discussed in view of current research on the psychosocial consequences of media violence.  

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Preparation and control of task-irrelevant actions as revealed by TMS

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Action tendencies can be elicited by stimuli with motivational salience (e.g., appetitive rewards) or objects with ‘ultilization behaviours’ (e.g., graspable tools). These action tendencies can potentiate behavioural performance through speeded reaction times in response tasks, and improve detection accuracies in attentional capture tasks. In a series of experiments, we used transcranial magnetic stimulation (TMS) to investigate the neural signatures of action tendencies in the presence of trained response cues. In all experiments, participants were presented with a continuous letter stream and instructed to quickly respond to two target letters using two different response keys. Following this training phase, the target letters were embedded within a new task (test phase) and we applied TMS to the motor cortex and measured motor evoked potentials in the contralateral hand as an index of corticospinal excitability. We found that action tendencies can be elicited by response cues trained within a single experimental session, and that successful control over these provocations were accompanied by suppression of the motor system. These results provide a model for understanding the relationship between well-trained response cues, the provocation of action tendencies by these cues, and the implementation of cognitive control to override such action tendencies.  

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Beyond cloze probability: Semantic and syntactic preview effects in reading

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Theories of eye movement control in reading assume that early oculomotor decisions are determined by a word’s frequency and cloze probability. This assumption is challenged by evidence that readers are sensitive to the contextual plausibility of an upcoming word: First-pass fixation probability and duration are reduced when the parafoveal preview is a plausible, but unpredictable, word relative to an implausible word. The present study sought to establish whether the source of this effect is sensitivity to violations of syntactic rules. The gaze-contingent boundary paradigm was used to compare plausible previews to semantically anomalous previews that either matched or mismatched the word class of the target. Results showed that semantic plausibility was the primary driver of the plausibility preview effect. However, there was an additional benefit from previewing a syntactically valid word that emerged later in the time course, providing the first direct evidence of parafoveal syntactic processing in reading. These results highlight the limitations of relying on cloze probability as an index of contextual predictability. It is argued that the data are consistent with recent probabilistic accounts of language comprehension.

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Learning and attention under uncertainty: evidence for an ‘attentional habit’?

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How do we direct our attention to stimuli in our environment? One prevailing view is that items that are predictive of events will attract our attention. This allows us to optimize our limited cognitive resources to make better decisions based on what is around us. However, when stimuli are followed by unexpected events, this uncertainty alters our attention to other potentially relevant stimuli in the environment. In a simple learning task which manipulated the certainty of cues predicting events, Beesley et al. (2015) found evidence for these two types of attentional biases when certainty was manipulated between-subjects. We sought to replicate this effect within-subjects using a two-staged learning task. Unexpectedly, it was found that participants who received certain contingencies (deterministic) prior to uncertain contingencies (probabilistic) continued to show the same attentional bias in the uncertain stage as in the certain stage. When the same task was conducted as a single stage of uncertainty (without a prior certain stage), attentional biases mirrored those seen in Beesley et al. We suggest that this may be the consequence of an attentional habit that develops during the initial (certain) stage of learning.

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Suddenly I see: Presentation of a solution enhances ‘aha’ experience, particularly when the solution is unexpected

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Investigations of insight using ‘insight problems’ have long been conducted with an underlying assumption that participants solve insight problems with insight processes and/or experiences. Neuroimaging studies build on this approach by presenting participants with the solution and analysing the result as though insight has taken place. Here we examined self-reports of the ‘aha’ experience, a defining aspect of insight, before and after presenting solution feedback. We presented participants (N = 129) with insight and non-insight problems, randomly interleaving the two problem types. Participants also completed compound remote associate tasks, commonly used in neuroimaging studies. Self-reports of insight experience were measured directly after problem solving, as well as after solution feedback. Before solution feedback there was no difference in ratings of ‘aha’ experience between insight and non-insight problems, but after feedback, insight problems resulted in significantly higher ‘aha’ ratings than non-insight problems. These results have implications for insight research paradigms as well as informing teaching methods.

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Individual differences in fear generalisation on a categorical level

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Fear generalisation refers to the spread of conditioned fear to stimuli perceptually similar to but distinct from the original conditioned stimulus. Recent studies have demonstrated that humans are also able to generalise their fear based on conceptual knowledge of object categories. The current study examined the role of individual differences in fear generalisation. We hypothesised that high trait anxiety would lead to more fear generalisation. Participants were presented with images in two categories, breakfast foods and pastries. Objects from one category were reinforced by an electrical shock, whereas objects from the other category were never reinforced. Anxious individuals showed higher levels of fear generalisation, but only to ambiguous test items that fit into both categories (e.g., croissants). The results aligned with past studies that suggest high anxious individuals are vulnerable to ambiguity.

