

The 8th (Virtual) Conference on Cognition Research of the Israeli Society for Cognitive Psychology (2021)

Full Program

Tuesday, February 23rd

09:30 – 11:30 – Virtual Workshop

Evaluating Evidence and Making Decisions using Bayesian Statistics.

Mattan S. Ben-Shachar, Ben-Gurion University

Bayesian methods are gaining increasing attention in psychological science. Some of their advantages, as opposed to that of the frequentist (or "classical") framework are the ability to describe parameters and estimates in probabilistic terms and explicitly incorporate prior knowledge about them into the modelling process. However, whereas frequentist statistics have the p-value as its one-and-only decision-making index, the Bayesian framework offers a plethora of indices to choose from, each with its unique meaning. The aim of this workshop is to familiarize psychological scientists with basic principles of Bayesian estimation, and present a handful of decision-making indices – explaining when each is appropriate (or when they are less so), how they are related (or not) to the p-value, and to provide some statistical tools, in R, for computing these indices.

The workshop is aimed at researchers who have some familiarity with Bayesian statistics (such as the Bayes factor) and who are interested in a more advanced understanding and application of the Bayesian framework.

The workshop is primarily based on the paper by [Makowski et al. \(2019\)](#), and the R package [bayestestR](#).

12:00 –13:00 – Invited Talk I:

Collective Wisdom and Metacognitive Feelings

***Asher Koriat, Institute of Information Processing and Decision Making
University of Haifa***

In the talk I will discuss two lines of research in my work that, to my surprise, turned out to converge. The first is the idea of collective wisdom or collective unconscious. Research suggests that people, even those of different cultures, share many cues and associations that affect their judgments and feelings. The second is the question in metacognition – how do people know that they know? Research suggests that metacognitive judgments such as the feeling of knowing or the feeling of certainty are based on a multitude of cues that are used mostly unconsciously. These cues are largely shared across people, and the extent to which people converge or diverge in their judgments has consequences for subjective feelings. I will review experimental evidence but will also comment on the thought processes that gave rise to these ideas.

13:30 –14:30 – Invited Talk II:

Cognitive Control: Processes and Implications

Avishai Henik, Department of Psychology, Ben-Gurion University

In everyday life there are constantly competing demands for attention by the outside world as well as from internally generated goals. Understanding how we focus on a specific goal or issue and how we ignore or inhibit irrelevant or habitual responding is important both from the basic perspective of understanding a major aspect in brain function, and from a clinical point of view. A lack of coherence in arbitrating between competing demands is a major source of disability in neurological and psychiatric diseases.

Pursuing a goal entails both focusing and inhibition. Researchers used various lab tasks to study goal-directed behavior. Focusing on Stroop and Stroop-like tasks, researchers have unraveled various cognitive conflicts that need to be resolved to achieve a goal. Much work has been conducted using reaction time measures. However, in recent years pupil dilation has been harnessed to examine these conflicts. Pupil dilation studies have shown interesting results regarding the aforementioned conflicts.

Interestingly, the above-mentioned discussions and results have important implications in other areas of social sciences. One such area is information security behavior and another is use of social media. We will discuss possible connections between information security, use of social media and conflict resolution.

Poster Session 1 (15:00-17:00)

Action, motor processes and motor learning

1	<p>Disparity between preparation biases and execution biases of movements in M1</p> <p><i>Abed Suleiman and Firas Mawase</i></p> <p>Technion-Israel Institute of Technology</p>
	<p>In everyday activities, we often perform some actions more than other. This biased frequency of recent actions affects movement representation in the primary motor cortex (M1). Frequent execution of movements must be associated with repeated preparation of the same movements. Whether similar parallels in movement-biases can be drawn for preparation still unclear. One hypothesis is that recent-history of actions shapes both movement representation in M1 and preparation representation in planning-related areas. Alternatively, movement and preparation-biases are distinct and each represents different aspect of the behavior. Here, we designed behavioral and TMS experiments to probe the biases in default preparation (preparation-biases) and biases evoked involuntarily by TMS over the thumb area in M1 (execution-biases). In Exp.1, we sought to determine whether the distributions of execution-biases and preparation-biases are similar. In Exp.2, we manipulated the execution-biases by asking participants to repeat a single movement and tested the effect of this manipulation on the preparation-biases. Data of Exp.1 showed that although at the group level, distribution of execution-biases was similar to the preparation-biases, closer inspection of the individual's behavior revealed a dissociation between two clusters of participants: one cluster (n=5) showed a large overlap between distributions whereas a second cluster (n=6) showed remarkable disparity between the distributions. Exp.2 showed that execution-biases were remarkably sensitive to movement repetition whereas preparation-biases showed persistent biases. Results demonstrate a distinction between execution-biases and preparation-biases. While execution-biases seems to be highly affected by recent-history of movement, preparation-biases might represent different aspect of the task and/or the body.</p>
2	<p>Dissociation the separation of motor memories into explicit and implicit processes</p> <p><i>Gefen Dawidowicz, Yuval Shaine and Firas Mawase</i></p> <p>Israel Institute of Technology-Technion, Haifa, Israel</p>
	<p>A common paradigm to study the ability to simultaneously learn multiple tasks is sensorimotor adaptation to opposing perturbations. Generally, learning of a single perturbation usually requires a cognitive strategy-based explicit process and an implicit process that occurs without conscious awareness. In conditions of opposing perturbations, recent studies suggested that using contextual cues enables learning by distinct explicit strategies with minimal contribution of the implicit process that is locally adjusted in different regions of the workspace. Nevertheless, it was not possible in previous work to untangle the effect of the explicit and implicit components from the net learning. Here, we designed 3 reaching experiments and manipulated the implicit and explicit components while participants learned opposing visuomotor perturbations that were randomly selected for each trial, with a second unperturbed follow-through movement. Exp. 1 showed that learning opposing perturbations is only possible using contextual clues. Exp. 2 consisted of two groups of participants, the first performed an experiment which isolated strategic learning and the second participated in an experiment which isolated the implicit component by using task-irrelevant error-clamp visual feedback. In Exp.3, we aimed to explore whether the implicit components reflect two separate implicit visuomotor maps or it reflects a single implicit map. The results of Exp. 2 suggested that opposing perturbations can be fully learned by explicit strategies; but when strategy is restricted, distinct implicit processes contributed to learning. In Exp. 3, we found that these implicit processes reflect a single implicit visuomotor map that locally generalizes around the movement plan.</p>

3	<p>Chronotype and motor learning: is there a best time of day to learn a new motor skill? <i>Noga Mudrik [1,2], Maria Korman [3], and Jason Friedman [1,4]</i></p> <p>[1] Sagol School of Neuroscience, Tel Aviv University; [2] Department of Biomedical engineering, Tel Aviv University; [3] Department of Occupational Therapy, Ariel University; [4] Department of Physical Therapy, Sackler Faculty of Medicine, Tel Aviv University</p>
<p>Biological processes oscillate under constant environmental conditions within a ~24h period – e.g., exhibit circadian rhythmicity. Chronotype refers to an individual's diurnal preference for rest and activity timing. Recently, it was suggested that evening chronotype is a predictor of less efficient learning during morning hours. The purpose of the current study was to examine the interaction of chronotype and time-of-day in motor sequence learning. Two groups, one of morning types and the other of evening types were trained on a finger-to-thumb opposition sequence task in a counterbalanced crossover design: once during morning hours and once during evening hours, with at least a week in between. Performance was assessed before, immediately after and 24h post-training. All participants improved in the number of correct sequences performed. No differences were found in the time-course and magnitude of learning as a function of chronotype or time-of-day, even though there were robust differences between chronotypes in morning vs. evening alertness levels. Our results suggest that healthy and young evening chronotype individuals do not show deficits in motor learning during off-peak time windows, in contrast to the current suggestions from the literature. We interpret these findings in the context of executive control theories.</p>	

ADHD

4	<p>Neural Correlates of Sustained Attention and Inhibitory Control in Children with ADHD: A Pilot Study <i>Sabina Mickel [1], Ornella Dakwar-Kawar [1], Tal Mench [1], Pragathi Priyadharsini Balasubramani [2], Noam Mairon [1,3], Lina Azzaiza [1], Snir Barzilay [1], Gaby Shakour [4], Roi Cohen-Kadosh [5], Itai Berger [6], Mor Nahum [1]</i></p> <p>[1] School of OT, Faculty of Medicine, Hebrew University, Jerusalem, Israel; [2] Neural Engineering and Translation Labs, Department of Psychiatry, University of California, San Diego, La Jolla, CA, USA; [3] Department of Psychology, Hebrew University, Jerusalem, Israel; [4] Tech InnoSphere Eng. Ltd., Haifa, Israel; [5] Department of Experimental Psychology, University of Oxford, Oxford, England; [6] Faculty of Health Sciences, Ben-Gurion University of the Negev, Beer-Sheva, Israel</p>
<p>ADHD is a highly prevalent neurodevelopmental disorder. Significant impairments in executive functions (EF), are core characteristic of the disorder. Specifically, in pediatric ADHD, deficits have been documented in inhibitory control, the ability to suppress competing goal-irrelevant distractions and behaviors; and in sustained attention, the ability continuously evaluate the accuracy of selected actions. Studies have shown differential activation in early and late Event-Related potentials (ERPs) components in ADHD compared to matched neurotypical children, during a standard inhibitory Go/NoGo paradigm.</p> <p>Here, we measured neural correlates from children with ADHD using both the standard version of the inhibitory Go/NoGo task, as well as from a variation of the task which includes frequent 'no go' stimuli and non-frequent 'go' stimuli, which measures sustained attention. 10 children with ADHD (age:7.47-13.11, avg=9.38, sdt=1.61) and 25 matched neurotypical children (age:7.08-12, avg=9.15, sdt=1.46) completed the two Go/NoGo task versions, while EEG was measured using a 32-electrode cap. In addition, we measured performance on a working memory task (the digit backward task of the WISC-VI), as well as ecological executive function (the BRIEF parent reports). Preliminary data shows differences between groups in the early ERP components of P1 and N2. Additional analyses will be conducted to examine differences in latter components, specifically P3 amplitude and latency. Moreover, we expect to find correlations between neural and behavioral ERP data and parent reports.</p> <p>This pilot study may contribute to our understanding of the mechanisms underlying inhibition and sustained attention in ADHD, and may eventually contribute to therapeutic applications for ADHD.</p>	

5	<p>Changes in Neural Oscillations following Non-Invasive Brain Stimulation in pediatric ADHD <i>Ornella Dakwar-Kawar [1], Noam Mairon [1,2], Tal Mench [1], Snir Barzilay [1], Lina Azaiza [1], Gaby Shakour [3], Roi Cohen-Kadosh [4], Itai Berger [5], Mor Nahum [1]</i></p> <p>[1] School of OT, Faculty of Medicine, Hebrew University, Jerusalem, Israel; [2] Department of Psychology, Hebrew University, Jerusalem, Israel; [3] Tech InnoSphere Eng. Ltd., Haifa, Israel; [4] Department of Experimental Psychology, University of Oxford, Oxford, England; [5] Faculty of Health Sciences, Ben-Gurion University of the Negev, Beer-Sheva, Israel</p>
	<p>ADHD is a neurodevelopmental disorder, diagnosed in 7-10% of children and characterized by inattention and/or hyperactivity/impulsivity. At the neural level, ADHD is characterized by greater resting-state fronto-central theta (4-8 Hz) activity, considered to reflect drowsiness and unfocused states, compared to matched controls. However, findings regarding abnormalities in other frequency bands, such as beta (14-30 Hz) or alpha (8-12 Hz) have been thus far mixed. Our previous results demonstrated significant increases in theta and beta power in children with ADHD in frontal areas, in addition to significant increase in alpha power at central region compared to neurotypical children. Here, we tested changes in these frequency bands following non-invasive brain stimulation (NIBS) over the dorso-lateral prefrontal cortex (DLPFC), which has been shown to yield long-term plasticity effects in healthy young adults and children.</p> <p>19 unmedicated school-age children with ADHD (6-12 y/o) received two weeks of NIBS over the DLPFC – one week of transcranial Direct Current Stimulation (tDCS) and one week of transcranial Random Noise Stimulation (tRNS) in random order. Resting-state EEG with eyes open was measured before and after treatment. Our results show that following treatment, there is a reduction in theta and beta band activities in central (Cz) and frontal areas, regardless of the order of treatment ($p < 0.005$ and $p < 0.05$ respectively). Moreover, there is a trend of reduction in alpha-band activity following tRNS treatment ($p < 0.054$) in frontal areas, but not following tDCS. These results are the first to demonstrate modulation in neural oscillatory activity following a tDCS/tRNS in pediatric ADHD.</p>
6	<p>Is it really steeper delay discounting? ADHD and suboptimal choices in temporal decision problems <i>Yehuda Pollak & Ortal Gabrieli Seri</i></p> <p>The Seymour Fox School of Education, The Hebrew University of Jerusalem</p>
	<p>Temporal decision making in ADHD has been often conceptualized as reflecting steeper delay discounting, and has been modeled as a preference of small-immediate over large-delayed rewards. Recent findings from our lab suggest a novel interpretation, according to which ADHD relates to suboptimal and inconsistent temporal decision making, rather than to steeper discounting. A total of 390 participants completed a temporal discounting task in which they were asked to choose between small-immediate and large-delayed options under one of two conditions. In the first condition, as in the customary paradigm, the delayed option was more optimal than the immediate option (e.g., \$22 today vs. \$50 in 31 days). However, in the second condition, the delayed option was the less optimal one (e.g., \$22 today vs. \$25 in 90 days). The results showed that, as expected, compared to participants with low levels of ADHD, the participants with high levels of ADHD symptoms chose the immediate reward more often when it was less optimal. On the other hand, unlike the traditional conception, the participants with high levels of ADHD symptoms chose the delayed reward more often when it was less optimal. Further analyses revealed that high levels of ADHD symptoms were associated with less consistent discounting parameter. We suggest that ADHD is linked to sub-optimal and inconsistent valuation of the delay, leading to either impulsive or excessively controlled sub-optimal choices</p>
7	<p>From Early Risk Via Cognitive Functioning to ADHD Phenotype <i>Tzvil Einziger [1,2], Yael Zilberman-Hayun [1], Naama Atzaba-Poria [1], Judith G. Auerbach [1], and Andrea Berger [1,2]</i></p> <p>[1] Department of Psychology, Ben-Gurion University of the Negev, Beer Sheva, Israel [2] Zlotowski Center for Neuroscience</p>

	<p>We examined the interplay between familial risk and the quality of the home environment and the intermediate role of cognitive functioning in the development of attention-deficit hyperactivity disorder (ADHD). Participants were 99 boys and their parents (M age = 7.34 years, SD = 0.23), who have been followed longitudinally since birth; 62 participants were followed until adolescence (M age = 13.5 years, SD = 0.95). We found that differential susceptibility to home environment in early childhood predicted the cognitive functioning (low executive function [EF] and increased intrasubject variability [ISV]) at elementary-school age. Specifically, in a lower quality home environment, those at high familial risk showed poor cognitive functioning (i.e., low EF and high ISV) at elementary-school age but under a supportive environment showed high cognitive functioning (i.e., high EF and low ISV), outperforming their peers at low familial risk. Moreover, child EF, but not ISV, was involved in a developmental path leading to an ADHD phenotype; it was found to mediate the relation between the early risk level (i.e., the interaction between familial risk and home environment) and child ADHD symptoms. A preliminary analysis suggested that EF may have a longitudinal effect on ADHD symptoms in adolescence; after controlling for the level of symptoms at elementary-school age, children with low levels of EF showed a significant increase in their symptoms over time. In general, our results proposed a plausible mechanism that explains how the familial risk for ADHD could be translated into actual symptoms among children</p>
8	<p>The Influence of Emotion Control Training on Emotion Regulation Among students With ADHD <i>Revital Hamerman [1] and Noga Cohen [1,2] [CANCELLED]</i> [1] Department of Special Education, University of Haifa; [2] The Edmond J. Safra Brain Research Center for the Study of Learning Disabilities, University of Haifa</p>
	<p>Individuals with Attention deficit hyperactive disorder (ADHD) show difficulties in emotion regulation. Specifically, they have difficulty to inhibit irrelevant information, what may lead to inability to use reappraisal (an adaptive emotion regulation strategy). Following prior work showing that emotion control training enhances reappraisal among healthy individuals. The current study examined whether individuals with ADHD could also benefit from such training. Participants with and without ADHD were randomly assigned to either a training or a control group. In the training group, negative pictures were typically preceded by a stimulus that recruits cognitive control (incongruent flanker stimulus), whereas in the control group, negative pictures were typically preceded by a stimulus that does not recruit cognitive control. Participants were subsequently asked to reflect on a negative personal event and to later reappraise it. Results replicated prior findings showing a training effect on reappraisal success in both the ADHD and control groups. Furthermore, compared to the control group, individuals in the ADHD group showed a higher propensity to use reappraisal following writing the event and a larger reduction in the reported significance and negativity of the event following the instructed reappraisal. These findings imply that emotion control training can improve emotion regulation skills among individuals with ADHD. Furthermore, our findings suggest that instructed reappraisal is especially beneficial among individuals with ADHD.</p>

Aging

9	<p>The cognitive cost of using context in spoken language understanding – Do older adults pay more? <i>Tami Harel-Arbeli [1, 2], Yuval Palgi [2], Boaz M. Ben-David [1,3,4]</i> [1] Interdisciplinary Center (IDC) Herzliya; [2] University of Haifa; [3] University of Toronto; [4] Toronto Rehabilitation Institute</p>
	<p>Speech understanding is a complex process that involves not only the identification of speech sounds, but also the integration of heard words in order to arrive to a meaningful and accurate representation of the intended message. The integration of heard words together with world knowledge and linguistic knowledge, enables listeners to predict upcoming words in speech; predictions facilitate speech understanding, even in the face of degraded input due to background noise or hearing loss. Clearly, the process of using contextual information taps working memory capacity, as listeners need to maintain the meaning of previous words in the sentence and hold their activation until the final word is heard. Less clear, however, is the extent of the</p>