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Why didn’t I see it? The effects of target prevalence and scene context on visual search in road scenes

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When driving, we are constantly scanning our visual field for information, such as road signs, and the location of other road users. Prior knowledge and expectations play an important role in where our visual attention is directed; however often drivers ‘look-but-fail-to-see’ relevant objects in the scene. The prevalence of a target and whether it conforms to our expectations of the environment, have both been shown to impact the likelihood of target identification, however investigation of the impact of these factors together is limited. We conducted two experiments designed to extend on previous research, manipulating the prevalence and scene context of different targets. In each experiment, 30 frequent car drivers, completed visual search of a road scene. Target type (pedestrian vs cyclist), prevalence (high vs low), and scene context (rule violation vs non-violation) were systematically manipulated. Response time, accuracy, and eye movements were recorded. Results suggest that target prevalence inadvertently influences the expected location of the target and therefore the potential for observers to ‘look-but-fail-to-see’ a target. Additional discussion focuses on the limitations of visual search models to account for real-world visual search patterns.

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Modeling Word Learning through Context

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Studies and computational models of word learning have mostly focused on ostension as a mechanism to map a word to its meaning. However, not all words could be learned through ostension either because they are abstract and have no referent, or because the referents are not present when the word is uttered. We propose an associative account that explains word learning through context and how the pattern of learning changes through development. The model is implemented as a neural network model that learns two types of associations (i.e., syntagmatic-and paradigmatic-associations) from a natural corpus. A syntagmatic association refers to the association among words that co-occur in an utterance such as furry and dog as in ‘the furry dog’. A paradigmatic association refers to words that have a similar context such as dog and cat as in ‘the furry dog’ and ‘the furry cat’. The paradigmatic associations are second order associations and could be built up on the basis of the syntagmatic associations, and therefore would come online after the syntagmatic associations. The model is supported by 16 experiments across two age groups, and naturally explains the developmental pattern as a function of experience.

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Voluntary action synchronises behavioural oscillations of sensitivity and criterion

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Perception is modulated by ongoing brain oscillations. Previous psychophysical studies have shown that voluntary action can synchronize brain oscillations, resulting in rhythmical fluctuation of visual contrast sensitivity. In this study, we examined whether voluntary action could trigger oscillations of decision criterion as well as sensitivity. Participants voluntarily pressed a button to start each trial. After variable time lags (0-800 ms, sampled every 5 ms), a brief noisy grating was presented at the fovea and participants discriminated its orientation (45 or -45). Using signal detection theory, we calculated participants’ sensitivity and criterion over time. To test the existence of oscillations, we fitted first-order Fourier series to the time series of sensitivity and criterion. We also performed Fast Fourier Transforms on these time series. With the permutation test, we found alpha oscillations of both sensitivity and criterion synchronized with voluntary action, but at different frequencies: 8.5 Hz for sensitivity and 10.4 Hz for criterion. Our findings may suggest different roles of alpha oscillations: alpha oscillations of sensitivity reflect rhythmic attentional inhibition, whereas alpha oscillations of criterion indicate the dynamic prestimulus perceptual expectations.

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Spontaneous recruitment of proactive control does not mitigate emotion-induced blindness

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Proactive control can be recruited either spontaneously (e.g., via manipulations of distractor frequency) or when participants are given explicit instructions. For tasks involving non-emotional stimuli, such as the Stroop and attentional capture tasks, both methods of recruiting proactive control have been found effective. However, less is known about tasks involving emotional stimuli, such as emotion-induced blindness (EIB). Previous EIB studies have found that, when given explicit information about the nature of distractors, participants show reduced EIB, but little is known about the spontaneous recruitment of proactive control. In a within-subjects experiment, participants searched streams of images for a rotated target image. A distractor of either negative or neutral valence was presented just before the target, and participants received alternating blocks with a higher (75%) or lower (25%) proportion of trials containing negative distractors. The results showed that the robustness of EIB was similar regardless of whether the block consisted of more or fewer negative trials. A follow-up between-subjects experiment, where participants either received a higher or lower proportion of negative trials throughout the experiment, produced the same pattern of results. Together, these findings suggest that spontaneous recruitment of proactive control, through manipulations of frequency, is not effective in mitigating EIB.

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Posters
The influence of body-related stimuli on attentional asymmetries

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Pathological eating behaviour is characterised by several cognitive abnormalities, including attentional biases towards body-related stimuli. In patients with anorexia nervosa, it has been found that the presentation of these stimuli leads to increased right hemispheric amygdala activation. In the general population, high levels of body dissatisfaction are found to be indicative of vulnerability toward both unhealthy and pathological dieting behaviour. Thus, it is unsurprising that similar cognitive deficits have been found in those displaying high levels of body dissatisfaction. Pseudoneglect, the tendency for neurologically normal individuals to over-attend to the left side of space, is linked to increased right hemispheric activation during visuospatial tasks. The aim of the current experiment was to investigate if negative and positive body-related stimuli could impact attentional biases in the general population. After completing a landmark task to determine baseline attentional asymmetries, participants completed an attentional training task in which they were trained to attend to either: negative body words, positive body words, negative emotion words, or neutral object words. Participants then completed a second line bisection task in which the word pairs were presented prior to the line, with the target word on the left side, to see how negative and positive body words impact attentional biases.

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Postural instability predicts the likelihood, but not the severity, of cybersickness

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Motion sickness experienced while using helmet mounted displays (HMD) is commonly referred to as ‘cybersickness’. While the causes of this type of sickness are currently unclear, ‘sensory conflict’ and ‘postural instability’ have been proposed as explanatory models. Here we examined subjective experiences of cybersickness using optic flow displays presented on an Oculus Rift HMD. Head tracking was used to shift the participant’s viewpoint during regular head oscillations, with the stimulus adjusting either in a manner congruent to natural viewpoint adjustment or in the opposite direction to the expected motion. Participants completed a pre-test measure of postural instability, a detailed simulated sickness questionnaire (the SSQ) to assess pre-post exposure symptoms, and were asked whether they felt sick after each experimental trial. Those who responded that they felt sick after trials also displayed significantly larger sway areas and greater anterior-posterior sway variability prior to testing (compared to participants who always responded they were well). While total SSQ scores were significantly higher for ‘sick’ participants, sway measures did not significantly predict symptom type or severity. Prediction of sickness in participants indicates a significant postural component to cybersickness; however, a more complex approach is needed to explain the multiple symptoms reported.

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Effects of Radio Frequencies on alpha oscillations and low-level visual processes

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The effects of electromagnetic radiation in the radiofrequency (RF) range emitted from wireless devices such as mobile phones have been associated with varying effects on the Alpha oscillation (8-12Hz), as recorded by EEG. Visual attention and suppression have been related to the alpha frequency oscillations, where phase and power of the oscillation play a significant role in conscious perception. This experiment aimed to replicate RF-induced effects on alpha oscillations and explore the potential effects on low-level visual processing such as motion coherence and contrast discrimination. Employing a double-blind and counterbalanced within-subjects design, participants completed basic visual processing tasks (motion coherence and contrast detection tasks) in order to establish visual thresholds under both RF-exposure and sham conditions. Concurrent EEG was recorded during both conditions. Resting state alpha was increased in left occipital areas during active compared to sham conditions. Alpha magnitude was correlated with motion coherence but not with contrast thresholds; however, increasing alpha did not significantly affect either contrast thresholds or motion coherence thresholds. This suggests that alpha may not play a causal role in low-level visual perception, but may rather be a consequence of higher-level visual processes.

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Polymorphisms in dopaminergic genes predict proactive inhibition in a Go/No-Go task

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Response inhibition is the ability to withhold a prepotent response and is often measured using the Go/No-Go paradigm, such as the Sustained Attention to Response Task (SART). Participants respond on ‘go’ trials, and refrain from responding on ‘no-go’ trials. Two processes contribute to successful response inhibition: reactive inhibition (withholding a prepared response on no-go trials) and proactive inhibition (slowing of response speed following an error to improve the likelihood of successful inhibition on future no-go trials). The SART allows us to isolate Post-Error Slowing (PES), an error-correction mechanism that estimates proactive inhibition. There is no clear consensus whether proactive inhibition relies on the indirect basal ganglia pathway and dopamine-D2 receptors, or the hyperdirect pathway and dopamine-D1 receptors. We therefore investigated whether PES is better predicted by polymorphisms associated with enhanced dopamine D1 vs D2 neurotransmission (DRD1 rs686 - the A allele is associated with increased expression of the DRD1 gene; and DRD2/ANKK1 rs1800497 - the C allele is associated with increased D2 receptor density) in 274 healthy individuals. PES increased with the number of DRD1 A alleles, suggesting that a genetic predisposition toward higher dopamine D1 neurotransmission increases proactive inhibition. This suggests that PES requires activation of the hyperdirect pathway.

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**The human visual motor system responds differentially to biological and non-biological motion**

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The inhibition of return (IOR) effect refers to the finding that we are slower to respond to targets when they are presented at previously-attended locations. Response times are also slower to targets that a co-actor has previously responded to (social IOR; sIOR). One account argues that processes of selective visual attention underpins sIOR. Another account suggests that in sIOR, action prediction mechanisms are triggered and are responsible for the effect. In Experiment 1, participants responded to right or left targets after watching a video of human models pointing or dots moving to those targets. The SOA between the initiation of the model’s movement and the presentation of the target was 100ms, 300ms, 600ms, and 1000ms. Both the dot and human models elicited sIOR effects at SOAs of 600ms and 1000ms. In Experiment 2, participants responded after videos of a dot model. The dot followed a biological motion or a non-biological motion (SOAs: 200, 600, and 1300). sIOR was only observed following biological motion at SOAs of 600ms and 1300ms. We speculate that the human visuomotor system responds differentially to biological and non-biological motion. This capacity may underpin IOR in social interactions.

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**Temporal dynamics of biased attention and anxiety: Is affective context a missing piece of the puzzle?**

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Previous research has demonstrated that individuals with anxiety-related vulnerability attend to negative emotional information at the expense of other information. This is commonly referred to as attentional bias. The field has conventionally conceived of this process as relatively static; however, research by Zvielli et al. (2014), and others, challenges this assumption by demonstrating considerable temporal variability in attentional bias among anxious individuals. However, the mechanisms of these temporal dynamics are less well known. Using a modified dot-probe task, the present study examined whether affective experience is a determinant of the variability observed in biased attention. Additionally, the study utilised blocked and mixed-trials design to compared the contextual effects of affective experience. Results indicate that individuals with higher trait-anxiety levels were significantly more influenced by blocked presentation of negative affective information, resulting in greater temporal fluctuations in biased attention. Furthermore, these findings provide additional evidence that attentional bias is best conceptualised as dynamic and variable, and that an individuals’ affective experience is one factor that regulates this fluctuation. Implications relating to theoretical and methodological factors are discussed.