	<p>toll on cognitive resources resulting from context use. This is of special interest in aging research, as cognitive resources decline with age. One of the ways to explore cognitive demands of a speech perception task is the dual task paradigm, where listeners perform a speech perception task and concurrent resource demanding task (for example, memory recall). Performance is measured on both tasks and compared between conditions (i.e. with context/ without context). In this poster we present a review of the studies that examined the use of context in a dual task paradigm, with younger and older listeners. Trends and future directions will be discussed.</p>
<p>10</p>	<p>“Effectivate” digital cognitive training as a therapeutic candidate for age-related cognitive decline: Initial results <i>Anna Izoutcheev and Yael Gilutz</i> Effectivate, Tel Aviv-Jaffa, Israel</p>
	<p>Background: Age-related cognitive decline may diminish people’s wellbeing, even without reaching a pathological threshold. As life expectancy increases, more individuals experience this phenomenon, resulting in a critical mass of people in need of a solution for preserving cognitive abilities. In the last decades, studies examining the effectiveness of computerized cognitive training showed mixed results, yet several recent meta-analysis studies conclude there are benefits in cognitive training. In order to address older adults' unmet needs while building upon current findings, we developed "Effectivate", a computerized cognitive training program that focuses on attentional and memory functions.</p> <p>Objective: Examine the influence of "Effectivate", a self-administered cognitive training application, on older adults' attentional and memory functions.</p> <p>Methods: Data was collected from 275 "Effectivate" users (age: $m=67.58$, $sd=8.13$) at two time points, with an average of 51.73 days ($sd=17.72$) training period between baseline and post-training assessments. Between both assessments participants could train as much as they wish, with a recommendation of 3 training sessions per week. Participants were divided into 4 subgroups based on their accumulated training durations ($med=208.5$ minutes) and age. Attentional and memory functions were assessed in 4 tasks: processing speed, attentional control, object-location binding and working memory.</p> <p>Results: Processing speed task: an overall improvement was observed, with greater improvement in older participants ($t(136)=2.27$, $p<0.05$). Attentional control: a significant decrease in RTs was found only for participants with longer training durations ($t(135)=6.30$, $p<0.001$). Object-location binding: an overall increase in accuracy was found under high visual load ($t(274)=1.70$, $p<0.05$). Working memory: a decline was found in older and less trained participants, while the other subgroups showed no such effect ($F(1,264)=4.26$, $p<0.05$).</p> <p>Conclusions: These results suggest that the “Effectivate” protocol may support older adults’ cognitive state.</p>
<p>11</p>	<p>Dissociative Associative Memory Deficit as a Function of Age and Stimuli Serial Position <i>Rotem Saar-Ashkenazy [1] & Jonathan Guez,[2,3]</i> [1] Faculty of Social-Work, Ashkelon Academic College, Ashkelon, Israel; [2] Department of Psychology, Achva Academic College, Israel; [3] Ben-Gurion University of the Negev Faculty of Health Sciences, Beer-Sheva Mental Health Center, Beer-Sheva, Israel</p>
	<p>Studies have showed specific associative episodic memory decline in older adult participants relative to younger adult participants. Hippocampal alterations are well documented in older age and it is agreed that hippocampal activity is needed to form and bind associations between single units of information. In addition, the serial position of a stimulus in the learning list has an influence on successful retrieval rates; stimuli with later list positions lack a trace in LTM and in addition are associated with reduced hippocampal activity at encoding. The objective of the current study was to test the separate and joint effect of both stimuli serial position (SSP) and aging on memory recognition for items versus associations. We hypothesized that older adults will exhibit greater associative memory decline (as compared to items in the same position) for stimuli presented at the end of a learning list than for stimuli presented at the beginning of the list. 22 younger and 22 older adult participants took part in an item-association recognition memory task in which</p>

retrieval was manipulated to primacy and recency as well as to items and associations modes. Supporting our hypothesis, the results showed greater associative deficit in the older adult group for stimuli presented at the end of a learning list than for stimuli presented at the beginning of the list. We postulate that in older age, morphological and functional alterations occur in the hippocampus and these affect associative encoding processes as manifested in associative-binding deficits in the older adult group.	
12	<p>Simulating High-Frequency Hearing Loss Can Mimic Aging Effects in The Perception of Spoken Emotions</p> <p><i>Yehuda Dor [1,2], Dor Kenet [2], May Rosenblum [2], Daniel Algom [1], and Boaz M. Ben-David [2]</i></p> <p>[1] School of Psychological Sciences, Tel-Aviv University; [2] Baruch Ivcher School of Psychology, Interdisciplinary Center, Herzliya</p>
<p>Emotions in speech are presented primarily in the semantic (words) and prosodic (tone) channels. While young, healthy adults rely mostly on prosody to decipher the speaker's emotional intent, older adults, as well as different clinical populations, show a more integrative approach between the channels and increased reliance on emotional semantics. According to the sensory information degradation theory, many age-related behavioral differences can be explained in terms of changes in basic sensory input. The current study tested this possible age-related sensory effect on emotional speech perception. Young, healthy adults with normal hearing listened to spoken sentences carrying emotional content in both prosody and semantics. Auditory stimuli were digitally degraded to simulate reduced sensitivity to high-pitch sounds, typical to older adults. Results show that the simulation of age-related hearing loss reduced the intelligibility of emotions in both channels for young, healthy adults. In addition, young listeners relied less on emotional prosody and more on emotional semantics, thus mimicking the response pattern of older adults, but no group effects were found in selective attention tasks. Results are discussed under the sensory information degradation view.</p>	
13	<p>Associative memory in aging: Assessing the forgetting curve after overlearning at encoding.</p> <p><i>Michael Batashvili, Neeve Sharon, Noam Kane and Daniel Levy</i></p> <p>The Interdisciplinary Center (IDC) Herzliya, Israel</p>
<p>Older adults exhibit greater decline in associative memory than item memory, but it remains to be determined whether that age-related decline should be attributed to problems in the encoding, storage/consolidation, or retrieval stages. To assess theories that have identified encoding processes as the key factor, we examined associative memory forgetting curves of older and younger adults under conditions of overlearning at the time of encoding. The older and younger adult participants learned unrelated object picture pairs until achieving a criterion of 100% accuracy in immediate cued recall. Participants were tested on half the pairs 48 hours after encoding and on the other half a week after encoding, as well the first half again to track the forgetting curve over a week. During all test periods, participants also rated confidence in their answers ranging from 1 (I just guessed) – 3 (I am completely certain). Preliminary results characterize the forgetting curve for these pair associates when encoded to 100% accuracy; data for older adults currently being collected will be compared with these findings in order to determine whether aging still differentially impacts associative memory when encoding is optimized.</p>	

Attention

14	<p>Is bottom-up attentional guidance really distinct from top-down possibilities?</p> <p><i>Hanna Benoni and Itay Ressler</i></p> <p>The College of Management, Academic Studies</p>
<p>The current work questions the consensus regarding the distinct category of 'bottom-up' attentional guidance. In the present study, the 'expectation-based' paradigm was designed. In this paradigm, a task-irrelevant singleton was expected in a certain location or color, but was actually absent in some of the trials. We found that attention was directed to the location of the expected task-irrelevant singleton, even in singleton-absent trials that cannot produce stimulus-driven capture. We argue that the attentional system seeks out unique items in the visual field, and that so-called 'bottom-up' instances essentially may not be</p>	

distinct from implicit 'top-down' possibilities. We will base this suggestion on theoretical premises and propose an alternative model, a "relevance spectrum", to represent the various sources of attentional deployment.	
15	<p>Transcranial direct current stimulation over the right Temporal Parietal Junction modulates inhibition of return</p> <p><i>Sabeel Jazmawi [1,2], Orit Nafcha [1,2], Simone Shamay-Tsoory [1], Shai Gabay [1,2]</i></p> <p>[1]School of Psychological Science, University of Haifa; [2]The Institute of Information Processing and Decision Making (IIPDM), University of Haifa</p>
<p>Our attention is automatically oriented toward exogenous cues that appear in our visual field. When a target is presented after a short cue-target interval, a facilitation effect, that is faster response times (RT) for valid than for invalid trials, emerges. In longer cue-target intervals, RTs are typically slower for detecting targets at attended locations compared to unattended locations. This phenomenon was termed Inhibition of return (IOR). One cortical brain area that might be involved in modulating IOR is the Temporal Parietal Junction (TPJ), which is linked to various cognitive functions such as attentional orienting, spatial selective attention, integrating multisensory signals, social cognition, etc. In the current study, we stimulated the right TPJ using transcranial direct current stimulation (tDCS) and then participants performed Posner's exogenous cueing task. We found that cathodal stimulation (inhibition) of the rTPJ reduced the IOR effect for targets presented in the left visual field compared to targets presented in the right visual field. We conclude that the right TPJ is involved in modulating IOR.</p>	
16	<p>The influence of monetary rewards on the social inhibition of return effect</p> <p><i>Eran Dorfman [1,2], Orit Nafcha [1,2], Simone Shamay-Tsoory [1], Shai-Gabay [1,2]</i></p> <p>[1] School of Psychological Science, University of Haifa; [2] The Institute of Information Processing and Decision Making (IIPDM), University of Haifa.</p>
<p>The social inhibition of return effect is characterized by slower reaction times (RTs) to a location already searched by another agent (SIOR; Welsh et al., 2005). While aggregated literature explores the influence of reward on the inhibition of return (the delayed response to previously attended locations; e.g., Bucker & Theeuwes, 2014), its effect on the social inhibitory process (e.g., the SIOR) is yet to be determined. In the current experiment, we have explored the influence of monetary reward on the SIOR effect. Would a reward following an action toward a specific location, acted upon by another agent, influence the performance of the participants? In particular, would the magnitude of reward (high vs. low reward feedback) influence the social effect? The results indicated that the co-actor's previous reward modulated the SIOR effect such that the SIOR was larger after trials where the co-actor earned a higher reward. This finding provides a novel indication of the influence of reward on human social inhibition through basic reflexive cognitive processes.</p>	
17	<p>Adaptation to Temporal Predictability is Related to Intelligence</p> <p><i>Mattan S. Ben-Shachar & Andrea Berger</i></p> <p>Department of Psychology and Zlotowski Center for Neuroscience, Ben-Gurion University of the Negev, Beer Sheva, Israel</p>
<p>The ability to use temporal cues to anticipate the timing of events is critical for adaptive interactions with the environment and efficient processing of stimuli. This ability to accurately represent temporal information varies among individuals. Although high intelligence has been related to higher resolutions of mental temporal representations, the ability to implicitly detect and dynamically adapt to changes in temporal structures have not been previously demonstrated in relation to intelligence. This relation was tested in a sample of 84 healthy adults using a foreperiod paradigm. We found that more intelligent individuals were better able to detect and learn new patterns of temporal information from their environment and use this information adaptively to guide their behavior, even when such information was implicitly presented. These findings further support the notion that intelligence can at least partly be attributed to better quality of mental representation of information.</p>	

Development, language and developmental disorders

18	<p>The Neurobiological Association between Executive Functions Abilities, Home Literacy Environment and Screen-Time in Preschoolers: an ERP Study <i>Lior Niv [1], Michal Zivan [2], Rola Farah [2], Alan Apter [1,3,4] and Tzipi Horowitz-Kraus [2,5]</i> [1] Fienberg Child Study Center, Schneider Children's Medical Center of Israel, Petach Tikva, Affiliated to Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel; [2] Educational Neuroimaging Center, Faculty of Education in Science and Technology, Technion, Haifa, Israel; [3] Interdisciplinary Center Herzliya, Herzliya, Israel; [4] Ruppin Academic Center, Emek Hefer, Israel [5] Reading and Literacy Discovery Center, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA</p>
	<p>Introduction: Executive Functions (EF) is an umbrella term describing higher order cognitive processes which are essential for learning. These abilities start developing early in life and have a strong genetics basis. However, EF may also be affected by environmental factors. The current study aimed to find the relations between EF and environmental factors such as parental EF, Home Literacy Environment (HLE) and screen exposure using behavioral measures and Event Related Potential (ERP) technique in preschool age children. Methods: Fifty one 4-6 years old children participated in the current study. Electroencephalogram (EEG) measures were taken while children performed the Attention Network Task (ANT). Data was analyzed using Event Related Potential technique focusing on N200 and P300 components and differences measures between congruent and incongruent conditions during the ANT were calculated. Screen exposure, home literacy environment and EF abilities of the child and the parents were assessed and associated with the EEG data.</p> <p>Results: Higher screen exposure in children was related to lower EF scores in the parents and in the child. Smaller gaps between N200 amplitudes and latencies for the congruent vs incongruent conditions in the EEG task were related to greater HLE measures. Whereas larger gaps between P300 amplitudes and latencies were associated with greater screen time.</p> <p>Conclusion: Our study findings provide neurobiological support for the positive association between child EF and HLE and the negative relations to screen exposure and may lead to future studies examining the effect of these factors on child language and cognitive development.</p>
19	<p>Distraction by phone is related to reduced mother-child brain to brain synchrony during joint storytelling interaction- An EEG hyperscanning study <i>Michal Zivan and Tzipi Horowitz-Kraus</i> Educational Neuroimaging Center, Faculty of Biomedical Engineering, Faculty of Education in Science and Technology, Technion, Haifa, Israel</p>
	<p>Introduction: Parent-child synchrony is related to the quality of interaction between parent and child as well as to child development. One of the most emotionally and cognitively beneficial interactions in early childhood is dialogic reading (DR). On the other hand, screen exposure, even parental one, is related to decreased parent-child interaction and delays in child development. The current study aims to determine the neurobiological correlates for mother-child DR vs DR interrupted with phone text-messages using a hyperscanning EEG method.</p> <p>Methods: Twenty-four mother-child pairs participated in this study. The children were 24-42 months old (mean = 33.5 ± 5.8 months). EEG recordings were taken simultaneously from mother and child during 1) an uninterrupted DR condition and; 2) a DR condition interrupted with messages to the mother's mobile-phone. Children underwent a developmental assessment (Bayley scale) and the parents underwent reading skills assessment.</p> <p>Results: Decreased mother-child neural synchrony was observed during the interrupted DR compared to uninterrupted DR. The difference in neural synchrony between the two conditions, was mainly observed in pairs of electrodes in the mother's left hemisphere with the child right hemisphere. This difference was positively correlated with maternal reading skills and negatively correlated with maternal screen-time exposure.</p>

<p>Conclusions: The DR-interrupted condition was related to decreased mother-child neural synchrony between electrodes located in language-related brain regions (left hemisphere) in the mother and comprehension-related regions in the child (right hemisphere). This is the first neural evidence for the negative effect of smartphone-use during parent-child social interaction on the quality of the interaction.</p>	
20	<p>Learning and Automaticity Phases of the Invented Letter Skill Learning Task Predict Probable Risk of Written-Language Disorders among Second-Graders</p> <p><i>Chagit Hollander [1,3], Esther Adi-Japha [1,2]</i></p> <p>[1] Bar-Ilan University, School of Education; [2] Gonda multidisciplinary brain research and studies center; [3] Givat-Washington College.</p> <p>This study tested associations between children's procedural motor-skill learning and probable risk of literacy disorders on the basis of theoretical models proposed by Ullman (2004), Nicolson and Fawcett (2019), and Berninger, Richards, and Abbott (2015). Children's procedural skills were assessed using a grapho-motor letter-writing task that served as the first of three developmental linguistic stages: Children's abilities at the levels of the subword (grapho-motor writing of letters), the word (reading/spelling), and probable risk of literacy disorder at the syntax/text level (reading comprehension and text-copying rate). One-hundred fifty-one Hebrew-speaking second-graders of a low socioeconomic background were tested in written language abilities at three stages of development. A grapho-motor Invented Letter Task (ILT) was assessed at the beginning of second grade. Subsequent cognitive (verbal/non-verbal) and literacy measurements at the word level were assessed in the middle of second grade. Probable risk of literacy disorder at the syntax/text level was assessed at the end of second grade (reading comprehension) and at the beginning of third grade (text-copying rate). Structural equation modeling (SEM) was used to analyze measurements among the three stages. The results of the final model indicated direct and mediated associations between the procedural skill learning (ILT) phases and probable risk of literacy disorders, strengthening the notion of an association between procedural motor skill learning and difficulties in literacy acquisition. Probable risk of reading comprehension disorders was directly predicted by the ILT learning phase. Cognitive measures primarily predicted children's level of reading comprehension while literacy measures mainly predicted text-copying rate abilities.</p>
21	<p>Internal State Terms in Narratives of Bilingual and Monolinguals Children at Risk for DLD</p> <p><i>Noy Glitz Perry [1], Sveta Fichman [2], Joel Walters [3] & Carmit Altman [4]</i></p> <p>[1] Bar Ilan University, MA ; [2] Hadassah Academic College, PhD; [3] Talpiot College of Education, Ed.D ; [4] Bar Ilan University, PhD</p> <p>Internal State Terms reflect children's understanding of the mind as the source for motivation, emotional state, and beliefs. In the narrative, children express the characters' goals, thoughts, and wishes using ISTs. The use of ISTs indicates lexical diversity and lexical depth, which reflect measures of microstructure. Furthermore, macrostructure represents the ability to organize the content into a cohesive idea and demonstrates a sequence of hierarchical events that drive the character to action and reaction, expressed using ISTs. The main question addressed in the current research is how proficiency status and bilingualism affect the frequency and type of ISTs during the narrative telling. Ninety-three pre-school children participated. Proficiency tests were administered to assess language skills in L1/Russian and L2/Hebrew. Narratives elicited with the picture book, Frog, where are you? (Mayers, 1969). Narratives in Hebrew were transcribed and coded for macrostructure, microstructure, and IST production. Findings showed that for macrostructure, children with DLD produced fewer macrostructure elements overall and fewer elements in the categories: characters, initiating events, attempts, and consequences. For microstructure, children with DLD produced fewer word types and shorter utterances than children with TLD. The effect of bilingualism was not observed in either the macrostructure or microstructure analyses. Perceptual ISTs was the most frequent category produced. The frequency of total ISTs yielded no significant differences between children with DLD and their peers with TLD. However, children with DLD used perceptual ISTs less frequently than their peers with TLD and more frequently motivational ISTs tokens. Bilinguals produced fewer ISTs types than monolingual children and linguistic IST types. Moreover, the frequency of ISTs correlated significantly</p>

with the macrostructure score, which shows their contribution to the narrative structure's complexity level. The discussion will relate to the source of difficulty children experience in macrostructure, microstructure, and ISTs.	
22	<p>Is it all Bad? Sub-Components of Screen Use and their Corresponding Neurobiological Constructs in 8–12 year-old healthy developing children</p> <p><i>Raya Meri [1] John Hutton [2], Rola Farah [1], Mark DiFrancesco [2], and Tzipi Horowitz-Kraus [1,2]</i></p> <p>[1] Educational Neuroimaging Center, Faculty of Education in Science and Technology, Faculty of Biomedical Engineering, Technion, Israel; [2] Reading and Literacy Discovery Center, General and Community Pediatrics, Cincinnati Children's Hospital; Medical Center, Cincinnati, Ohio, USA</p>
<p>Screen based media has become a prevailing part of our lives, in particular, in children. The availability of different technologies, including portable devices, is burgeoning and is providing an unprecedented access to a wide range of content. This accessibility has immensely increased screen exposure among young children. However, the neurobiological correlates for different sub-components of screen (such as level of access, content, and frequency) and how these are related to different cognitive abilities is still known. Resting state functional MRI data was collected in 29 native English speaking children (8-12 years old) in addition to cognitive behavioral measures. Functional connectivity measures within and between several neural networks related to cognitive control, attention, and language processing were calculated [language network, fronto-parietal network (FP), dorsal attention network (DAN)]. Sub-components of screen exposure were measured using the Screen-Q questionnaire.</p> <p>Higher access to screens, was related to lower functional connectivity between neural networks associated with basic attention skills and language (between DAN and language), and to an increased functional connectivity between cognitive control networks (between DAN and FP).</p> <p>Our findings are in line with previous literature suggesting that screen exposure may overload visual processing and hence may over-engage DAN and on the other hand disengage other neural networks related to language processing. Enhanced understanding of these processes can provide an important scientific basis for future educational and medical approaches regarding screen use.</p>	