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When familiarity doesn’t matter: no encoding differences for image-level details in familiar and unfamiliar faces

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Fast and accurate identification of familiar faces is achieved through the refinement of stored memory representations from exposure. Prominent theories of face recognition propose that a process of abstraction drives this refinement: from superficial image-level properties that encode changeable features (e.g. expression, lighting, head orientation) towards robust representations that encode invariant features. We examined whether familiarity modulates the representation of superficial image properties at the earliest stages of representation formation: during the initial encoding of faces. Across four experiments, we measured participant’s short term memory accuracy for individual photographs of familiar and unfamiliar faces using four different tasks: a duplicate detection task, a change detection task, a short term image memory task and a visual search foraging task. These tasks required participants to encode and store superficial image details in order to match, recognise or find individual photos. Contrary to recent work reporting worse long term memory for individual images of familiar faces, we find no evidence that familiarity affects performance on short term memory tasks. This suggests that the encoding of superficial image properties are not affected by familiarity. We instead conclude that long-term memory mechanisms are responsible for these recent reports.

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Eye tracking Allows Methodological Advancement in the Immediate Self-Report of Emotional Experience

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Self-reporting emotional response has traditionally required pen and paper (for example Herpertz et al., 2005), or computer input devices (for example Dan-Glauser & Scherer, 2011) to make ratings of valence and intensity. This style of response results in the participant moving constantly throughout the study. Movement is acceptable in traditional studies. However, movement is far less satisfactory in studies utilizing psychophysiological measures, as movement artifacts increase error variance. Alternatively, researchers can collect self-reported emotional experience and psychophysiological data separately. However, repeated exposure to the same stimuli increases test times, as well as reducing the emotional impact of the stimuli. The combination of eye tracking technology and a four-quadrant fixation triggered rating graph combats these known issues. This solution simultaneously allows participants to rate the valence and intensity of their emotional experience using small eye movements. This minimizes movement artifacts while allowing researchers to collect self-report and psychophysiological data in unison. The current study compares keyboard input and fixation triggered methodologies for rating emotion valence and intensity. Further, we consider data from each methodology in relation to EDA. The study uses facial expression and emotional scene stimuli to compare the two rating methodologies.
Automatic Facial Expression Recognition: A validation study

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Automatic coding of emotion and facial action units has progressed significantly in recent years and offers a potentially valuable resource to researchers investigating the psychology of emotion. This is particularly true for studies using dynamic and natural observations of emotional facial expressions where the number of images and frames of interest can become prohibitive. However, in order for automatic coding to be of use to researchers in behavioural sciences, more validation data is needed. The aim of this study was to provide data using FACET (Emotient) to code the dynamic facial expressions in the Amsterdam Dynamic Facial Expression Set (ADFES), a validated database of dynamic facial expressions of emotion with models of different ethnicities. We examined the performance of FACET with regards to the display of the intended emotion in the ADFES and found high accuracy in categorising the emotion of expressions. Results are further discussed with regards to variations in the evidence for expressions across race and individual emotions.
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A New Approach to Understanding Systems of Subitizing ? The Comparison of Small Quantities

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Every day, we perform important tasks that require the comparison of small quantities, such as when choosing the shortest queue at the grocery checkout. Typically, small quantities (i.e., queues) are quantified or enumerated through one of two processes. Subitizing for the rapid enumeration of one to four items, and Counting for the slow and accumulative enumeration of five or more items. The current study investigates how we combine two subitizing processes into a single Subitizing System, employed for the comparison of two small quantities. In a new approach to understanding Systems of Subitizing, we applied an advanced mathematical-modelling framework termed Systems Factorial Technology to assess three fundamental properties of system processing: Architecture (parallel vs. serial), stopping rule (exhaustive vs. minimum time processing) and workload capacity. Our findings show that Subitizing Systems are typically combined in Serial and under conditions of high cognitive load. We also provide evidence for Parallel Subitizing Systems under conditions of high cognitive load for a select few individuals. Our investigation provides a new method and a new insight into how the Human Cognitive System combines numerical information when comparing small quantities.
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Connecting objects affects perceived number lawfully

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The ability to estimate the number of objects in a scene is something humans share, quite literally, with the birds and the bees. While usually veridical, perceived numerosity is reduced by connecting objects into groups. We propose a simple law that accurately describes behavioural measurements of this underestimation. Participants indicated the more numerous of two arrays of dots: one unconnected, and one connected by lines into groups of two, three or four dots. Connected arrays were judged to be less numerous, and underestimation increased with group size. Notably, we found that underestimation was almost perfectly described by a linear combination of the number of dots and the number of dot groups. On average, participants applied approximately equal weightings to local (dot) and global (dot group) number. Weightings varied between observers, but each observer was remarkably consistent across experimental conditions (mean r-squared = 0.95). Further experiments reproduced this underestimation in arrays balanced (both objectively and subjectively) for 'surrogate' properties correlated with numerosity, such as area, spatial frequency, spacing, local orientation and texture density. These findings shed light on how numerosity information is extracted from the scene, and suggest that perceived number is not reducible to surrogate properties alone.

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The Effect of Temporal Context Cues on the Renewal of Conditional Fear Responding

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Previous research suggests that temporal context cues can manipulate conditional fear responding. The present study investigated whether a temporal context cue from extinction reduced ABA renewal when compared to a novel cue. In a mixed model, differential fear conditioning experiment, two groups of 24 participants were presented with acquisition (CSx-US/CSa), extinction (CSx/CSe), and delay phases, followed by treatment and test trials (CSx). During treatment, the control group received a novel stimulus (CSn), whereas the experimental group received a stimulus from extinction (CSe). Renewal was induced by varying the context (computer screen colour) such that acquisition, treatment, and test (context A) occurred in a context different from extinction (context B). Differential fear conditioning as indexed by skin conductance responses and unconditional stimulus expectancy ratings was acquired, extinguished, and renewed equally for both groups. ABA renewal was not reduced by presenting a cue from the temporal context of extinction when compared with a novel cue. This suggests that discrete temporal context cues may be limited in their ability to activate the CS-No US association in the presence of stronger contextual CS-US association cues.

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Is the attentional spotlight symmetrical?

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Extensive research using the irrelevant-distractor paradigm has shown that cognitive load influences distractibility, such that distractors are more likely to be processed and slow reaction times during low cognitive load. In contrast, attentional resources are more limited during high cognitive load, and reaction times are speeded in the presence of distractors. We manipulated distractor location to determine whether visual field location differentially increased/decreased distractibility. Overall, reaction times were faster in the presence of distractors. During low cognitive load, reaction times were increased equally for all distractor locations. In contrast, left distractors speeded reaction times significantly more than did right distractors. Upper and lower visual field distractors both decreased reaction times, but there was no difference between these locations. We suggest that the attentional spotlight was sufficiently large to encapsulate both the distractor and the visual array during low cognitive load, leading to increased distraction, whereas the attentional spotlight split across the two visual stimuli during high load. Further, executive control is better in the left visual field, which prevents distraction and provides a greater performance benefit.

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Forensic science expertise: examining visual statistical learning about complex patterns across categories

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Forensic science examiners evaluate evidence over the course of their work. As a consequence, they are exposed to many different exemplars of complex evidence patterns (e.g., fingerprints, tire and shoe impressions). Learning information from exposure to these exemplars may assist forensic science examiners to decide if patterns have the same or different origins (or ‘pattern-matching’). The present study aimed to examine the conditions under which individuals are able to learn statistical information about specific features from complex patterns. Participants were exposed to 120 exemplars, which were constructed using 13 features that appeared with different statistical frequencies across two categories of patterns. Statistical learning for the frequency of features was assessed using binary choice preference and explicit probability elicitation methods. The results indicate that participants were able to learn visual statistical information at above chance performance for the features appearing in complex exemplars. They were also able to discriminate the frequency of occurrence for the same feature across different categories. These results provide the first evidence that individuals are able to learn statistical information about features and categories from exposure to complex visual patterns, indicating that forensic examiners may also do so as a consequence of their exposure to evidence patterns.

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Language Training Paradigms: How Language Aptitude and Working Memory Plays a Role in Language Learning

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Learning a foreign language is difficult, causing many learners to give up in the early stages of the learning process. But, not all learners encounter the same difficulty under the same training conditions, suggesting that training paradigms need to be developed that take into account individual differences in variables of interest (e.g., language aptitude and working memory). The present study aims to examine how training can be tailored to the needs of individuals, based on their cognitive profiles. Specifically, in a multi-session training paradigm, Australian listeners initially receive passive exposure training, designed to keep cognitive demands low. Once learners reach a set criterion, they then progress to advanced training (with corrective feedback). We present preliminary data for this tailored language training program that takes into account individual differences in language aptitude and working memory, and discuss the implications for theories of speech processing.
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Investigating the processing of dual-cue memory intersection problems

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How do we solve memory problems that require more than one cue to be considered? For example, try to remember which movie was created by Disney and was about the Greek mythology. Intuitively we might expect that the cues [Disney, Greek Mythology] would be processed together, in parallel. This would seemingly allow the solution, the ‘intersection’ of the cues (Hercules, in this example), to be readily identified. However, some recent investigations have concluded that participants actually only consider one cue at a time. This distinction between serial (one-at-a-time) and parallel processing of memory cues could have important implications for our theoretical understanding of human memory, and problem solving more generally. Our project aims to remedy some methodological concerns from previous work and explore the possibility that processing strategies depend on the design of a task. We present two studies, one in which participants are queried about a potential intersection, and a second in which they must generate the intersection of two cues for themselves. Using a novel application of the powerful Systems Factorial Technology, we present preliminary evidence that most participants use both cues in parallel to solve an intersection problem. We also find some evidence that the proportion of subjects using parallel processing changes between tasks, which presents a possible avenue for reconciling the conflicting evidence in the literature.
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Configural, holistic and featural processing of facial expressions, and their role in expression recognition ability.