Emotion

23	<p>Rumination, Emotional Intensity and Emotional Clarity</p> <p><i>Liel Shlomit Lask, Natali Moyal, Avishai Henik</i></p> <p>Ben Gurion University of the Negev</p>
<p>Background: It has been suggested that a high tendency to ruminate presents a deficient emotion regulation that has a strong association with psychopathology. Past research found that people with high tendency to ruminate show sustained attention for negative stimuli and increased negative thinking, which may result in intensified experiences of negative emotions. Moreover, past research found that high level of rumination is associated with low emotional understanding. In accordance, we hypothesized that: 1. High Ruminators (HR) will experience more intense emotional reactions than Low Ruminators (LR) in negative but not in positive emotions. 2. LR will have higher emotional clarity than HR.</p> <p>Methods: 165 participants completed the short demographic questionnaire, the Rumination Response style (RRS) questionnaire, The Beck Depression Inventory II (BDI II), and an Emotion Recognition Test (ERT). We chose the highest (HR) and lowest (LR) quarters level of ruminators (82 participants, 81.7% females, mean age= 23.95± 2.03) and compared their level of emotional intensity and emotional understanding.</p> <p>Results: In line with our hypothesis we found that HR experienced negative emotions more intensely than LR, while the two groups did not differ in positive emotions. This pattern of results was not modulated by level of depressive tendency. In contrast with our hypothesis, the two groups did not differ in their emotion understanding.</p> <p>Conclusions: Our results may suggest that inhibitory deficits, which are associated with rumination, may result in higher negative, but not positive rating of intensity. Our research shed light on the mechanism underling rumination and emotion regulation.</p>	

24	<p>The Effects of Consolidation on Emotional Memory-Experience Gap <i>Gil Ben-Joseph [1], Zohar Rotem [1], Michael Gilead [1], and Talya Sadeh [1,2]</i> [1] Department of Psychology, Ben-Gurion University of the Negev; [2] Department of Cognitive and Brain Sciences, Ben-Gurion University of the Negev</p>
	<p>The memory-experience gap is defined as a discrepancy between the average of experienced emotions and the overall evaluation of an experience, which is usually more intense than the averaged emotions¹. This effect can be partially explained by the peak-end rule, which suggests that the evaluation is based on the emotional peak and/or the end of an experience². Our recollection of events is typically incomplete and heavily dependent upon the feelings we feel during an experience. Accordingly, it was found that details of emotional experiences can be influenced by post encoding consolidation processes that occur during sleep. These processes not only solidify memories but also preferentially preserve emotionally salient aspects of an experience³.</p> <p>In the first pilot, 17 participants were randomly assigned into two groups – experimental or control. During the first phase, participants watched emotional video clips (positive or negative) and were asked to rate their emotional responses to each clip on a scale from 1 (Low Intensity) to 10 (High Intensity). Both groups participated in the second phase after a 12-hour delay, whereas the control group had the delay during the daytime, the experimental group had it during the night, which enabled them to sleep. They were asked to rate their positive, negative, and overall evaluations of the experience. Results suggest a main peak effect over the positive evaluation of the experience ($\beta=1.32$, $SE=0.93$, $p<.05$). Meaning, the most intense positive clips influenced the positive evaluation after a delay. The effects of negative emotions as well as interaction with the experimental condition were not significant.</p>
25	<p>Shame and Social Anxiety Disorder among High functioning ASD (HFASD) compared to Typically development (TD) young adults <i>Meyrav Gaziel-Guttman, Nira Mashal, David Anaki</i> Bar-Ilan University</p>
	<p>Autism Spectrum Disorder is a neurodevelopmental disorder characterized by social communication and emotional impairments. Recent studies have estimated that between 21% and 59% of adults with ASD meet Social Anxiety Disorder (SAD) criteria. While in TD young adults SAD levels are related to feelings of shame, among HFASD, there is no evidence regarding the association between shame experience and its link to SAD. The current study compared 25 young adults with HFASD to 29 TD and examined the associations between shame, SAD, and severity of ASD symptoms.</p> <p>SAD was assessed by LSAS self-report questionnaire (Leibowitz, 1987). This questionnaire is comprised of fear and avoidance subscales. Shame was measured by the GASP self-report questionnaire (Cohen, Wolf, Panter & Cohen, 2011) which is comprised of withdrawal behavior and negative self-evaluation subscales (NSE). The severity of symptoms was assessed by the Autism Spectrum Quotient (AQ) scores (Baron-Cohen, Wheelwright, Skinner, Martin & Clubley, 2001).</p> <p>Results indicated that ASD group while the GASP's withdrawal sub-scale predicted the LSAS fear subscale of SAD for TD group, it was fully mediated by the AQ score for the HFASD group. Also, the HFASD group graded themselves on shame-arousing scenarios with less NSE.</p> <p>These findings may suggest that experiencing lower NSE levels regarding shame-arousing situations might harm social integration of young adults with HFASD. Also, by facilitating the relationship between shame and SAD, AQ score might serve as a self-reflector of the deficits experienced by individuals with ASD.</p>
26	<p>Automatic Polarization and the Aversion from the Political Left or Right: How Political Metaphors Influence Spatial Orientation Judgements <i>Heather A. Kumove [1,2], Boaz M. Ben David [2,3], Bernhard Leidner [1] and Gilad Hirschberger [2]</i> [1] University of Massachusetts Amherst; [2] The Interdisciplinary Center Herzilya; [3] The University of Toronto</p>
	<p>Political polarization is rising globally, leading individuals to feel anxious about the stability and unity of their nations. The large political and social divisions across the globe has made some fearful that the high levels of hatred will lead to degeneration of democratic values. Previous research has predominantly focused on</p>

	<p>explicit and controlled measures of political polarization, which may miss some of the more insidious aspects of political polarization. Our current research project aims to explore subtle and implicit aspects of political polarization. Identifying the more covert aspects of political polarization may help to uncover some the harder to address and more harmful dimensions of political partisanship. Internalized political partisanship has contributed to deep seeded negativity towards the other political side, which has fueled derogation and hatred for those with different political beliefs. In turn, we believe these responses are no longer related to explicit differences in policy preferences but have become automatic gut reactions. Our preliminary results in Israel have supported this concept by a demonstrated slowing in the utterance of the word left, especially after political priming. These results indicate that aversion towards the political left has been generalized to an aversion of the word in general. Thus, the word left has taken on a taboo connotation in Hebrew and people have become hesitant to even say the word.</p>
27	<p>Social reversal learning is associated with social attendance and positive affect in a one-year longitudinal study <i>Reut Zabag, Einat Levy-Gigi and Eva Gilboa-Schechtman</i> Bar-Ilan University</p>
	<p>Social anxiety is postulated to be associated with a pronounced and consistent tendency for avoidant rigid coping. Previous research from our lab have found that social anxiety is associated with a deficit in social reversal learning from punishment to reward.</p> <p>The aim of the current study was to enrich previous research and examine the association between success in social reversal learning from punishment to reward and social anxiety related outcomes in a longitudinal design.</p> <p>Thus, participants completed social reversal learning task in time 1 and were asked about their attendance to social events and their affect during these events in three subsequent time points. We found that better reversal learning at time 1 predicted attendance to more social events one week ($n=216$; $r=.170$ $p=.012$) and four months ($n=126$, $r=.198$, $p=.027$) after initial assessment. Moreover, better reversal learning predicted positive affect four months ($n=126$, $r=.186$, $p=.037$) and one-year ($n=101$; $r=.193$, $p=.057$) after initial assessment. Results were found over and above the effect of social anxiety severity at Time 1.</p> <p>Our findings suggest that reversal learning from punishment to reward is associated with social anxiety related outcomes and might have a role in the maintenance of social anxiety.</p>

Language

28	<p>Concept pre-activation improves visual word processing in spoken and literary Arabic: A behavioral and event-related potential study <i>Bahaa Madi-Tarabya, Samer Andrea, and Asaid Khateb</i> The Unit for the Study of Arabic Language, Edmond J. Safra Brain Research Center for the Study of Learning Disabilities, University of Haifa</p>
	<p>Diglossia in the Arabic language refers to the use of two varieties of the same language (Ferguson, 1959): literary Arabic (LA) and spoken Arabic (SA). Previous studies have suggested that LA words are processed faster than SA words when presented visually. Semantic priming studies have shown that words are processed faster when preceded by a semantically related (SR) prime than by an unrelated (SU) one. This study sought to examine whether the activation of a concept by an image (presented for 100ms) followed immediately either by a related or unrelated SA or LA word (presented for 200ms) will facilitate the processing of SA words. ERP measures were collected in a semantic decision task and the N400 component elicited by LA and SA words was analyzed.</p> <p>Behaviorally, no difference was found SR-LA and SR-SA words ($p=.348$). SU-LA words were processed faster than SU-SA words ($p=.001$). More globally, SR words ($M=702ms$) were processed faster ($p=.001$) than SU words ($M=756ms$). The analysis of the N400 component period showed a significant effect of relatedness ($p=.000$) with SU words inducing a larger N400 amplitude than SR words, but with no effect of language variety. The analysis of the N400 latency from difference waves revealed an earlier peak ($p=.016$) for LA</p>

	(M=477ms) than for SA (M=503ms). These results indicate that image priming have improved the visual recognition of both LA and SA semantically related words to the extent that difference in processing between the two varieties disappeared during the image related conditions.
29	<p>Exploring the effects of background noise on the time course for spoken word recognition: an eye tracking study</p> <p><i>Gal Nitsan [1,2], Karen Banai [2], and Boaz M. Ben-David [1,3,4]</i></p> <p>[1] Interdisciplinary Center (IDC) Herzliya; [2] University of Haifa; [3] University of Toronto; [4] Toronto Rehabilitation Institute</p>
	<p>Daily communication is often accompanied by background noise that disrupts speech processing. Speech-in-noise research typically distinguishes between energetic masking (interference due to the acoustic overlap between target and masker) and informational masking (all other forms of interference). The present study investigates the effects of noise type on the time course for spoken word recognition. Specially, we test whether cognitive load and individual differences in cognitive capacity affects speech processing differently in each type of noise.</p> <p>Young normal-hearing listeners (N = 50) completed a speech-in-noise task with a concurrent working memory load task while their eye-gaze was being recorded. While following spoken instructions to touch a target object, the listener was asked to retain 1 or 4 digits for later recall. We tested eye-fixations on a target object relative to fixations on an object with a phonologically-similar name (e.g., ar.gaz and ar.nav), as the word unfolds in time. Target words were presented in either speech spectrum noise (energetic masking) or in a multi-talker babble noise (informational masking). Preliminary data pointing to similarities and differences in these effects will be discussed.</p>
30	<p>Mind the Gap: Semantic Information Constrains Morphological Knowledge in Low SES</p> <p><i>Kahta Shani, Kiasi Mali, Sasson Ayelet, and Schiff Rachel</i></p> <p>Bar-Ilan University, Israel</p>
	<p>Morphological knowledge plays an essential role in the acquisition of literacy skills and has therefore gained increasing attention in studies involving populations with literacy deficits, such as students from low socioeconomic status (SES) backgrounds. Previous studies have shown that fully developed abstract morphological representations are independent of their semantic properties. However, little is known about the morphological representations of low SES adolescents. The current study examined whether the morphological knowledge of low SES adolescents is independent of semantic properties. To this end, seventy-three Hebrew-speaking ninth graders performed two morphological tasks in a within-subject design: the priming lexical judgement task that explored morphological processing, and the morphological analogies task that assessed morphological awareness. In each task, we manipulated the level of semantic relatedness between stimuli and target words and assessed participants' accuracy and response time. The results of the priming lexical judgement task revealed significant differences between high and low SES students in both accuracy and reaction times. While among high SES students' morphological priming accelerated word identification regardless of semantic information, among low SES students, acceleration was observed only when primes and targets shared semantically related morphemes. A similar pattern of results was found in the morphological analogies task, suggesting that low SES students' morphological representations are still semantically dependent. These results support the role of environmental factors in low SES students' linguistic knowledge and imply that the well-reported gap does not close in high school in the absence of targeted intervention programs.</p>
31	<p>The relevance of encoding two-dimensional stimuli to reading accuracy among young struggling readers</p> <p><i>Ilanit Hochmitz [1], Shira Frances [1], Shani Terner [1], and Lilach Shalev-Mevorach [1,2]</i></p> <p>[1] Constantiner School of Education, Tel- Aviv University; [2] Sagol School of Neuroscience</p>
	<p>Reading acquisition is a major milestone in children's development. While some children acquire reading almost naturally, others experience various difficulties. Most of the research on the development of reading has focused on domain-specific abilities, such as phonological awareness and naming, emphasizing their contribution to reading. However, some evidence has demonstrated that domain-general cognitive factors</p>

<p>such as attention and cognitive control can also strongly affect reading. The current study examined whether cognitive control plays a role in reading among young struggling readers.</p> <p>Sixty-three second graders, identified by their teachers as having reading difficulties, performed a Location-Direction task which is a Stroop-Like task where they had to respond to an arrow according to either its location on the screen (above/below fixation) or its direction (pointing upwards/downwards) ignoring the irrelevant aspect. In addition, participants completed a reading assessment battery. Although no relation was found between the congruency effect in the Location-Direction task and reading performance, we found that the overall accuracy in the Location-Direction task was correlated with reading accuracy in non-words, single words, and connected text. Moreover, when dividing the sample to subgroups of poor vs. typically performers in terms of the accuracy level in the Location-Direction task, according to age based accumulative data-base, a robust group difference emerged in reading accuracy. These results demonstrate the involvement of domain-general cognitive mechanisms in early stages of reading. We suggest that the poor performance of these children in the Location-Direction task derives from ineffective encoding of two-dimensional stimuli that translates to impaired reading accuracy.</p>	
32	<p>Embodied conceptual representations: the role of interoception and empathy in abstract and concrete concepts</p> <p><i>Fabio Marson [1,2], Revital Naor-Ziv [3], Patrizio Paoletti [1], Joseph Glicksohn [3,4], Filippo Carducci [2], and Tal Dotan Ben-Soussan [1]</i></p> <p>[1] Research Institute for Neuroscience, Educations and Didactics, Patrizio Paoletti Foundation, Assisi, Italy; [2] Department of Physiology and Pharmacology, Neuroimaging Laboratory, Sapienza University, Rome, Italy; [3] Department of Criminology, Bar-Ilan University, Ramat Gan, Israel; [4] The Leslie and Susan Gonda (Goldschmied) Multidisciplinary Brain Research Center, Bar-Ilan University, Ramat Gan, Israel</p>
<p>According to embodied cognition theories, conceptual knowledge is represented in bodily states, perceptual and motor features. This account explains the grounding of concrete concepts (CC) but it does not seem to fully explain the grounding of abstract concepts (AC) which are considered to lack perceptual features. Nevertheless, recent studies suggest that AC can be grounded in sensorimotor features through interoception, emotional and social experience. Interoception allows the integration and perception of signals from within the body and has been recently found to be a relevant component of AC and, to a lesser extent, of CC. Emotional and social experiences are strictly related to interoception by insular cortex and mirror neurons system, which are thought to support multimodal integration in coherent representations of others actions providing a neural basis for empathy. Thus, experience of AC, such as “justice”, could elicit interoceptive feelings and multimodal representations which constitute the perceptual basis of its embodied representation. Yet, as far as we know, no study directly examined structure of AC and CC in relationship to interoception and empathy measurements.</p> <p>Consequently, in the current exploratory cross-linguistic cognitive study, we are currently examining this important issue, utilizing bodily integration, interoceptive sensitivity and empathy questionnaires together with a perceptual strength, abstractness and familiarity test of 40 AC and CC.</p> <p>We hypothesize that: 1) interoceptive perceptual strength characterize AC more than CC; 2) interoceptive strength of AC correlates with interoceptive sensitivity and empathy; 3) features of AC and CC are consistent across languages (i.e., Italian, Hebrew and English).</p>	

Memory

33	<p>The Pupil Knows: Using Pupillometry to Predict Memory in Free Recall</p> <p><i>Oria Appel [1], Gal Atun [2], and Yaniv Mama [1]</i></p> <p>[1] Ariel University; [2] Tel-Aviv University</p>
<p>In this research, we examined the relationship between pupil variability and the processes of encoding and retrieving memory to investigate whether this relationship is predictable. Sixty-three subjects aged 18-30 who reported adequate vision participated in this study. Eyelink Portable DUO eye tracking device with a</p>	