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This study explored the cognitive mechanisms associated with facial expression recognition ability by measuring configural, holistic and featural processes. Participants completed a battery of expression recognition tasks including an emotion-labelling task (upright and inverted); a bubbles task; a scrambled-blurred task; and a composite task. Analyses revealed inversion and composite effects, as expected. The bubbles task indicated that good recognisers (top quartile on the upright emotion-labelling task) required significantly less visual information to correctly identify expressions compared to poorer recognisers (bottom quartile); and performance on the scrambled-blurred task indicated that while participants were more accurate at labelling scrambled expressions compared to blurred, there was a speed-accuracy trade-off. There were significant positive associations between expression recognition ability (upright expressions) and inverted, scrambled, and blurred expressions. Together these results suggest a role for configural, holistic and featural processing in expression recognition. The nature of the relationship between these roles and recognition of individual expressions will further contribute to our understanding of expression recognition ability.

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Exploring the relationship between ageing, placeholders, and the spatial spread of attention

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The capacity to distribute attention is crucial for effective functioning. However, the relationship between healthy ageing and the distribution of spatial attention is not clear. The aim of the current study was to address this using a paradigm designed to measure the spread of inhibition of return (Bennett & Pratt, 2001; Wilson, Lowe, Ruppel, Pratt, & Ferber, 2016). Here, the distance between the cue and the target is varied, and changes in response time are used to infer the spread of inhibition. Specifically, previous work has found minimal changes in inhibitory spread with ageing (e.g. Langley, Gayzur, Saville, Morlock, & Bagne, 2011). However, these studies used placeholder stimuli to cue attention, which potentially restrict the range over which attention is deployed (Taylor, Chan, Bennett, & Pratt, 2015). Therefore, we measured the spread of inhibition in younger and older adults without using placeholders. Preliminary analyses indicate negligible changes in inhibitory spread with ageing. This suggests that older and younger adults use similar attentional strategies in the absence of placeholders.

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Neural discrimination between genuine and posed facial expressions: Fast Periodic Visual Stimulation (FPVS) reveals highly reliable EEG markers

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In everyday life, facial expressions sometimes reflect genuine, felt emotion, and are sometimes posed (displaying pretended emotion). The present study is the first to test for EEG markers of neural discrimination between these two types of facial expressions, starting with expressions of sadness. Using Fast Periodic Visual Stimulation (FPVS), genuine expressions were presented as ‘oddball’ stimuli within a rapid ‘baseline’ stream of posed expressions, and vice versa. Our key measure was EEG response to the oddball stimuli, which is indicative of discrimination between the oddball and baseline stimulus categories. Results showed significant oddball responses to genuine expressions presented in a posed baseline stream, and to posed expressions presented in a genuine baseline stream. Critically, these oddball responses were significantly stronger: (1) in right-hemisphere occipito-temporal electrodes (e.g., T6), corresponding with face-perception areas, compared to the equivalent left-hemisphere electrodes (T5); and (2) when faces were upright compared to inverted. Further, oddball responses were highly reliable even at the individual participant level. Overall, our novel findings show face-perception brain regions clearly discriminate between genuine and posed facial expressions, and identify EEG markers suitable for investigating group and individual differences in perception of emotional genuineness (e.g., in social anxiety, or high autistic traits).

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Can the phonological component of reading be controlled?

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Kinoshita, De Wit & Norris (2016) found that colour naming was slower when the colour was displayed in colour unrelated words (e.g. ABBEY) than non-linguistic symbols (a row of Xs or symbol string), and that this interference was absent when the response to the colour was manual. In the present research, the interference for colour unrelated words (relative to hash symbols) interacted with neutral proportion, with the interference effect being reduced when neutral proportion was low relative to when it was high. The interference effect was also reduced when the previous trial was a colour unrelated word than when it was a hash symbol trial (i.e. there was a Gratton effect). Further, the Gratton effect was modulated by neutral proportion, with a significant Gratton effect being found when neutral proportion was low but not when it was high. These results were interpreted as evidence that neutral proportion modulated reactive control of the phonological component of reading. The results of the RT distribution analysis will also be discussed.


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Are executive functions related to children’s anticipation of regret and reasoning about another’s regret?

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Regret is a counterfactually-mediated emotion as its experience depends on individuals’ ability to engage in counterfactual reasoning (Byrne, 2016). The anticipation of regret has been associated with improvements in decision making, whilst the ability to reason about another’s regret has been linked to greater understanding of general human behaviour and pro-social behaviour. However, relatively little is known about the cognitive mechanisms that underlie the abilities to anticipate regret and to infer regret, nor is much known about the relationship between them. We investigated the relationship between executive functions and anticipated and inferred regret in 6- to 9-year-old children (N=68). Children completed measures of working memory, inhibitory control and task switching, and tasks that assessed their ability to anticipate regret in themselves and to infer the experience of regret in another. Results indicate that working memory, but not inhibitory control or task switching, correlates significantly with performance on both anticipated regret and inferred regret tasks. Hierarchical regressions revealed that age affects anticipated regret indirectly through its effect on executive functions, and that task performance in anticipated regret is predictive of inferred regret task performance. These findings thus provide insight into the development of varying forms of regret and their cognitive correlates.

Cones and colour: similarity, discrimination and our perception of cardinal colours

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Generally, it has been assumed that the task of stimulus discrimination differs from that of categorisation; exemplar-based theories challenge this assumption. It was recently shown that both the discrimination and categorisation of cardinal colours may be explained by the same underlying similarity judgement space. Further, we have found that similarity judgement of cardinal colours are best fit by an elliptical deformation of the cardinal colour plane into a perceptually equal space. Here we extend these data by examining how similarity judgements change as the amount of information on each sample is reduced. Observers were required to judge, on a scale of 1-8, the degree of similarity between 210 pairs (21 colours) of scaled, equiluminant cardinal colour patches presented for 100msecs. The paradigm and stimulus structure was exactly the same as used for the previous discrimination and categorisation measurements; only the observer judgement changed. The data were analysed using multi-dimensional scaling to give a psychological similarity space for each subject. We found few systematic differences between the MDS spaces for the same group of subjects as in the longer duration study despite the brief stimuli. We discuss this in terms of exemplar-based theories of categorisation.
Music That Moves You: Auditory Vection Induced by the Shepard-Risset Glissando

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Sounds are thought to contribute to perceptions of self-motion, often via higher-level, cognitive mechanisms. This study examined whether illusory self-motion (i.e. vection) could be induced by auditory metaphorical motion stimulation (without providing any low-level sensory information consistent with self-motion). Five different types of auditory stimuli were presented to our 20 blindfolded, stationary participants (via a surround-sound loud speaker array): (1) an ascending Shepard-Risset glissando; (2) a descending Shepard-Risset glissando; (3) a combined Shepard-Risset glissando; (4) a combined-adjusted (loudness-controlled) Shepard-Risset glissando; and (5) a white-noise control stimulus. We found that compelling auditory vection was induced by all four Shepard-Risset Glissandi compared to the white-noise control. This metaphorical auditory vection appeared similar in strength to the vection induced by the visual (physics-based) reference stimulus. Replicating past visual vection findings, we also found that individual differences in postural instability appeared to significantly predict auditory vection magnitude ratings. These findings are consistent with the notion that auditory contributions to self-motion perception may be predominantly due to higher-level cognitive factors (Všlijamš & Sell, 2014).

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The influence of attentional alignment on performance and evidence accumulation

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Every day we are confronted with an overwhelming amount of visual information. Attention helps us to make sense of this information by filtering the relevant aspects of a scene from the irrelevant. Typically, we move attention around the environment through two complementary forms of orienting: covert shifts in attention and overt eye movements. While these mechanisms often work in concert, a growing number of studies suggest that they do not always align. Here we sought to examine how the coordination of these orienting mechanisms may influence the decision-making process. Across two experiments participants completed an orientation discrimination task while covert and overt attention was manipulated independently. Performance was compared when covert attention and a prepared saccade were directed to the same location (aligned) and when they were directed to opposite locations (misaligned). Results revealed performance to be better when an eye movement was prepared towards the target, compared to away. This was true regardless of whether the prepared eye movement aligned or misaligned with covert attention. These findings suggest that even when overt and covert attention are directed to opposite locations, performance is primarily determined by the direction of a prepared saccade.

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Can Practice Expand the Functional Field of View?

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Although many tasks require observers to process information from large areas of the visual field, performance is both slower and less accurate for targets in the periphery, and particularly when presented with distractors. The Functional Field of View (FFOV; i.e., the area of the visual field from which information can be extracted without head or eye movements) is assessed by asking participants to identify targets presented at varying distances from central fixation. The current study aimed to explore whether practice could expand the FFOV. Participants completed three sessions on consecutive days, and although overall improvements to performance were observed, practice did not modulate the effect of target eccentricity. To explore the cognitive mechanisms underlying this practice benefit, data were fit using Brown and Heathcote’s (2008) Linear Ballistic Accumulator model. Results suggest the quality of information that can be extracted from a display was degraded by both target eccentricity and the presence of distractors (i.e., slower rates of evidence accumulation). Consistent with a perceptual filtering cost, the presence of distractors also resulted in longer non-decision times. Interestingly practice effects manifested selectively on the decision threshold; that is, participants were less cautious in their responding across the three practice sessions.

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Capacity limits for processing concurrent briefly presented words

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Humans have a limited capacity to identify concurrent briefly-presented targets. Recent experiments using concurrent rapid serial visual presentation (RSVP) of letters have documented that the direction of reading affects which of two horizontally-displaced streams is prioritised. Here, we investigate whether the same pattern of prioritisation occurs when participants are asked to identify two horizontally displaced words. Using a stimulus where two words are briefly presented at the same time (not embedded in an RSVP stream), and the location of one of the words is subsequently cued, we do not find evidence of prioritisation in the direction of reading. Instead, we observed a right visual field advantage, that was not affected by whether participants were told which word to report immediately, or after a 200ms delay. We compare these results with results from an experiment where the two words are embedded in an RSVP stream. These experiments provide insight into the conditions in which hemispheric differences rather than reading-related prioritisation drives visual field differences, and may have implications for our understanding of visual processes that operate when one must identify and remember multiple stimuli, such as when reading.