	<p>resolution of 1920X1080 was used to detect changes in pupil size during a free recall task. The current results depict larger pupil size in the encoding phase for later successfully retrieved words than forgotten words. This phenomenon occurs even before the subject has read and understood the stimuli consciously. We had drawn this conclusion by observing the initial pupil size increased when the word was successfully recalled, compared to an individual baseline. This finding indicates that pupil size can be used to measure memory retrieval success or failure. It is well known that the pupil may serve as an indicator of the amount of load or memory effort (Kahneman & Beatty, 1966). This research presents pupil size variations among subjects who remembered more or less than 12 words overall. Our results suggest that pupil size can predict memory, depending on the amount of cognitive effort invested.</p> <p>This study could assist medical technology in memory understanding and has an actual application among the clinical population with head injuries or severe communication difficulties.</p> <p>Kahneman, D., & Beatty, J. (1966). Pupil Diameter and Load on Memory. <i>Science</i>, 154 (3756), 1583–1586.</p>
34	<p>Evidence for grid-cell-related activity in the time domain</p> <p><i>Gregory Peters-Founshtein, Amnon Dafni-Merom, Rotem Monsa and Shahar Arzy</i></p> <p>Hebrew University of Jerusalem, Israel</p>
	<p>The role of spatial mechanisms in the processing of time has been an enduring cross-disciplinary question. Grid cells have been recognized as a hallmark of the mammalian navigation system, with recent studies attesting to their involvement in organization of conceptual knowledge in humans. Here we inquired whether (1) displacement within an abstract two-dimensional environment in the time domain could drive grid cell-associated brain activity, and (2) whether timeline congruency could modulate said activity.</p> <p>Methods: 28 healthy subjects were trained to engage a two-dimensional time paradigm, constructed as an image of a person against a city backdrop, in which the person's age and time-of-day could be manipulated. A trajectory consisted of changing the age and/or time-of-day. While under fMRI, subjects executed multiple such trajectories.</p> <p>Results were subjected to a split-half analysis, where grid orientation was estimated on half the data and applied to the other half, and analyses estimating the differences between congruent (past-to-future) and incongruent trials.</p> <p>Results: Within individual maps of the Entorhinal cortex (EC), parameter estimates of grid-aligned trials were significantly larger than those of grid-misaligned trials bilaterally.</p> <p>Concerning timeline congruency, pairwise analysis revealed significant behavioral benefits for congruent over incongruent trials. Moreover, a searchlight-based multi-voxel pattern analysis showed the right EC to decode trial congruency. Finally, the magnitude of grid-like representation was significantly larger for congruent over incongruent trials in the right EC.</p> <p>Conclusions: These results support the claim that grid cells are involved in processing of time and that timeline congruency can modulate grid signal.</p>
35	<p>Enhancing Consolidation of Conceptual Learning via EEG Neurofeedback & tACS</p> <p><i>Limor Shtoots, Josh Levine, Rom Barzilay, Valery Kostovetsky, Aryeh Rothstein, Liran Shati & Daniel A. Levy</i></p> <p>Baruch Ivcher School of Psychology, Interdisciplinary Center Herzliya, Herzliya</p>
	<p>Consolidation of newly formed memories is readily disrupted, but can it be enhanced? While sleep provides the most commonly studied framework for such consolidation processes, it may also impact on plasticity processes. Our previous studies revealed that post-learning modulation of theta power using EEG neurofeedback (NFB) significantly contributed to immediate and delayed procedural, spatial and episodic memory performance, since theta enhancement may provide optimal conditions for stabilization of new memories. A promising possibility is that these memory effects of NFB may also strengthen semantic memory. We used NFB to enable participants to selectively increase EEG theta power following semantic knowledge learning, and tested their subsequent memory performance over time compared with control groups. In addition, we also conducted an additional study in which we employed post-learning transcranial alternating current stimulation (tACS) at theta frequency (contrasted with a sham control condition), such that neural entrainment is passive and not linked with particular cognitive/affective strategies. Our results</p>

revealed that participant's memory performance in the final exam, which was conducted 1-week post the NFB / tACS intervention, did not decline in Theta group participants as it did for participants in the control groups. Our results indicate that post-learning theta upregulation stabilizes semantic memory.	
36	<p>A river runs through it: Brain representations of segmented environments</p> <p><i>Michael Peer and Russell Epstein</i></p> <p>University of Pennsylvania, Philadelphia, PA, United States</p>
<p>Spatial environments are often segmented into multiple regions. How is this segmentation represented in the brain? Previous studies have suggested three possible mechanisms: grouping (locations in different segments appear more distant than they actually are); schematization (locations are coded in a way that generalizes across segments); and remapping (each segment is represented independently, with no integration into a global map). To test these possibilities, we taught participants the locations of 16 objects within a segmented virtual environment and used fMRI to assess location codes for these objects. The environment consisted of a virtual courtyard transected by a river that divided it into two identical segments. After training, participants' distance estimations and free recall order were affected by the spatial segmentation, suggesting that their mental representations were affected by the presence of the river. Analysis of multivoxel fMRI activity patterns revealed that spatial relations between objects were coded in the hippocampus, occipital place area (OPA) and retrosplenial complex (RSC). Notably, OPA and hippocampus coded schematic representation of the individual segments, such that objects in geometrically equivalent locations within the two segments were represented as being spatially similar, while RSC coded a global map of the environment. We did not find evidence for grouping or remapping. Our findings suggest that spatial segmentation can be induced by topographic feature of the environment even when all parts of the environment are co-visible, and that segmented environments are encoded using a combination of schematic representations of the segments and a global map.</p>	

Working memory and cognitive control

37	<p>Single-channel EEG features during n-back task correlate with working memory load</p> <p><i>Neta B. Maimon [1,2], Lior Molcho [2], Nathan Intrator [1,2], and Dominique Lamy [1]</i></p> <p>[1] Tel Aviv University; [2] Neurosteer Ltd, Herzliya, Israel</p>
<p>Working Memory (WM) load is an important cognitive feature that is highly correlated with mental effort. Several neurological biomarkers such as theta power and mid-frontal activity show increased activity with increasing WM load. Such correlations often break down in cognitively impaired individuals, making WM load biomarkers a valuable tool for the detection of cognitive impairment. However, most studies have used a multi-channel EEG or an fMRI, which are not massively accessible.</p> <p>In the present study, we evaluate the ability of novel features extracted from a single-channel EEG located on the forehead, to serve as markers of WM load. We employed the widely used n-back task to manipulate WM load. Fourteen participants performed the n-back task while their brain activity was recorded with the Neurosteer® Aurora EEG device. The results showed that the activity of the newly introduced features increased with WM load, similar to the theta band, but exhibited higher sensitivity to finer WM load changes. These more sensitive biomarkers of WM load are a promising tool for mass screening of mild cognitive impairment.</p>	
38	<p>Expectations about the number of task-relevant objects gate attentional access to working memory</p> <p><i>Alon Zivony and Martin Eimer</i></p> <p>Birkbeck, University of London</p>
<p>In dynamic environments, encoding information in working memory (WM) depends on allocating attention to the relevant object at the right time. In rapid serial visual presentation (RSVP) tasks, failures in attentional selectivity are frequently observed when a target is followed by a potentially reportable distractor. However, in tasks with two targets, accuracy for both targets is typically high when they are presented in immediate succession (lag-1 sparing). To account for this disparity, we tested whether expectations about the number</p>	

of targets in RSVP streams gates their access to WM. Colored target digits were embedded among grey letters and digits in two lateralized RSVP streams. The first target was followed either by a grey digit, or a second target (another colored digit). To manipulate expectations, the ratio of one-target and two-target trials (75%-25% or vice versa) was varied between blocks. Participants were much more likely to report seeing two targets when two targets were expected, even on trials where only a single target was present. To rule out response bias, we measured ERP markers of attentional selection (N2pc) and WM storage (CDA) in a second experiment. Both components were larger when two targets were expected, regardless of the actual number of targets, demonstrating that expectations modulated attentional selection as well as the number of items encoded in WM. Together, these findings reveal that attentional selectivity and WM encoding is modulated by expectations about the amount of task-relevant information.

39

The locus of proactive interference in visual working memory

Roy Shoval and Tal Makovski

Open University of Israel

Recent studies showed that Proactive Interference (PI) impairs visual Working Memory (WM), as performance is better when the memory items are unique rather than repeated throughout the experiment. To scrutinize the mechanisms driving this effect, we tested how it affects the stages of encoding, retention and testing. Experiment 1 found that, when response speed was emphasized, responses were slower in the repeated than in the unique condition, suggesting memory source confusion during testing. Experiment 2 showed that a retention interval manipulation did not affect the magnitude of the PI effect. Finally, Experiment 3 found that the PI effect did not increase when the encoding interval was short. Instead, the difference between the repeated and unique conditions was reduced, probably because the increased familiarity with the memory items in the repeated condition facilitated consolidation. Taken together, these results suggest that the main locus of PI in visual WM is during testing and that encoding and retaining information in visual WM are hardly affected by no-longer-needed information. Consequently, these data support the involvement of long-term memory in the effect.

17:30 – 18:30 – Keynote Address I:

***Affordances and Representations: Understanding Mental Rotation,
Perspective Taking and Spatial Reorientation***

Nora Newcomb, Temple University.

All mobile organisms must track their movements in space, and remain oriented to the external world. The evolution and development of these capacities has been the focus of a great deal of research in cognition, neuroscience, development, ethology and individual differences. Collectively, the resulting data provide a rich testbed for evaluating various approaches to understanding the human mind/brain. This talk will provide an overview of the theoretical terrain, advocating for a neuroconstructivist account.

20:00 – 21:30 – Murder mystery – a virtual party by Brainstorm.IL

Join us for a fun virtual experience, as we solve a murder mystery with the help of interactive clues and riddles!

Wednesday, February 24th

Poster Session 2 (9:30-11:30)

Action, motor processes and motor learning

1	<p>Automatically Controlled: Task Irrelevance Fully Cancels Otherwise Automatic Imitation <i>Eitan Hemed, Ilya Mark-Tavger, Uri Hertz, Shirel Bakbani-Elkayam & Baruch Eitam</i> University of Haifa</p>
	<p>Automatic Imitation refers to the unintentional mimicking of observed distractor actions. We tested whether automatic imitation depends on the task-relevance of the to-be-imitated movements. Replicating previous results, we find that movements that are part of the participant's task-set unintentionally influence responding. We show for the first time that movements that are not part of the task set and hence task-irrelevant are not imitated, although familiar and virtually identical to the in-set responses. Our novel finding is problematic for current accounts of automatic imitation such as Associative Sequence Learning or Theory of Event Coding. Furthermore, using a computational model we show that imitation depends on changes in the rate of evidence accumulation rather than changes in response conservativeness, and crucially no such change occurs when observing task-irrelevant distractors. We conclude that automatic imitation depends on the activation of action representations, which in turn depends on their task relevance.</p>
2	<p>Expectations of outcome intensity are embedded in the kinematics of stimulus-triggering actions <i>Batel Buaron*[1], Daniel Reznik*[2], and Roy Mukamel [1]</i> <i>*Authors contributed equally to this work</i> [1] Sagol School of Neuroscience and School of Psychological Sciences, Tel-Aviv University; [2] Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany</p>
	<p>At the base of any goal-directed action lies the expectation of its sensory consequences. Previous studies showed that when sensory stimuli are the consequence of self-generated, voluntary actions, neural evoked responses and perceptual reports are modulated relative to those evoked by physically identical stimuli triggered by an external source. It is suggested that such modulations are driven by predictions originating from the motor system, with respect to the sensory outcome. However, while most studies focus on how motor output modulates responses to sensory outcomes, there is little evidence demonstrating how such expectations affect motor output. In the current study, we examined participants' motor output (button press force trajectories), which were explicitly coupled with sensory outcomes of two intensities: faint and salient. Participants' force trajectories were measured during generation of either auditory, tactile, or visual stimuli. We found that across all modalities, participants (n=72) applied greater force when they pressed buttons to generate faint compared with salient stimuli. Importantly, this effect was absent when participants pressed the buttons in response to the same faint or salient stimuli. In addition to our behavioral findings, preliminary EEG results show reduced N100 amplitude for auditory stimuli triggered by stronger button presses, suggesting a possible link between press force and sensory-evoked response. Such a link supports a mechanism in which the degree of motor inhibition on sensory regions is proportional to the degree of motor output. Taken together, our results provide a potential explanation for the commonly reported sensory modulations of self-triggered stimuli.</p>
3	<p>Same action, different meaning: Neural substrates of Semantic Goal Representation <i>Shahar Aberbach [1], Roy Mukamel [1,2]</i> [1] Sagol School of Neuroscience, Tel Aviv University; [2] School of Psychological Sciences, Tel Aviv University</p>
	<p>Accurate control over everyday goal-directed actions is mediated by online comparisons of the expected and re-afferent immediate sensory feedback, conceptualized as internal forward models. However, voluntary actions are oriented not only towards immediate sensory outcomes, but also long-term conceptual goals</p>

and intentions for which the sensory consequence is sometimes absent or cannot be fully predicted. Yet, to date, the underlying processes that give rise to amodal introspective representations are unknown. Therefore, using behavioral measures and fMRI, in the current study we manipulated the semantic intention ('yes'/'no' response to questions regarding visual stimuli) of identical actions (either right or left hand button presses). Importantly, actions were devoid of immediate sensory outcome.

Imaging results, using a novel MVPA Multi-T analysis revealed voxel patterns differentiating the two semantic goals in somatomotor pathways including the primary motor, somatosensory and premotor cortex, bilaterally, as well as in visual pathways including the left LOC. Interestingly, clusters differentiating semantic meaning when subjects used their right hand partially overlapped the ones revealed when subjects used their left hand.

Behavioral results obtained outside the scanner suggest that the results cannot be explained by kinetic differences since within each hand, subjects apply similar force amplitudes during button presses when responding 'yes' compared to 'no'.

To the best of our knowledge, this is the first evidence showing that different semantic meaning is embedded in the neural representation of actions. Importantly, the differential neural activity is independent of immediate sensory outcome and kinetic differences.

Attention

4	<p>Does color priming alter attentional priorities in visual search?</p> <p><i>Aniruddha Ramgir and Dominique Lamy</i></p> <p>Tel Aviv University, Tel Aviv</p>
	<p>A salient distractor's ability to capture attention is thought to depend on goals: in search for a known target shape, the presence of a salient-color distractor slows performance when the target is reliably the unique shape (and participants use singleton-detection mode) but not when it appears among heterogeneous shapes (and participants use feature-search mode). However, such control breaks down when the target and distractor colors randomly repeat or swap from trial to trial. In addition, distractor interference is sharply reduced when the colors repeat vs. swap. This color-priming effect is taken to show that selection history guides attention and can override goal-directed control: a color's priority increases if it characterized the target on the previous trial, and decreases if it characterized the distractor. Here, we test an alternative account, according to which color priming reflects difficulty in disengaging attention from a distractor sharing the previous target's color rather than increased priority of that color. To dissociate priority from disengagement effects, target and distractor colors were selected from four possible colors. Thus, the target color could repeat, be new or swap, i.e., take on the previous distractor's color. Likewise, the distractor could repeat, be new or swap, i.e., take on the previous target's color. Target-color activation (reflected by target repeat vs. new and distractor new vs. swap) modulated distractor interference, supporting the priority account over the disengagement account. However, distractor-color priming did not modulate distractor interference, suggesting that it does not underlie resistance to capture by constant distractors.</p>
5	<p>The effects of subjective evaluation of sleep quality and circadian rhythm on sustained attention – a remote home conducted study</p> <p><i>Yarden Dankner, Shlomit Yuval-Greenberg, and Lilach Shalev</i></p> <p>Tel Aviv University, Israel</p>
	<p>The ability to sustain attention over time is essential for various everyday prolonged activities such as studying, working, conversing etc. This ability is affected by fluctuations in physiological alertness throughout the day. The fluctuations in alertness are a subjective diurnal process, affected by both internal biological processes such as sleep quality and wake-sleep cycles, individual differences in circadian rhythm (chronotypes), and external factors such as environmental demands. The aim of the current study was to investigate how alertness related internal process such as sleep quality and subjective differences in circadian rhythm influence the ability to sustain attention in individuals of different chronotypes in morning</p>

<p>compared to evening. Fifty-three Participants performed a continuous performance task (CPT) in their homes twice in one day (morning and evening), to assess their ability to sustain attention. They also filled a sleep log and questionnaires to assess their sleep quality, circadian rhythm tendencies and ADHD symptoms. Findings showed that general sleep quality as well as ADHD symptoms predicted sustained attention performance, as measured by reaction time consistency, solely in the morning and not in the evening. These effects were not evident at evening time, either due to task familiarity or diminished differences in alertness between participants at evening. We conclude that under regular sleeping conditions, sleep quality and chronotype tendencies modulate sustained attention in the morning.</p>	
6	<p>Does priming of location guide attention?</p> <p><i>Daniel Toledano, Mor Sasi, and Dominique Lamy</i></p> <p>School of Psychological Sciences, Tel Aviv University</p>
<p>It is widely accepted that objects that match our goals (top-down control) and salient objects (bottom-up control) attract our attention. Recently, there is increasing evidence suggesting that prior experience (or selection history) has a similar role. For instance, search is speeded when the target location is repeated, a phenomenon known as location priming. However, few systematic attempts have been made to test priming of location using measures that specifically index attentional guidance. In the current study, we tested whether priming of location influences first eye movements and whether this effect is modulated by distractor interference, two known indexes of attentional guidance. Participants searched for a perfect circle (the target) among three ellipses (the distractors) and target-distractor similarity was varied. The results revealed that first saccades were strongly attracted to the location of the previous target. Crucially, competition strength (i.e., search difficulty) modulated this effect, a result suggesting that location priming biases the competition for attention. However, we also reanalyzed the results of four experiments (Adams & Gaspelin, 2020; Gong & Theeuwes, 2020) that used variations of the additional singleton paradigm. We found that priming of location did not reduce the large interference exerted by a salient irrelevant distractor, a result suggesting that location priming does not bias the competition for attention. These conflicting results raise the possibility that priming of location may serve as a habit-like attentional response (see Jiang, 2018) that bypasses the priority map.</p>	
7	<p>Spatial cueing effects do not always index attentional capture: Evidence for a Priority Accumulation Framework</p> <p><i>Maya Darnell and Dominique Lamy</i></p> <p>Tel Aviv University, Tel Aviv, Israel</p>
<p>In visual search, improved performance when a target appears at a recently cued location is taken as strong evidence that attention was shifted to this cue. Here, we provide evidence challenging the canonical interpretation of spatial-cueing (or cue-validity) effects and supporting the Priority Accumulation Framework (PAF). According to PAF, attentional priority accumulates over time at each location until the search context triggers selection of the highest-priority location. Spatial-cueing effects reflect how long it takes to resolve the competition and can thus be observed even when attention was never shifted to the cue. Here, we used a spatial-cueing paradigm with abruptly onset cues and search displays varying in target-distractor similarity. We show search performance on valid-cue trials deteriorated the more difficult the search, a finding that is incompatible with the standard interpretation of spatial-cueing effects. By using brief displays (Experiment 1) and by examining the effect of search difficulty on the fastest trials (Experiment 2), we invalidate alternative accounts invoking post-perceptual verification processes (Experiment 1) or occasional failures of the onset cue to capture attention (Experiment 2). In Experiment 3, we used a combination of the spatial-cueing and dot-probe paradigms. We show that the events that occurred in both the cue and search displays affected attentional distribution, and that the relative attentional priority weight that accumulated at the target location determined how easily the competition was resolved. These findings fully support PAF's predictions.</p>	

8	<p>What inhibits in the Social inhibition of return effect? <i>Orit Nafcha [1,2], Simone Shamay-Tsoory [1], Shai Gabay [1,2]</i> [1]School of Psychological Science, University of Haifa; [2]The Institute of Information Processing and Decision Making (IIPDM), University of Haifa.</p>
	<p>Social inhibition of return (SIOR) refers to the phenomenon in which there are slower reaction times toward locations already acted upon by the co-actor in a previous trial. Whereas earlier studies have established the importance of the social factor in this task, the mechanism underlying this effect remains controversial, especially regarding the cause for the observed inhibition. Is it the representation of another's action location or the representation of another's target location or both that is responsible for the inhibitory effect? In the current study, participants performed a discrimination task in which they were required to respond to the identity of the targets rather than to their locations. We manipulated the information delivered from a central arrow cue which appeared after an action was made. In one condition, the arrow pointed to the previous trial's action location (e.g. pointing to the left after the left key was pressed in reaction to seeing the X target). In a second condition, the arrow pointed to the previous trial's target location (e.g. pointing to the left after a target was presented on the left, regardless of the response action location). Results revealed that the target location is the key for this effect and not the action location. This finding reinforces the theory that SIOR evolved as a facilitator of foraging by inhibiting redundant searches of already acted-upon locations, regardless of any specific action.</p>
9	<p>An Attentional Priority-Accumulation Framework of Attentional Capture <i>Mor Sasi, Daniel Toledano, and Dominique Lamy</i> Tel Aviv University</p>
	<p>One of the most debated issues in the attention research field concerns the factors that guides our attention. While most models in the field might disagree regarding the relative contributions of the factors that guide our attention, there is a broad consensus that at any given time, attention is automatically deployed to the highest priority object in the visual field. Recently, Lamy et al. (2018) suggested an alternative model of how attentional allocation works, the Priority-Accumulation-Framework (PAF). Unlike previous models, PAF argue that attentional priority weights accumulate across time and that instead of relentlessly shifting our attention to potentially irrelevant events, we wait for the right context to appear in order to deploy our attention to the highest-accumulated priority location. The current study tested the PAF using behavioral measures and eye movements. The experiment's aim was to test PAF by measuring overt attention. Participants performed a spatial-cueing task in which they searched for a shape-defined target among distractors, following a spatially uninformative cue, and the similarity of the distractors to the target was varied. Results showed that most often participants waited for the task-relevant context to appear, to move their eyes. Crucially, even when the cue did not capture participants' overt attention early on, it biased the competition at a later stage, according to PAF's predictions; the cue's influence increased as the competition became more difficult.</p>

Auditory cognition

10	<p>Vibrations under the mask: Auditory to Tactile Device to assist in mask-distorted speech perception in noise. <i>Maya Mentzel [1], Katarzyna Cieřla [1,2], Gizem Ozdemir [1], Tomasz Wolak [2], Artur Lorens [2], Amir Amedi* [1], and Boaz M Ben David* [1,3] *equal contribution</i> [1] Baruch Ivcher School of Psychology, Interdisciplinary Center, Herzliya; [2] Institute of Physiology and Pathology of Hearing, World Hearing Center, Warsaw, Poland; [3] University of Toronto, Canada</p>
	<p>Perceiving speech is one of the most important abilities one needs in order to have good social relationships. Yet, it is not a simple task, and it involves integration of several modalities, including visual and auditory channels. Any reduction in the quality of the input leads to a reduction not only in the identification of the words but also in the interpretation of the prosodic cues. Face masks used to prevent the spread of COVID-19 distort speech, i.e. reduce its intensity and remove important visual cues (e.g., lips.). On top of this,</p>

	<p>speech in real life situations is usually accompanied by noise or signal disruptions. These two situations, as well as the existence of hearing loss (such as in the elderly) have been extensively found in the literature to be obstacles for spoken communication. Given the pivotal role of spoken communication to quality of life, can we find a simple technical solution to assist in mask-distorted speech perception? Audio-to-tactile sensory substitution devices (SSD) devices present a possible route that can compensate for these sensory obstacles, by adding complementary tactile information to the distorted auditory signal. In collaboration with the World Hearing Center in Warsaw (and Neurodevice company) we developed the Vibrating Auditory Stimulator (VAS), as a prototype for an easy to use audio-to-tactile device. The primary goal of the proposed research plan is to examine whether the novel tool can provide such a solution for daily use. Preliminary data will be discussed.</p>
<p>11</p>	<p>The impact of similarities between speaker and listener's speech features on listener's evaluation of the speaker <i>Inbal Ravreby [1], Tzlil Tabib [2] and Yaara Yeshurun [2,3]</i> [1] Department of Neurobiology, Weizmann Institute of Science, Rehovot; [2] School of Psychological Sciences, Tel Aviv University; [3] Sagol School for Neuroscience, Tel Aviv University</p>
	<p>In friendship formation, similarity to the other plays a great role. This goes hand in hand with the notion of homophily – we tend to like others who are similar to us. We constantly hear ourselves, and are thus highly used to hear our own speech features such as rate, volume, fluency and pitch. Hence, the ease of hearing others who speaks similar to us may positively influence our impression of them. The role of speaker-listener's similarity of speech features in listener's judgments of the speaker received relatively scarce scientific attention. In this online study we hypothesized that both speaker's speech features and listener-speaker's similarity in speech features will predict the following dimensions: speech intelligibility and comprehension, motivation for interaction with the speaker, willingness to hear the speaker and evaluation of speaker's characteristics (e.g. positivity and aggression). In the first step of our study, participants recorded a ~30 seconds audio speech segment about what their houses looks like. This topic was chosen as it is relatively neutral, surprisingly not boring, and easy to generate. Next, participants heard 34 voice segments of other individuals (17 women and 17 men, mean age 26.11, similar to participants' age) describing their houses. After hearing each voice segment, participants judged the speaker on the mentioned dimensions. Our preliminary results suggest that not all speech features are equally related to judgement of others, and that for some features speaker-listener's similarity better predicts the judgments than the speech feature's value itself.</p>
<p>12</p>	<p>Audiomotor learning across ears <i>Hadar Dery [1], Batel Buaron [1,2], Roni Mazinter [1] and Roy Mukamel [1,2]</i> [1] School of Psychological Sciences, Tel-Aviv University; [2] Sagol School of Neuroscience, Tel-Aviv University</p>
	<p>Actions with sensory consequences require integration of motor and sensory information. In recent studies, we found that actions with sensory consequences (visual/auditory), modulate perception and neural activity in relevant sensory cortices (visual/auditory respectively) in a hand dependent manner. These results imply that sensory regions code not only the sensory consequences of the action, but also the identity of the active effector involved. In the current behavioral study, we examined whether manipulating the identity of the sensor (rather than the effector), would also differentially affect sensorimotor integration as assessed by the learning process of a sensorimotor skill. Right-handed subjects (N=43) trained for two days to perform an audiomotor task using their left hand. The task involved performing a repeated finger sequence with a constant inter-press-interval (IPI) on a digital piano. Auditory feedback in each group was presented monaurally, either to the left or right ear. Subjects in both groups showed improved IPI and reduced errors across learning blocks and days. However, subjects who received auditory feedback to the right ear had more accurate IPIs and performed less errors than subjects who received feedback to the left ear. It remains to be seen whether this advantage can be ascribed to right-ear stimulation or rather contralateral relationship between the active hand and stimulated ear. Taking into account previous neuroimaging and behavioral results, current results are in agreement with a model in which sensorimotor integration is</p>

sensitive to whether the neural representation of actions and their sensory consequences reside within or across hemispheres.	
13	<p>Suspenseful music enhances incidental long-term declarative memory</p> <p><i>Nawras Kurzom and Avi Mendelsohn</i></p> <p>Sagol Department of Neurobiology & Institute of Information Processing and Decision Making (IIPDM), University of Haifa, Haifa, Israel</p>
<p>Successful formation and retention of long-term declarative memory is influenced, among other things, by attention, emotion, and deviation from expectations. We examined the effect that musical features, and particularly musical suspense/tension, exert on the formation of declarative memory. This was tested by composing three original music pieces that contained both suspenseful and neutral musical conditions. A galvanic skin response (GSR) study was first conducted on 19 participants in order to validate the musical attributes of the composed excerpts. Indeed, suspenseful musical excerpts, characterized by prolonged delays in melodic resolution, were associated with heightened GSR, corroborated by increased subjective ratings of suspense as compared to neutral excerpts. These musical stimuli were subsequently used in experiments that tested the influence of suspenseful music on long-term memory. In the encoding stage, 44 participants listened to the three musical pieces while they were presented with unique images that were evenly dispersed among four conditions – suspense, suspense-resolution, neutral music, and silence. One day later, their memory performance was examined using a memory-recognition test for images presented during encoding and for new pictures. We found that memory performance was enhanced for pictures presented during the suspenseful musical periods compared to the other conditions, and particularly for participants who did not report felt tension during the suspenseful excerpts. Understanding the interrelations between musical components, which exert powerful and fundamental responses in humans, and cognitive faculties as proposed is bound to provide insights as to the basic features of memory formation and retention.</p>	
14	<p>Speech recognition in a spherical anechoic room with a 97-speakers array in real environmental background noise with tactile feedback</p> <p><i>Gizem Ozdemir, Katarzyna Cieřła, Maya Mentzel, Amir Amedi</i></p> <p>Interdisciplinary Center (IDC), Herzlia</p>
<p>Understanding speech is an important ability for social communication in daily life, especially in places with multiple sound or speech sources. Both auditory and tactile signals can operate by vibration (in a limited range of up to 1000 Hz) and reach mechanoreceptors in the body (in the ear and on the skin). Tactile feedback can be used to enhance auditory perception and improve the recognition of speech. In this study, we conducted several experiments focused on speech in noise understanding, in simulated real environment scenarios (such as ‘city’) where multiple speech sources are presented.</p> <p>For the experiments, we developed a setup consisting of several vibratory tactors/actuators that can deliver stimulation on multiple/varied locations on the body, based on sensitivity and tactile resolution of various body parts (body mapping) (see Figure 1 and Figure 2). The experiments were carried out in a unique multisensory room in the Baruch Ivcher Institute For Brain, Cognition & Technology, equipped with a 97 speakers’ array and 12th order Ambisonics, which makes it possible to create almost any immersive auditory scene. In order to deliver tactile input on fingertips, we used a dedicated Vibrating Auditory Stimulators (VAS), developed in collaboration with the World Hearing Centre in Warsaw and Neurodevice company (https://www.neurodevice.pl/en/). The other tactors used for the experiments were developed in-house at IDC. Preliminary data will be discussed.</p>	

Consciousness

15	<p>Awareness measurement can strongly interfere with subliminal priming: Online vs. Offline assessment methods</p> <p><i>Ofer Kahane [1], Amir Tal [2], and Liad Mudrik [1,3] [CANCELLED]</i></p> <p>[1]School of Psychological Sciences, Tel Aviv University; [2] Department of Psychology, Columbia University; [3] Sagol School of Neuroscience, Tel Aviv University</p>
	<p>Unconscious cognition research typically relies on two main approaches to assess participants' awareness of subliminal stimuli: online measurement, in which awareness is measured within every experimental trial; and offline measurement, in which awareness is measured retrospectively in a separate block. Each method has strengths and weaknesses with respect to its ability to measure awareness, yet the potential influence of these measures on the unconscious process that is being probed has thus far been largely overlooked. Here, we examined the implications of using online vs. offline awareness measures in subliminal research. Across two sessions separated by 2-4 days, participants (N=40) completed two subliminal priming tasks, in one of two grouping conditions: Online Awareness Assessment (OAA); or No Online Awareness Assessment (NOAA). Behavioral priming effects evoked with NOAA were robust and strongly correlated between the two sessions. However, priming under OAA was smaller, uncorrelated between sessions, and characterized by high between-subject variance. Interestingly, this variance was substantially smaller in the second session of OAA, presumably due to a reduction in task interference following training. Taken together, our findings suggest that the choice of awareness assessment method can strongly influence unconscious processing effects: the dual-task condition imposed by online measurements can induce undesired variance, resulting in weak, unreliable effects. Yet, this potential interference can be mitigated by training, and allow for a refined online measurement method.</p>
16	<p>The Consciousness Theories Studies (ConTraSt) database: how consciousness theories have been neuroscientifically studied.</p> <p><i>Itay Yaron[1], Lucia Melloni [2,3,4], Michael Pitts [5], and Liad Mudrik [1,6].</i></p> <p>[1] Sagol School of Neuroscience, Tel Aviv University, Tel Aviv Israel; [2] New York University Comprehensive Epilepsy Center, 223 34th Street, New York, NY 10016, USA; [3] Department of Neurology, New York University School of Medicine, 240 East 38th Street, New York, NY 10016, USA; [4] Department of Neuroscience, Max Planck Institute for Empirical Aesthetics, Grüneburgweg 14, 60322, Frankfurt am Main, Germany; [5] Department of Psychology, Reed College; [6] School of Psychological Sciences, Tel Aviv University, Tel Aviv, Israel</p>
	<p>Several theories try to explain the neural basis of conscious experience, yet each provides fundamentally different interpretations of empirical data. Accordingly, there is no agreed-upon theory of consciousness, and no clear description of current findings in the field, as the latter are typically described within the framework of each theory. Thus, a systemic, quantitative and theory-free review of studies is necessary to characterize the state of the field regarding these theories. We conducted a comprehensive, quantitative and theory-neutral review of neuroscientific studies of consciousness (379 papers, reporting 418 experiments) that interpreted their findings as supporting/challenging one of four leading theories of consciousness: Global Neuronal Workspace, Integrated Information Theory, Recurrent Processing Theory and Higher Order Theory. Collapsed together, a highly variable pattern of spatial and temporal neural findings emerges, that is not predicted by any theory. We further show that some methodological choices of researchers increase the probability of their findings supporting certain theories. Finally, we found that the field generally suffers from a strong confirmatory-bias and that the majority of studies post-hoc interpret their findings with respect to the theories, rather than being designed a-priori to test critical predictions. We suggest that cross-talk between the theories is needed to overcome these biases, testing each other's predictions and integrating ideas, as opposed to gaining further affirmative results according to each theory's predictions. To allow researchers to conduct additional queries and analysis of the data, we created an open-access website in which we share the metadata on all studies in the database.</p>

17	<p>Awareness is needed for scene-based contextual effects on perception of ambiguous objects <i>May Sar-Shalom [1], Tzahi Kravitz [1], Dan Biderman [2], Liad Mudrik [1,3]</i> [1] Sagol School of Neuroscience, Tel Aviv University, Tel Aviv, Israel; [2] Department of Neuroscience, Columbia University; [3] School of Psychological Sciences, Tel Aviv University, Tel Aviv, Israel</p>
	<p>Perception is typically held to rely on both bottom-up information like a stimulus' physical properties and top-down processes like expectations and previous knowledge. Past work suggested that some top-down processes can take place even without awareness, by showing that subliminally presented contextual inducers can bias the perception of an ambiguous symbol. Here, we extend this line of work and examine whether such effects can also be found for real-life objects in scenes. In three studies, we presented an ambiguous visible object embedded in scenes that were either consciously or unconsciously perceived. In experiment 1, the object was presented together with the scene. While the scene biased object categorization when consciously perceived, no effect was found for invisible scenes. In experiment 2, we examined if this result might have stemmed from the simultaneous presentation of the object and the scene, attracting subjects' attention towards the former and away from the latter. Accordingly, here the scene was presented before the object, yet the same effect as found. Finally, in Experiment 3, the ambiguous object was presented prior to its being simultaneously presented with the invisible scene, allowing sufficient time to generate predictions about object identity. Here too, invisible context did not bias object classification. Taken together, these findings provide substantial evidence against the ability of invisible scenes – as opposed to visible ones – to disambiguate visible objects and bias their classification. This suggests that consciousness might play an essential role in top-down contextual effects and in integrating objects onto rich and complex scenes.</p>
18	<p>States of consciousness as structural and functional variations of the cognitive system. <i>Shulamith Kreitler</i> Tel-Aviv University, School of Psychological Sciences</p>
	<p>A new conception of consciousness and altered states of consciousness will be described. It is grounded in the theory of meaning (Kreitler & Kreitler) which considers cognition as a meaning-dependent and meaning-generating system. Meaning is defined as an input-centered pattern of contents, which is characterized in terms of five kinds of meaning variables. Specific clusters of meaning variables may become prominent at different times, due to factors intrinsic to the system of meaning or extrinsic to it. Different empirical studies showed that the functioning of the cognitive system depends on the kinds of meaning variables that are prominent at a given time and dominate its structure. Accordingly, the dominant meaning variables modulate the kinds of information available at that time, how they are organized and used, and what the cognitive outputs will be. These cognitive contents and processes affect also perception of reality, the sense of self, emotions, and indirectly behavior too. Hence, a state of consciousness can be defined as the state of the cognitive system as a whole functioning in a way determined by the relative salience of specific meaning variables. Thus, many different states of consciousness exist and many more are possible. Examples will be provided of studies describing changes in cognitive and emotional functioning when the cognitive system is dominated by different clusters of meaning variables, such as those representing personal-subjective meaning, or interpersonally-shared meaning or the concrete approach.</p>