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Evidence of an abnormal state for visual hallucinations in the normal population

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Are hallucinatory experiences dependent on an abnormal neural/perceptual state, like sleep, drug effects, or neurological changes like Parkinson’s disease? Some have proposed that such states may underlie clinical hallucinations. We sought evidence of an induced abnormal state in normal participants using geometric flicker-induced hallucinations. An annulus flickering at 10 Hz reliably induces hallucinatory moving grey blobs. We measured hallucination onset latency by keypress when subjects saw hallucinated blobs, which was taken as evidence of being in this state. A prior 10 Hz flickering annulus induced an onset latency priming effect, relative to non-hallucinatory flicker (50 Hz) and control annuli, suggesting a lasting hallucinatory state that facilitates subsequent hallucinations. Presenting prior and test stimuli at different frequencies didn’t consistently attenuate this priming effect, suggesting that priming might not be dependent on neural oscillations at the stimulation frequency. Phase-shifting the flickering test stimulus relative to the prior stimulus also did not attenuate this priming effect. These data suggest that luminance flicker might induce a non-ordinary hallucinatory perceptual state, evidenced by facilitation of subsequent hallucinations in a manner not specific to particular stimulation parameters. Perceptual and neural mechanisms underlying this state, and its relation to clinical and non-clinical hallucinations are currently under investigation.

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Support for visuomotor modulation in shared, social space: Non-human distractors do not influence object affordance motor congruency effects

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Our previous study indicates shared, social space modulates visuomotor processes for object affordances. Objects elicited motor congruency effects for participants acting alone, but when opposite a co-actor, only objects nearest the participant produced the effect. The current study employed a non-social version of the original experiment to address a simple distractor explanation for these findings. Participants stood at a narrow table, viewing images of household objects in relatively near or far locations. Objects handles faced left or right. Participants responded to objects’ upright/inverted orientation both alone and with a Japanese waving cat statue (Experiment 1) or digital metronome (Experiment 2) placed opposite. Both experiments produced the typical affordance effect; faster responses when left/right response hand matched left/right object handle. In Experiment 1, the cat statue elicited a similar but nonsignificant data pattern to the original, social study, perhaps reflecting the cat’s anthropomorphisation. Accordingly, Experiment 2 employed a distractor without human-like features (metronome). The affordance effect emerged but was not modulated as in the original study. Results support past findings suggesting object affordance modulation in social space. These studies provide an important step toward understanding object affordances in real-world contexts and have implications across fields of social action/cognition and body-space representation.
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Postural sway and Parkinson's disease: Discriminative power of linear and non-linear measures.

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A cardinal feature in Parkinson’s disease is impairment of posture and balance. Clinically, this manifests as abnormalities of gait and righting reflexes, though these can be subtle in the early stages. Postural adjustments made while standing still, while easily measured, can yield a sophisticated set of measures of postural sway. Using shared data from a Stanford University sample, we analysed sway data from 44 PD patients and 22 age-matched controls, along with a measure of disease severity, the UPDRS-III (motor subscale of the United Parkinson's Disease Rating Scale). We used both linear (path and area) and non-linear (dynamical systems) measures. Both types of measures showed clear differences between PD patients in the ‘off’ state and controls. For a subset of 14 patients who had sway data for four separate medication states, the non-linear and linear measures were complementary in differentiating between medication states, and each measure showed clear differences. Mediolateral sway was more informative than antero-posterior. In addition, for patients with less severe PD, non-linear measures in the ‘off’ state predicted disease severity scores on the UPDRS-III where linear measures did not. We believe these measures show promise for tracking disease progression and measuring outcomes in PD.
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An examination of body categorization and sequential dependency of male bodies

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This study aimed to (1) determine the perceptual categorization point of subjective equivalence (PSE) for skinny/fat, and scrawny/muscular male bodies and whether individual psychological and biophysical factors influence perceptual categorization of these body types. Further, this study aimed to (2) examine serial dependencies on perceptual body categorization judgments. Sixty male undergraduate students completed a forced-choice dichotomous body categorization task in which they were exposed to multiple images of male bodies varying in body fat percentage and muscularity. Their task was to categorize these bodies as skinny or fat, or scrawny or muscular. Various anthropometric data and self-report measures of body dissatisfaction, and eating disorder symptomology were collected. Associations between physiological and psychological factors, and body categorization decisions were examined through correlational analyses. This included bivariate correlational analyses between PSEs and weight classes, body dissatisfaction, and eating disorder symptomology. Further, t-tests were used to examine serial dependencies on perceptual body categorization judgments. The implications of these results for theories of body-related cognitive and affective biases and eating disorders will be discussed.
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The effects of transient attention on higher-level visual processing

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It has been well established that visual attention modulates several aspects of early vision, e.g., contrast sensitivity, spatial resolution, and temporal perception. By contrast, little is known about the effects of attention on higher-level aspects of vision. In this experiment, we examined the effects of attention on two facets of object perception: object recognition and object-orientation discrimination. Results from 24 participants indicated that in both tasks, accuracy was significantly worse when a briefly presented cue directed transient attention to the target location compared to when the target location was not cued. That is, transient attention impaired performance on both tasks. These results cannot be attributed to cue-induced visual masking because, using the same cue-target configuration, we observed an attentional facilitation in a spatial acuity task. Instead, we argue that the short durations of the stimuli in both tasks, and/or participants’ reliance on the low-spatial-frequency content of the images, resulted in primarily magnocellular- or dorsal-stream-mediated performance. Since transient attention is known to impair performance on tasks mediated by the magnocellular system, this could explain why attention impaired performance on both tasks.

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Notes