Development, language and developmental disorders

19	<p>Cognitive flexibility in children with Developmental Language Disorder: How do they draw nonexistent objects? <i>Elma Bloma [1,2], Roni Berke [3], Nehama Shaya [3], and Esther Adi-Japha [3]</i> [1] Utrecht University, The Netherlands; [2] Arctic University of Norway; [3] Bar-Ilan University</p>
	<p>Children often need to adapt their thoughts and behaviors to changing situations in their everyday life. In order to do this, they need cognitive flexibility. Cognitive flexibility comprises one of the executive functions (Miyake & Friedman, 2012; Miyake et al., 2000). Executive functions are a set of general-purpose control processes that regulate a person's thoughts and behaviors and include inhibition and updating of the working memory contents, in addition to cognitive flexibility. Deficits in cognitive flexibility have been</p>

	<p>associated with several neurodevelopmental disorders, including Developmental Language Disorder (e.g., Farrant, Maybery, & Fletcher, 2012; Kapa, Plante, & Doubleday, 2017; Roello, Ferretti, Colonnello, Levi, & 2015). However, other studies found that cognitive flexibility is spared in children with Developmental Language Disorder (e.g., Henry et al., 2011; Im-Bolter, Johnson, & Pascual-Leone, 2006). Further research is needed to determine whether or not children with Developmental Language Disorder have difficulties with cognitive flexibility. The current study is the first to study cognitive flexibility in children with Developmental Language Disorder using a nonexistent object drawing task (Karmiloff-Smith, 1990).</p>
20	<p>Is Rolandic epilepsy benign? Syntactic, lexical, and reading difficulties in adolescents with Rolandic epilepsy <i>Gur Shalom [1], Veronika Chernuha [2], Aviva Fattal-Valevski [2,3] and Naama Friedmann [1]</i> [1] Language and Brain Lab, School of Education and Sagol School of Neuroscience, Tel Aviv University, Israel; [2] Pediatric Neurology Unit, Tel Aviv Sourasky Medical Center, Israel; [3] Sackler Faculty of Medicine, Tel Aviv University, Israel</p>
	<p>Benign childhood epilepsy with centrotemporal spikes (BCECTS) is the most common epilepsy in children. Onset occurs between the ages 3 to 13 years, and seizures usually recede before the age of 16 years. The term "benign" indicates that it is commonly assumed that the symptoms and outcomes of this epilepsy do not lead to long-term deficiencies. Our study tested syntax, lexical retrieval, and reading in these children and found that this is not the case.</p> <p>We tested 18 adolescents with BCECTS aged 9;10-18;8. We assessed their syntax using tasks that evaluate the comprehension and production of sentences with syntactic movement and of pronouns; we tested single word reading in a test that is sensitive to various types of developmental dyslexias, and we assessed their phonological working memory, and lexical retrieval.</p> <p>Results: 11 of the 18 participants had a syntactic movement deficit. These participants' deficit was specific to object wh-movement structures: they performed significantly below controls on tasks that involve comprehension, production, and repetition of object relatives, object questions and topicalization structures. They showed intact repetition of sentences with embedding, suggesting the syntactic deficit is specific to syntactic movement. Six participants had a deficit in the comprehension and production of pronouns; Twelve had at least one type of dyslexia; Eleven participants had a lexical retrieval deficit; and Twelve had a phonological short-term memory deficit. These results indicate that BCECTS is not benign after all, and individuals with BCECTS are at risk for language impairment.</p>
21	<p>Developmental Proper name Anomia <i>Yaara Petter and Naama Friedmann</i> Tel Aviv University, Tel Aviv, Israel</p>
	<p>The ability to accurately and efficiently retrieve proper names is of great importance in human communication. There is much evidence supporting the claim that proper and common names are retrieved via distinct processes, including compelling cases of acquired proper-name anomia without common-name anomia.</p> <p>This study describes the first in-depth cases of developmental proper-name anomia and examines in detail the nature of the impairment and its locus in the name retrieval process.</p> <p>The participants were Nine individuals aged 30-50, with considerable difficulties in retrieving persons names since childhood. Their performance was compared to aged-matched controls (N=37, mean age 37). Proper-name retrieval was assessed using a person-picture naming task and naming to definition tasks, both adapted to the age of the participant. For each participant, unfamiliar faces were removed from further analysis; retrieval failure was only coded in case the participant knew the person but could not retrieve the name. Nine participants preformed significantly lower than age-matched controls in proper-name retrieval (Crawford & Howell, 1998, $p < .05$). A dissociation analysis (Crawford, Garthwaite, & Gray, 2003) found that five of these participants showed a significant ($p < .05$) dissociation between impaired proper-name retrieval and intact object-name retrieval (in an object naming task, 193 items, Biran & Friedmann, 2005). These five participants then preformed individually-tailored tasks which examined in detail the extent and functional locus of their deficit,</p>

	effects on reading, the representation of first and family name and more. The results shed a light on a scarcely reported developmental difficulty and contribute to the understanding of proper name retrieval processes.
22	<p>Fluent reading is associated with functional connectivity of the ventral and dorsal attention networks in children with dyslexia</p> <p><i>Nikolay Taran [1], Rola Farah [1] & Tzipi Horowitz-Kraus [1, 2]</i></p> <p>[1] Educational Neuroimaging Center, Faculty of Education in Science and Technology, Faculty of Biomedical Engineering, Technion, Haifa, Israel; [2] Reading and Literacy Discovery Center, Pediatric Neuroimaging Research Consortium, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, USA</p>
<p>This study aims to investigate the neurobiological correlates for the involvement of Visual Attention during fluent reading in Typical Readers (TR) and children with Developmental Dyslexia (DD).</p> <p>Seventy-nine 8-12 year-old children (36 TR, 39 DD) underwent a cognitive behavioral assessment and performed an fMRI fluent reading task with two conditions: a) Deleted, in which the letters of the text were being deleted from the screen at a constant pace, and b) Still, where the text remained on the screen. Executive Functions (EF) and Visual Attention abilities were compared between the groups using t-tests. Seed-to-voxel analyses for the fMRI data for both conditions were conducted focusing on the Dorsal Attention Network (DAN) and the Ventral Attention Network (VAN).</p> <p>The DD group showed decreased EF and Visual Attention abilities, compared to TR. Children with DD exhibited an increased Functional Connectivity (FC) within the DAN and VAN when compared to the TR. DD also showed increased FC between VAN and several bilateral language-related regions. TR showed greater FC than children with DD between DAN and the left Angular Gyrus while reading the Still and Deleted text, this Functional Connectivity value predicted reading comprehension.</p> <p>Children with DD may compensate for their reading impairments by relying on both attention networks (DAN and VAN) in synchronization with language-related brain regions. Results also suggested that reading fluency may be a challenging task not only for children with DD but also for TRs.</p>	

Emotion

23	<p>Political Views Shape the Brain Response to Political Content</p> <p><i>Noa Katabi, Hadas Simon, Inbal Ravreby, Sharon Yakim, May Blechman, Noam Edelshtein and Yaara Yeshurun</i></p> <p>Tel Aviv University</p>
<p>Individuals view the world through their own subjective filters -- their beliefs, knowledge, and perspectives. Consequently, people often interpret the same real-life situation in different ways. We are interested in exploring the neural mechanisms underlying this phenomenon. In this functional magnetic resonance image (fMRI) study we focused on two groups with opposing political views. We scanned 17 right- and 17 left-wing participants before April 2019 elections in Israel. In the MRI scanner, participants watched 8 movie clips, 7 of them containing political content. In this project, we focused on three clips – right-wing campaign ad, left-wing campaign ad and a neutral non-political movie clip. Our behavioral results demonstrated highly significant difference between left- and right-wing participants in their agreement and interpretation of the political clips' content. We used inter-subject correlation (ISC) analysis to test for differences and similarities in participants' brain response to these clips. We found that right-wing participants were significantly more synchronized than left-wing participants in a wide range of brain areas, including high order regions (e.g. precuneus) and primary sensory regions (e.g. visual cortex). This effect was demonstrated only for the political clips, and not for the neutral clip. Moreover, in some of these regions, differences in the neural response correlated with differences in the interpretation of the clip's content. These preliminary results suggest that seeing the world through opposing political lens may shape the brain response even in early sensory regions.</p>	

24	<p>Interpreting the constructivist theory of emotion with the 'entry point' hypothesis. <i>Uri Berger [1], and David Anaki [1,2]</i> [1] The Child Study Center, Yale University, New Haven, CT, USA; [2] Department of Psychology and; [3] Gonda Brain Research Center, Bar-Ilan University, Ramat-Gan, Israel</p>
	<p>Objects and concepts can be categorized at different levels of hierarchy, such as superordinate (e.g., animal), basic (e.g., dog), and subordinate (e.g., Labradoodle). According to the 'entry point' hypothesis, recognition of an object or concept first occurs at the level which corresponds best to the perceptual characteristics that are most salient in memory. The constructivist theory of emotion claims that core-affect underlies discrete-emotion. Thus, core-affect and discrete-emotion are hierarchically related elements; a discrete-emotion (e.g., disgust) is subordinate to a core-affect (e.g., negative valence). One unclear issue is whether discrete-emotions and core-affect are equally salient to experience. Our study aimed to examine whether emotional stimuli are first experienced as a discrete-emotion or a core-affect (i.e., valence). In two experiments, participants categorized images (e.g., clogged toilet) at the discrete level (e.g., 'disgusting' or 'pleasant') and the core-affect level (e.g., 'positive' or 'negative'). By comparing the tasks' reaction-time, we determined the saliency of discrete-emotion and core-affect. Results indicate that stimuli are first experienced as discrete-emotion (i.e., basic level category) and later according to their core-affect (i.e., superordinate level category). These results indicate that the entry point of emotions is at the discrete emotion level.</p>
25	<p>Do you see what I see? Individual differences in contextualized emotion recognition <i>Noga Ensenberg, Ran R. Hassin & Hillel Aviezer</i> Hebrew University of Jerusalem</p>
	<p>Recent evidence suggests that real life facial expressions are often more ambiguous than previously assumed. Accordingly, context plays an indispensable role in communicating emotion. In fact, even the recognition of stereotypical, exaggerated facial expressions can be shifted by context. For example, previous reports suggest that the body context in which a face is presented can bring to a categorical shift in recognition from the face. This effect has been studied extensively at the group level but are we all effected in a similar way? Our results suggest the answer is no. Using a multiple-choice categorization task, 101 participants were presented with still presentations of incongruent facial and bodily emotional expressions. We asked whether individuals differ in their susceptibility to the bodily context when categorizing the face and if so whether effects are consistent over time. Striking differences were found, these were stable over two sessions ($r = 0.84$, $p < 0.001$). Our second study suggests that this phenomenon is not bound to the method used and holds also when using an open question paradigm. Testing 83 participants we show a robust correlation between the methods ($r = 0.63$, $p < 0.01$). Our third study shows that individual differences in the susceptibility to context hold even across modalities, presenting participants with dynamic audio-visual expressions (43 participants, $r = 0.7$, $p < 0.001$). We conclude that different people exposed to identical affective stimuli may perceive strikingly different emotions as a function of highly stable individual differences.</p>
26	<p>Identifying variables that predict depression following the general lockdown during the COVID-19 pandemic <i>Einav Gozansky, Gal Moscona and Hadas Okon-Singer</i> Department of Psychology, University of Haifa and The Integrated Brain and Behavior Research Center (IBBR), University of Haifa</p>
	<p>Background: This longitudinal study aimed to define psychological markers for future development of depression symptoms following the lockdown caused by the COVID-19 outbreak. We focused on loneliness, intolerance of uncertainty, economic stress and emotion interpretation biases as potential predictors of elevated depression levels. This study was conducted at two time points, during and after a general lockdown in Israel, enabling examination of immediate as well as short-term influences of the lockdown on subjective well-being.</p> <p>Methods: During the general lockdown in April 2020, 553 participants reported their psychological health by means of online questionnaires along with a unique emotion interpretation bias task. Of these participants,</p>

	<p>129 took part in a second phase in June 2020. The data was analyzed using structural equation modelling that enabled detailed investigation of the relationships between sociodemographic and individual traits. Results: Subjective loneliness, rather than objective isolation, was found as a strong predictor for symptoms of depression five weeks later ($\text{Beta} = .2, p = .009$), when controlling for depression levels during the lockdown ($\text{Beta} = .48, p < .001$). Younger age ($\text{Beta} = -.22, p = .002$) and health stress ($\text{Beta} = .19, p = .004$) also predicted higher non-clinical levels of depression and emotional distress.</p> <p>Discussion: Considering the global rise in mental health problems due to the COVID-19 outbreak, our results shed light on some of the predictive factors that contribute to the development of depression symptoms. As the global crisis continues, focusing on psychological factors is important for the efforts of identifying individuals at risk of developing depression, and for promoting new prevention strategies.</p>
27	<p>The Effects of Priming Ageist, Ethnic and Racial Stereotypes on Processing of Emotions in Speech</p> <p><i>Lior Tidhar and Boaz Ben David</i></p> <p>Interdisciplinary Center (IDC), Herzlia</p>
	<p>An essential step in understanding another person lies in communication. Effective communication does not only merit the current identification of the content of the message, but also deciphering the emotional state of the speaker. Misattribution of emotional intent can lead to communication breakdown and false attributions that may, in turn, reinforce stereotypes. In spoken language, two acoustic channels form the main source for emotional judgment, semantics (the linguistic content) and prosody (tone of speech, indexical cues). These serve different roles in different groups. For example, studies have shown that whereas younger adults base their emotional judgment of the utterance on the prosodic content, older adults are biased to the semantics (Ben-David et al., 2019). Also, preliminary finding shows that priming an ethnic origin changes the way an individual perceives emotions. In this way, a Mizrahi speaker is perceived as more emotional than an Ashkenazi one. Given that emotional speech is being perceived differently according to the speaker's social group, the question arises will listeners change their evaluation of spoken emotions due to primed stereotypes of outgroup members.</p> <p>Our future studies will focus on emotional stereotypes related to three dichotomous social grouping, age, ethnicity, and race. We will use the Test for Rating Emotional Speech (T-RES appendix 1), (Ben-David & al., 2016), that examines the separate roles that semantics and prosody have on processing emotions in spoken sentences. The same test with the same stimuli will be presented to all participants. Participants will be randomly assigned to different experimental groups, in which the social status of the speaker will be primed by a vignette.</p>

Judgment and decision-making

28	<p>You left no good luck here for me: good luck is perceived as a limited resource in space</p> <p><i>Déborah Marciano [1], Oded Wertheimer [2], Sacha Bourgeois-Gironde [3,4], Leon Y. Deouell [2,5]</i></p> <p>[1] University of California, Berkeley; [2] The Edmond & Lily Safra Center for Brain Sciences, The Hebrew University of Jerusalem, Israel; [3] Department of Economics, LEMMA, Université Paris 2, Paris, France; [4] Institut Jean-Nicod, École Normale Supérieure, Paris, France; [5] Department of Psychology, The Hebrew University of Jerusalem, Israel</p>
	<p>We recently hypothesized that good luck can be perceived as a limited resource (Marciano et al., 2019). Here we investigate whether luck is perceived as limited in space: do we get close to/move away from locations that have just been lucky/unlucky?</p> <p>In an online spatial lottery game, participants ($N=1200$) chose an envelope from a set of envelopes dispersed on a map. They knew that some of these envelopes contained a big monetary prize, while others contained a medium/small/or no prize at all. Participants were paired with another player. Unbeknownst to them, the other player was virtual and always played first. His choice's location and outcome were presented to the participants before they made their decision. In the Good/Mild/Bad Luck condition, the virtual player (VP) received a big/medium/no prize. In the Control condition, the envelopes contained shapes and participants received a bonus if the shape in their envelope and the VP's were identical. In all conditions, we found that the participants' choice of an envelope on the map was not random: the distribution of the distance</p>

	<p>between the participant and the VP's choices was clearly bimodal, with a "close" distribution (a small group of participants choosing an envelope around the VP), and a "far" distribution (the vast majority moving away from the VP). Moreover, participants moved significantly farther away from the VP's choice in the Good Luck condition (and in this condition only) than in the Control condition. This suggests that participants perceive good luck as a limited resource in space.</p>
29	<p>Evidence integration and decision-confidence are modulated by stimulus consistency <i>Moshe Glickman [1], Rani Moran [1], and Marius Usher [2]</i> [1] University College London; [2] Tel Aviv University</p>
	<p>Evidence-integration is a normative algorithm for choosing between alternatives with noisy evidence, which has been successful in accounting for a vast amount of behavioral and neural data. However, this mechanism has been challenged as tracking integration boundaries sub-serving choice has proven elusive. Here we first show that the decision boundary can be monitored using a novel, model-free behavioral method, termed Decision-Classification Boundary. This method allowed us to both provide direct support for evidence-integration contributions and to identify a novel integration-bias, whereby incoming evidence is modulated based on its consistency with evidence from preceding time-frames. This consistency bias was supported in three cross-domain experiments, involving decisions with perceptual and numerical evidence, which showed that choice-accuracy and decision confidence are modulated by stimulus consistency. Strikingly, despite its seeming sub-optimality, this bias fosters performance by enhancing robustness to integration noise. We argue this bias constitutes a new form of micro-level, within-trial, confirmation bias and discuss implications to broad aspects of decision making.</p>
30	<p>Approach and avoidance motivations in social interactions in the time of COVID-19 <i>Ran Amram [1], Inbal Ravreby [2], Nitzan Trainin [3], and Yaara Yeshurun [1,3]</i> [1] School of Psychological Sciences, Tel Aviv University; [2] Department of Neurobiology, Weizmann Institute of Science; [3] Sagol School for Neuroscience, Tel Aviv University</p>
	<p>The new norm of physical distancing, which emerged amid the COVID-19 pandemic, has had dramatic effects on day-to-day social interactions. The inclination of sociable individuals to engage physically with others collides with the fundamental drive to avoid disease-related threats entailed in such engagement. In this study, we employed a choice reaction time (RT) task to test whether this motivational tension amounts to an approach-avoidance conflict, which resolves in reduced interactions. Participants were presented with auditory descriptions of daily social situations typical to the COVID-19 era, taking place in both the physical and virtual spaces. Participants were required to decide, as quickly as possible, whether to interact with others (close) or not (far). Participants also completed the Sociability Scale (Cheek & Buss, 1981) and reported their fear of COVID-19. We predicted sociability would be positively associated with RTs, particularly in the physical space (Hypothesis 1), and with the probability to respond close, particularly in the virtual space (Hypothesis 2). Results have shown RTs to be slower in the physical compared to virtual space. Sociability, however, did not moderate this difference. Hypothesis 2 was confirmed and complemented by a mirroring pattern, whereby fear of COVID-19 predicted the probability to respond close in the physical space. We suggest that when facing the opportunity to engage physically with others in the COVID-19 era, sociable individuals may experience an approach-avoidance conflict, while unsociable individuals may respond slowly due to conflict-independent factors. The decision itself is determined by fear of COVID-19, which takes over sociability's role.</p>
31	<p>Worth waiting for: Dismantling credit-assignment processes for wait vs. act choices <i>Shira Niv, Yoav Ger and Nitzan Shahar</i> Sagol School of Neuroscience and Psychology Department, Tel Aviv University, Israel</p>
	<p>Human action is said to be under the tutelage of at least two learning systems with varying computational strategy complexity: (1) A model-free system, which evaluates actions based solely on how successful they have been in the past, and (2) A model-based system, which exploits explicit knowledge about the structure of the environment to inform option choice. While the influence of model-based and model-free decision-making has been vastly studied in the context of actions, little is known regarding the way humans assign value for a decision to wait that we refer to as "non-action". Here, we explored model-based and model-free</p>

credit assignment for action compared with non-action. Participants performed a modified go/no-go version of a two-step decision task, allowing us to dismantle the contribution of model-based and model-free systems to the subjects' decisions. In our modified version of the task choosing between actions was made by a key-press (i.e., go) or a waiting period (i.e., no-go). Analysis of participants' behavior using computational modeling allowed us to estimate deficits in model-free and model-based learning when a motor action is omitted. This study opens a discussion about the cognitive mechanism that enables waiting. Additionally, it holds the potential to shed new light at the abilities and limitations of the model-based and model-free systems.

Language

32	<p>The scalar interpretation of double negation <i>Yechezkel Shabanov, Einat Shetreet</i> Tel Aviv University, Tel Aviv, Israel</p>
	<p>What do we mean when we say “not unhappy” (‘lo lo sameax’)? Logically, it should mean the same as “happy”. However, intuitively, we understand that the two expressions do not convey the same meaning. This study aims to examine the suggestion that the second negator makes a weaker statement than the logically equivalent affirmative, by compelling an unexcluded middle. If so, this means that “not unhappy” and “happy” occupy different scopes of meaning on the same scale. Furthermore, we compared doubly-negate expressions (“not unhappy”) with approximators (“pretty happy”), considering they serve as similar meaning devices, suggesting that they would occupy similar scopes of meaning on the same scale. In the experiment, participants had to determine the range that various expressions occupy on a given adjective scale (e.g., “pretty happy” on the scale between happy and sad). From their responses, we extracted (i) the range’s size, (ii) its central point, and (iii) inclusion of the edge (e.g. happy for “pretty happy”). Doubly-negated expressions differed from affirmatives on all 3 parameters (ranges for affirmatives were smaller, located closer to the edge, and included the edge more often than doubly-negated expressions). Additionally, doubly-negated expressions were bigger and their center was closer to the edge than the center of the approximators. These results confirm the suggestion that double negation allows for a weaker interpretation of the equivalent affirmative, while still retaining the possibility of being interpreted logically. They also suggest that double negations afford a wider range of interpretation than approximators.</p>
33	<p>Phonological visual word recognition in the two cerebral hemispheres: Evidence from a masked priming study with cross-script pseudohomophones as primes <i>Orna Peleg [1], Mor Moran-Mizrahi [1], and Dafna Bergerbest [2]</i> [1] Tel-Aviv University; [2] The Academic College of Tel-Aviv-Yaffo</p>
	<p>To test the separate and combined abilities of the two cerebral hemispheres to activate phonological information during visual word recognition, Hebrew-English bilinguals were asked to perform a lexical decision task on Hebrew targets (דגן [lake]) briefly preceded by Hebrew words written phonetically in English. The primes were either phonologically identical to the targets (agam-דגן) or unrelated to the targets. In Experiment 1, the targets were presented in the central visual field to both hemispheres. In Experiment 2, the targets were presented either in the right visual field to the left hemisphere or in the left visual field to the right hemisphere. Consistent with interactive models (e.g., Grainger & Ferrand, 1994), in both experiments, targets were easier to recognize in the phonologically related condition than in the unrelated condition. Importantly, these pre-lexical phonological effects occurred even though the primes and the targets were written in completely different alphabets. Such results indicate not only that sub-lexical orthographic representations automatically activate their corresponding phonological representations, but also that these automatic bidirectional orthographic-phonological interactions operate in a language non-selective manner (e.g., Dijkstra & van Heuven, 2002). Interestingly, no difference was found between the two hemispheres. That is, phonological effects were obtained irrespective of visual field presentation. Thus, despite the critical role assumed for the left hemisphere in activating phonological codes during the</p>

processing of written words (e.g., Peleg & Eviatar, 2012), the current evidence suggests that both hemispheres are able to access phonological codes during the early moments of visual word recognition.	
34	<p>Who talks to the child? Analyzing linguistic input in Sesotho and French corpora; <i>Georgia Loukatou [1], Camila Scaff [2], Katherine Demuth [3], Alejandrina Cristia [1], and Naomi Havron [1, 4]</i></p> <p>[1] LSCP, Département d'études cognitives, ENS, EHESS, CNRS, PSL University, 75005 Paris, France; [2] Human ecology group, Institute of evolutionary medicine (IEM), University of Zurich, Zurich; [3] Macquarie University, Australia; [4] University of Haifa</p>
<p>Who talks to the child? Analyzing linguistic input in Sesotho and French corpora</p> <p>Most language acquisition research is based on Western, Educated, Industrialized, Rich, Democratic (WEIRD) communities [1], where the primary caregiver is the mother. Mother-child dyad speech has long been the focus of early input studies, despite evidence suggesting that non-maternal input can be important for language outcomes (e.g., [2]). Additionally, in many communities (particularly non-WEIRD ones), interaction occurs with multiple speakers rather than mostly the mother (e.g. [3]). Yet, few studies describe child-directed speech (CDS) from various speakers, and even fewer investigate this across cultures (see [4]).</p> <p>In this study, we analyze speech produced around and to children by their mother, other children and adults, in two diverse cultures. We ask who produces the input, and how much of it is child-directed. We also ask whether different speakers vary in terms of utterance length, function (ratio of questions) and lexical diversity - these factors are known to support language learning. To answer these questions, we annotated three corpora. The non-WEIRD Demuth corpus ([5]) in the Sesotho language was recorded in non-industrial South African Lesotho. It contains input to three toddlers aged 2;1-3;3 years. We also annotated recordings from the WEIRD Lyon and Paris corpora ([6], [7]) for three children- those with siblings, and the same age range as in the Demuth corpus.</p> <p>More than 80% of input is child-directed for both French and Sesotho. On average, 79% of French CDS utterances come from mothers, whereas in Sesotho only 25.3% did (Figure 1). Other children (siblings and peers) provided 3.3% of French CDS, when in Sesotho such speech was more than 10 times more prevalent (38.5%). Other adults provide 9.2% of French CDS, versus 15.8% in Sesotho. There were expected differences between languages in utterance length, function and lexical diversity of CDS, but no differences across speakers in utterance length and lexical diversity within each language. This means that child-produced CDS has the same characteristics known to affect language outcomes positively, in both societies. The only difference was that children asked considerably less questions in both Sesotho and French (Figure 2).</p> <p>Our findings indicate that CDS is more prevalent than overheard speech for both settings. However, the input composition is dramatically different; maternal input is more dominant in the WEIRD corpora compared to the non-WEIRD one. In the latter, other children's input is more prevalent than maternal input, consistent with previous non-WEIRD descriptions. Interestingly, in terms of speech quality, other children's and adults' CDS present similarities with maternal speech within each culture. These results invite further cross-cultural early input research to examine the impact these might have for language development.</p>	
35	<p>Lexical retrieval beyond the single word: morphologically complex verbs in language impairments</p> <p>Yuval Katz and Naama Friedmann Tel Aviv University</p>
<p>Lexical retrieval is a central theme in the psychological study of language and language impairments. Most models of lexical retrieval describe the stages of retrieval from a single, abstract, non-linguistic concept to a single phonetic string corresponding to that concept. Accordingly, assessment of lexical retrieval abilities in the lab is usually carried out by tasks that examine the production of single words. However, words in the wild rarely appear in isolation.</p> <p>In this study, we propose a model for lexical retrieval of words in their sentential context by considering morphology, which is an interface between single words and higher level processes. E.g., kafa ('freeze',</p>	

<p>intransitive) and hikpi ('freeze', transitive) are morphological alternants, and the choice between them is based on the number of arguments and their role in the sentence.</p> <p>We designed seven tasks to assess the production of morphologically complex Hebrew verbs with various agreement markers in various morphological patterns (binyanim). We then tested 34 Hebrew speaking individuals with various acquired or developmental language impairments, whose functional locus of impairment we diagnosed. Finally, we inferred the function of each cognitive component in the production of morphologically complex words based on the error pattern of patients with an impairment in the component. We found that the conceptual system, the semantic lexicon, the syntactic lexicon, the phonological output lexicon, and the phonological output buffer all play different and crucial roles in the retrieval of morphologically complex verbs, and that a selective impairment in each of these components manifests itself differently.</p>	<p>36 The effect of word frequency on the speed and accuracy of visual word recognition in Arabic: An event-related potential study <i>Samer Andrea, Bahaa Madi-Tarabya, Asaid Khateb</i> The Unit for the Study of Arabic Language, Edmond J. Safra Brain Research Center for the Study of Learning Disabilities, University of Haifa</p>
<p>Diglossia in Arabic refers to the existence of two varieties of the same language: Spoken Arabic (SA) and Literary Arabic (LA). Previous studies have suggested that written SA words were processed as low frequency LA words .</p> <p>Objective: This study aimed at assessing word frequency effects in LA and characterizing the electrophysiological correlates (ERPs) of the processing of SA and LA words. LA high frequency words (LAHF), LA low frequency words (LA-LF) and SA high frequency words (SA-HF) were used together with their equivalent pseudowords during a lexical decision task.</p> <p>Results: Behaviorally, the fastest RTs were observed for LA-HF followed by SA-HF and then by LA-LF. Electrophysiologically, the results showed first a modulation of the P100 component: the highest amplitude for LA-LF followed by SA-HF then by LA-HF with no differences between the first two. This suggested that the first two conditions behaved similarly, and that less familiar written representations elicited larger brain responses. A modulation of the orthographic N170 component was also observed, being larger for LA-HF than for LA-LF and SA-HF. Furthermore, the P6 component, which is related to late memory/decision making processes, was of higher amplitude in LA-HF than for LA-LF and SA-HF.</p> <p>Conclusions: These observations indicate that processing of SA written words compares to the processing of LA-LF words. This finding is discussed in the context of the diglossia question and supports the view that LA and SA words are part of the same linguistic system, although their processing might mimic that of first and second language.</p>	

Metacognition, thinking and reasoning

<p>37 The way we think about our next decade: New Long-Term Future Thinking scale (LTFT). Yael Zuri, David Passig School of Education, Bar-Ilan University, Israel</p>	<p>We develop and validate the Long Term Future Thinking scale (LTFT). LTFT measures long term Future Time Perspective (FTP) and long term Episodic Future Thinking (EFT). Future Time Perspective (FTP) holds multiple conceptualizations. Early conceptualization defined FTP as the individual's subjective experience of time and views of one's psychological future. Recently, the research literature conceptualizes FTP as a cognitive construct that focuses on an individual's tendency to anticipate and structure one's future. This conceptualization differentiates it from personality-trait, affect, or behavioral concepts. Most of the common scales used to measure FTP were based on mixed conceptualizations of affect, behavior, and cognition. After reviewing the most common FTP tools we generated a pool of items derived from the conceptualization of FTP as a cognitive structure with adaptations to long-term future, defined as thinking about the next decade (10 to 20 years from present). Episodic Future Thinking (EFT) is a relatively new concept defined as the ability to project the self into the future to pre-experience an event. We collected</p>
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<p>metacognitive evaluation of participant future events representations for their next decade. Explanatory factor analysis (EFA) yielded similar factors to those which were previously defined by FTP methodology and one factor for EFT. New scales showed good reliability and validity. In addition, we demonstrate the scale's Concurrent and convergent validity by examining its correlations with common FTP scales (ZTPI and CFC) and EFT related construct meaning in life questionnaire (MLQ). Questionnaires were distributed using online tools on a sample size of 202 participants.</p>	
38	<p>The Productive Failure Effect and Metacognition in Verbal Reasoning</p> <p>Yael Sidi and Ina Blau</p> <p>The Open University of Israel</p> <p>The productive failure design is intended to facilitate long-term learning and transfer in novel complex problems, by allowing learners to engage in the solving process with little guidance or facilitation. While productive failure is well-established in mathematical domains, other content domains have received much less empirical attention. Moreover, the effect of productive failure on associated metacognitive processes, including monitoring reliability and efficiency, has yet to be examined. Thus, the present study aimed to fill this gap by comparing solving novel analogy problems in a guided and unguided conditions in an adult population. Experiment 1 demonstrated an advantage for unguided problem solving in task success and efficiency, compared to guided solving. Moreover, the unguided group were well-calibrated with their performance, while the guided group showed overconfidence. In Experiment 2 the learning phase consisted of relatively difficult problems, which resulted in similar outcomes for both the unguided and guided groups, eliminating the advantages of unguided learning. Taken together, our findings suggest that, for verbal analogies in an adult population, the potential advantage of unguided solving may be dependent on the extent of the failure experienced during the learning phase. Theoretical and practical implications for instructional design are discussed.</p>
39	<p>The moderating effects of fixed and growth mindsets on meta-reasoning processes</p> <p>Baillie Sarah Shuster, Rakefet Ackerman, and Liat Levontin</p> <p>Technion - Israel Institute of Technology</p> <p>The research domain dealing with mental effort regulation while solving problems is called Meta-Reasoning. The classic paradigm involves solving problems and rating confidence in each solution, while measuring response time and success. When given the option to do so, people are typically reluctant to withhold their answers by using an "I don't know" response. This reluctance to respond "I don't know" has been found even when having low confidence in the given answers and when providing incorrect answers can be costly. In the present research, we examined whether mindsets, growth versus fixed perception of intelligence, and withholding framing, as admitting lack of knowledge ("I don't know") versus skipping the question, might matter. Specifically, we compared these two withholding strategies to full answering—a requirement to provide all solutions—in submission rate, success rates before and after excluding the withheld answers, confidence, and response time. Furthermore, we explored the answering process by comparing associations among these measures. Growth mindset participants consistently preferred the "I don't know" option over the skip option when exposed to a reward scheme emphasizing loss. Meanwhile, fixed mindset participants consistently used both options equally. Additionally, the rate of using "I don't know", but not skipping a question, was increased when the reward scheme emphasized losses. Intriguingly, participants continuously acted "irrationally" and under-utilized the answer withholding options. These findings suggest that mindsets matter in meta-reasoning processes and that individuals are predominantly unsuccessful in taking advantage of favourable opportunities, even when they are right in front of them.</p>
40	<p>Alpha Power over Right/Mid-Frontal Brain Regions Support the Generation of Remote Associations in Higher Creative Individuals</p> <p>Yoed N. Kenett [1], Ioanna Zioga [2], and Caroline Di Bernardi Luft [2]</p> <p>[1] Technion – Israel Institute of Technology; [2] Queen Mary University of London</p> <p>Little is known about the neural mechanisms underlying the spontaneous generation of creative ideas. We aimed to investigate the role of alpha oscillations during the production of spontaneous remote associations, and how they vary in relation to individual differences in creative ability. Participants were presented with a stimulus word and were asked to produce as many associative responses as possible in 2 minutes to a set of cue words, while having their EEG recorded. Participants also underwent a battery of</p>

creativity tests, which were used to divide them into lower and higher creativity groups. To estimate the semantic proximity of the word streams that participants produced, we used forward flow (www.forwardflow.org) which employs co-occurrence statistics of words in textual corpora to compute the semantic distance between consecutive associative responses. At the behavioral level, higher creative participants generated significantly more responses compared to lower creative participants. While higher creative participants did not generate more remote associations than lower creative participants, forward flow was positively correlated with general creativity. At the neural level, the generation of semantically distant concepts was associated with higher alpha frequency activation over right and mid frontal areas, but only for higher creative participants. This activation has been previously linked to increased cognitive control and inhibition mechanisms of the prefrontal cortex. Thus, we suggest that enhanced alpha oscillations at right/mid-frontal areas relate to the spontaneous generation of semantically remote concepts, uniquely in higher creative individuals.

12:00 –13:00 – Invited Talk III:

Losing Control over Stroop: Ever Larger Chinks in the Armor of Control Theories of the Stroop Effect

Daniel Algom, Tel-Aviv University and Achva Academic College

Recent work based on computational modeling and recording of brain activations ignore the primary meaning of the Stroop effect as a measure of selective attention -- with the Stroop test losing its raison d'etre. Numerous studies in the past 20 years conceive performance in the Stroop task in terms of conflict-induced adjustments governed by central control on a trial-to-trial basis. In the face of this tsunami, I try to convince the audience that conflict-monitoring and control are fundamentally unsuited to serve as a candidate theory of Stroop processes. I discuss a range of problems and show that the key concept of conflict is misconstrued in control and conflict-monitoring models.

13:30 –14:30 – Invited Talk IV:

Revealing the Secrets of Perceptual Organization

Ruth (Rutie) Kimchi, Dept. of Psychology and Institute of Information Processing and Decision Making, University of Haifa

Our conscious experience is a meaningful scene composed of distinct objects and surfaces and their interrelations. This consciously perceived visual world is strikingly different from the unstructured mosaic of intensities and colors that stimulates the retina. Perceptual organization (PO) is the process by which the disjoint bits of visual information are structured into the larger coherent units that we experience as environmental objects. Inspired by the Gestalt psychologists who were the first to recognize the problem of PO, I have attempted to reveal the principles and the processes underlying visual perceptual organization. I have addressed this issue from different but complimentary perspectives, including microgenesis and ontogenesis, and examined the relationship between PO and visual attention, and more recently, the role of visual awareness in PO. In this talk I'll present some highlights of this work, with a focus on hierarchical structure, much of which have challenged the traditional view of PO. I'll also discuss some insights that have emerged from this work concerning perceptual objecthood and holistic processing.

Poster Session 3 (15:00-17:30)**Attention**

1	<p>The role of transient attention on the inner-outer asymmetry of crowding. <i>Bahiyya Kewan-Khalayly, Amit Yashar</i> Department of Special Education, Faculty of Education, and The Edmond J. Safra Brain Research Center for the Study of Learning Disabilities, University of Haifa</p>
<p>Crowding refers to the failure to identify a peripheral object because other objects (flankers) surround it. A hallmark characteristic of crowding is the inner-outer asymmetry; the outer flanker produces more substantial interference than the inner one. However, the processes that underlie the inner-outer asymmetry are still unclear. Here, we investigated the role of attention in visual crowding by investigating whether and how spatial transient attention interacts with its flankers' asymmetrical effect.</p> <p>Method. Observers (n=18) estimated the orientation of a Gabor target presented at 7° eccentricity. There were two flankers along the horizontal meridian, one on each side of the target, in the crowding display. We manipulated attention by using a pre-cue that could appear at one of four possible locations: fixation, target, inner-flanker, or outer flanker. We assessed each flanker's contribution to the pattern of errors by fitting probabilistic mixture-models.</p> <p>Results. As in our previous study, instead of the target, observers often misreported the outer flanker (eccentric) as the target, but not the inner flanker. Whereas directing attention to the inner flanker reduced the crowding interference by decreasing the rate of misreports of the outer flanker. Directing attention to the outer flanker increased the crowding interference by increasing the misreports of the outer flanker.</p> <p>Conclusions. These findings are inconsistent with some current crowding views (e.g., the cortical magnification and the receptive size views). They suggest that spatial attention plays an essential role in the inner-outer asymmetry, a hallmark characteristic of crowding.</p>	
2	<p>Reconsidering the role of the frontoparietal cortex in the Stroop effect <i>Noga Oren [1], Edna Inbar [2,3], Amir Glik [3,4,5], Israel Steiner [3,5], Irit Shapira-Lichter [1,3]</i> [1] Functional MRI Center, Beilinson Hospital, Rabin Medical Center, Petach Tikva, Israel; [2] Imaging Department, Beilinson Hospital, Rabin Medical Center, Petach Tikva, Israel; [3] Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel; [4] Cognitive Neurology Clinic, Beilinson Hospital, Rabin Medical Center, Petach Tikva, Israel; [5] Department of Neurology, Beilinson Hospital, Rabin Medical Center, Petach Tikva, Israel</p>
<p>Humans are goal-directed beings, yet goal-unrelated information still affects us, the question is how? The Stroop task is typically used to answer this question. However, its so-called task-irrelevant information is actually very relevant to the task since it refers to the task's dimension. To overcome this drawback, we developed a modified fMRI Stroop task with an isolated stimulus-level conflict detached from the task's dimension. The known behavioral Stroop effect persisted, while in the brain a double dissociation emerged within the frontoparietal regions that are recruited by the standard Stroop task. The bilateral intraparietal sulcus responded to the conflict, an effect that was directly related to the corresponding behavioral effect. It did not show repetition suppression to repeated stimuli that differed in congruency. Frontal regions showed the opposite pattern. These results indicate that people cannot ignore information detached from their present goals and point to the intraparietal sulcus as a mediator of this effect.</p>	
3	<p>Sub-profiles of Stroop performance are related to reading profiles in Hebrew-speaking individuals with dyslexia and in typical readers <i>Donia abo elhija [1], Tzipi Horowitz-Kraus [1,2,3]</i> [1] Educational Neuroimaging Center, Faculty of Education in Science and Technology; [2] Faculty of Biomedical Engineering, Technion, Israel; [3] Reading and Literacy Discovery Center, Cincinnati Children's Hospital; Cincinnati, Ohio, USA</p>

	<p>Introduction: Executive Functions (EF), specifically of inhibitory control, speed of processing and switching support reading ability. The Stroop task is traditionally engages these EF and hence was also associated with reading proficiency. However, most studies related Stroop accuracy level, rather than performance time, to reading ability (i.e. intact or disabled reading). The current study aims to determine whether sub-profiles of the Stroop performance, focusing on performance time, can predict sub-profiles of reading and cognitive abilities.</p> <p>Results: Based on Stroop performance time, our cohort of 97 individuals with reading difficulties and typical readers were divided to four reading groups. Participants with shorter Stroop time demonstrated better reading abilities whereas those with longer Stroop time showed decreased reading abilities. Shorter Stroop time was also associated with better performance in additional cognitive tasks such as visual attention, working memory, speed of processing and switching. Individuals with reading difficulties as well as typical readers were included in the second and third groups which were characterized by longer Stroop time than the fastest group but shorter Stroop time than the slowest group. The moderation analysis suggested that both Speed of processing and attention abilities (sub-component of EF) predict reading abilities moderated by the Stroop time.</p> <p>Conclusions: Results suggest that Stroop performance time can differentiate between sub-groups of readers. Importantly, EF such as Speed of processing and attention ability abilities can serve as predictor for reading abilities and with Stroop time serving as a mediator for reading time.</p>
4	<p>I spy something fly: Do we detect non-relevant stimuli around us? <i>Gal Moscona [1,2], Einav Gozansky [1,2], Hadas Okon-Singer [1,2]</i> [1] Department of Psychology, University of Haifa [2] The Integrated Brain and Behavior Research Center (IBBR), University of Haifa</p>
	<p>Background: Previous studies have found that specific phobia is associated with biased attention allocation to threat-related stimuli. However, it is yet unclear whether the perception of threatening task-irrelevant stimuli depends on attention resources. The current study examined the effect of negative non-relevant stimuli on performance, considering different factors including attention resources, personality traits, and stimuli characteristics.</p> <p>Method: An emotional modification of the perceptual load task was used in two experiments. Participants with high and low fear of spiders performed the task in two perceptual loads conditions, high and low, while ignoring a distracting picture. Experiment 1 included spider or bird pictures in two blocks, an achromatic block and a color block. Experiment 2 presented one fear-related block (i.e. spider or bird pictures) and a non-fear-related block (i.e. angry face or bird pictures).</p> <p>Results: Overall, in the low load condition, when the distractor pictures were ecologic and colorful, spider pictures caused interference in reaction times. However, in the high load condition, spider pictures facilitated performance only in the high fear of spider group. This effect was not found in the non-ecological condition or in the non-fear-related block.</p> <p>Conclusions: The current study shows that fear-related stimuli affect performance even when they are task-irrelevant and when attention resources are directed to a different task. Our results demonstrate that the interference of distracting threat to performance is pending on an interaction between the characteristics of the distracting stimulus and its relations to personality traits.</p>
5	<p>Personalized cognitive training: individual-level meta-analysis implementing machine learning methods <i>Reut Shani [1,2], Shachaf Tal [1], Sigal Zilcha-Mano[1], Hadas Okon-Singer[1,2]</i> [1] Department of Psychology, School of Psychological Sciences, University of Haifa, Haifa, Israel [2] The Integrated Brain and Behavior Research Center (IBBR), University of Haifa, Haifa, Israel</p>
	<p>Cognitive training comprises a class of relatively new therapeutic interventions, which target cognitive mechanisms underlying different mental health conditions. Cognitive training involves practice or modification of a given cognitive function, such as executive attention or control, with the aim of making this function more efficient or more benign. Extensive research supports the potential of cognitive enhancement methods to promote wellbeing and emotional functions. However, questions remain regarding efficacy and</p>

generalizability. Previous studies suggest that certain subgroups may benefit more from cognitive training, compared to other subgroups. While inconsistent outcomes across the field may arise from individual differences in response to training, few investigations examined possible moderators associated with individual differences in training outcomes.

With the aim of promoting personalized cognitive training regimes we collected Twenty-six cognitive training datasets, comprising 1,942 participants. Datasets incorporated diverse training regimes which differed in training characteristics such as the targeted domain (e.g., working memory training, attentional bias modification, interpretation bias modification, inhibitory control training); whereas participants differed in diagnostic status (anxiety disorders, depression, healthy), age, sex and country of residence. Machine learning algorithms designed to identify individuals most responsive to cognitive training in general and to discern which methods may be a better fit for certain individuals were implemented.

Methodological aspects which facilitated this comprehensive analysis, as well as preliminary outcomes, will be presented.

Consciousness

6	<p>On the time course of conscious and unconscious semantic processing</p> <p><i>Nitzan Micher, Shai Fisher, Maayan Avneon and Dominique Lamy</i></p> <p>Tel Aviv University</p>
	<p>Previous research suggests that conscious and unconscious processing follow different time courses. Early studies showed that primes' impact on responses to subsequent targets survives only short prime-target intervals for subliminal primes, but lasts longer for supraliminal primes. However, this dissociation may reflect differences in stimulus strength rather than in conscious perception. Later studies showed that with liminal primes, for which conscious and unconscious processing can be compared under the same stimulus conditions, unconscious priming occurs only for fast responses, whereas conscious priming remains stable across the RT distribution. This dissociation may reflect decay of unconscious representations. However, it could also reflect that fast responses, unlike slow responses, rely on fast-and-dirty processing that is particularly sensitive to unconscious information. Finally, these dissociations were reported for semantic priming and whether they hold for lower-level prime representations is unclear. Here, we used the liminal-prime paradigm and measured repetition priming, response priming from learned stimulus response associations and semantic response priming. We forced participants to rely on fast, intuitive processing by imposing a short response window, and manipulated prime-target intervals. Both response priming effects quickly waned for unconscious primes and generally increased for consciously perceived primes. By contrast, repetition priming was independent of conscious perception and increased with prime-target interval. These findings suggest that conscious perception prevents decay of the prime's impact on response selection. However, the different pattern observed for repetition priming calls for further research on the longevity of unconscious effects that are not mediated by response priming.</p>
7	<p>Aware humans performance clusters with monkeys performance more than that of unaware humans: Clustering of individual behavioral data</p> <p><i>Moshe Shay Ben-Haim [1,2], Olga Dal Monte [1], Nicholas Fagan [1], Yarrow Dunham [1], Ran R Hassin [2], Steve WC Chang [1], Laurie R Santos [1]</i></p> <p>[1] Yale University; [2] The Hebrew University of Jerusalem</p>
	<p>In the biological sciences, clustering of species by their genetic makeup, or samples by gene expression profiles, are common practice to capture similarities between species or experimental conditions. Here, we use a similar cluster analysis approach on behavioral response time data to capture similarities between individual humans and monkeys performing in an awareness dissociation task. We have previously established that only humans which were consciously aware of the predictive value of incongruent priming cues displayed facilitation in response to a following incongruent target (Ben-Haim et al, PNAS, under review). Using a simple unsupervised machine learning algorithm that clusters individuals based on their response time similarities, we identified that all monkeys performing in an identical task were clustered</p>

	<p>together with aware humans. Furthermore, within this group, each monkey responses resembled more that of another human rather than that of another monkey. The very similar facilitations observed in monkeys strongly suggests that monkeys were most likely consciously aware of the cues predictive value as were only the humans which exhibited facilitation in this task (Ben-Haim et al, PNAS, under review). Importantly, importing biological clustering tools show massive potential in making meaningful interpretations when segregating individual differences in behavioral data.</p>
8	<p>Dynamic Boundaries of The Self: Sequential effects in embodied sense of agency <i>Yonatan Stern [1,2], Inbar Ben-Yehuda [2], Adam Zaidel [2] and Roy Salomon [2]</i> [1] University of Haifa ; [2] Bar-Ilan University</p>
	<p>The feeling of control over our body's actions, termed the Sense of Agency (SoA), arises from the continuous integration of sensorimotor signals and is critical in defining our experience of an embodied self. Although this embodied experience is typically perceived as stable and continuous, recent theoretical accounts highlight the experience-dependent and dynamic nature of the embodied self. Examining two datasets of the Virtual Hand (VH) task (N=100), we computationally modeled the mechanisms through which previous stimuli and choice influence SoA. In Dataset 1 that included only temporal alterations, previous stimuli significantly (Mean beta = 0.33, $t_{43} = 3.6$, $p < .001$) recalibrated the perception of the current stimuli as similar to the previous. Whereas previous choice significantly induced a repetition bias increasing the likelihood to repeat choices across trials (Mean beta = -0.21, $t_{43} = 3.4$, $p = .001$). Thus, previous subjective choices and the objective stimuli exert opposing influences on SoA. We replicated these findings in Dataset 2 whose VH task included alterations in both temporal and spatial domains (beta prev. stimuli = 0.17, $t_{43} = 5.2$, $p < .001$, beta prev. choice = -0.1, $t_{43} = 2.4$, $p = .02$). Furthermore, previous stimuli from a different domain than the current stimuli significantly influence SoA (Mean beta = 0.09, $t_{43} = 2.5$, $p = .02$), demonstrating a domain-general history effect of previous stimuli. Thus, SoA is a dynamic unifying construct organizing our experience of the self across perceptual domains, and constantly updated by our previous choices and stimuli experiences.</p>
9	<p>ACC and Insula encode the visual self across social interactions and life stages <i>Adi Ulmer Yaniv [1,2], Ortal Shimon-Raz [1,3], Shani Weidergoren [2], Ariel Shaked [1], Roy Salomon*[1], Ruth Feldman*[2] *Equal contribution</i> [1] Gonda Brain Research Center, Bar-Ilan University, Ramat Gan, Israel; [2] Center for Developmental Social Neuroscience, Interdisciplinary Center Herzliya, Herzliya, Israel; [3] Department of Psychology, Bar-Ilan University, Ramat Gan, Israel</p>
	<p>The anterior cingulate cortex (ACC) and insula are both paralimbic regions, core hubs of the salience network, underpinning perceiving surprising events, pattern deviations, emotionally engaging, pleasurable, rewarding, or self-relevant stimuli as noticeable and relevant events. In the following study, we examined the insula and ACC activation during a task of watching self vs. other dyads in a naturalistic social interaction - while varying age, emotional affect, semantic content, and visual characteristics.</p> <p>We examined two cohorts: first, young adults (N=50) were watching themselves interacting with their mother vs. an unfamiliar mother-child dyad in three timepoints: as babies, as children, and as young adults. In the infancy condition, the mother played with the child as they normally do, while in the school-age and young adult interactions, the mother and the child were planning the 'best day ever' together. In a second cohort, mothers (N=23) were presented with six video vignettes of self and other mother-infant interactions depicting three maternal Conditions: Unresponsive- no interaction with the baby, mother does not respond, Unavailable- minimal interaction, mother is busy, but respond to the baby when he/she signals and Social-mother and infant are engaged in a face-to-face social interaction.</p> <p>Preregistered analysis in both cohorts revealed that, across all ages and social conditions, the ACC and insula were consistently more active in response to the self vs. the other stimuli. These results show that these regions are tuned to a constant self-related processing rather than changing social-affective, semantic or age-specific representation of the self.</p>

10	<p>Unconscious processing and regression to the mean: an attempt to improve common practices <i>Itay Yaron [1], Yoav Zeevi [1,2], Uri Korisky [3], William Marshall [4,5], and Liad Mudrik [1,3]</i></p> <p>[1] Sagol School of Neuroscience, Tel Aviv University, Tel Aviv Israel; [2] Department of Statistics and Operations Research, Tel Aviv University, Tel Aviv, Israel; [3] School of Psychological Sciences, Tel Aviv University, Tel Aviv, Israel; [4] Department of Psychiatry, University of Wisconsin-Madison, Madison, WI, 53719, USA; [5] Department of Mathematics and Statistics, Brock University, St. Catharines, ON, L2S 3A1, Canada</p>
<p>The scope of unconscious processing has been debated for decades. Some claim that any cognitive function can be carried out unconsciously, others claim that unconscious processes are limited to simple, habitual processes, and yet others hold that unconscious processing is negligible or completely driven by methodological shortcomings. One prominent criticism targets the highly common practice of excluding participants based on an awareness assessment, claiming that this post-hoc data selection leads to false effects driven by regression to the mean (RTTM). Here, we put this criticism to the test using both simulations and real data from 15 studies probing unconscious processing (36 experiments overall). We first confirmed that post-hoc data selection can yield false effects due to RTTM. We further examined the reliability of awareness measures in the obtained datasets, and found it to be concerningly low, in line with the original criticism. Yet we also found that the suggested way to assess whether an effect is genuine or reflects RTTM is flawed, deeming effects as RTTM-driven, even when they were not. Thus, we examined alternative ways to assess the possible contribution of RTTM to the reported effects. This was to be extremely challenging, given that our analysis questioned the common assumption that awareness level as reflected by awareness measures is linearly related to the strength of processing. Together, our findings emphasize the need to establish more reliable measures of awareness, in order to minimize the contribution of measurement error to explaining effects of unconscious processing.</p>	
11	<p>"Windows of Integration" hypothesis: Where are we now? <i>Rony Hirschhorn [1], Ofer Kahane [2], Inbal Gur-Arie [2], Nathan Faivre [3], and Liad Mudrik [1,2]</i></p> <p>[1] Sagol School of Neuroscience, Tel-Aviv University; [2] School of Psychological Sciences, Tel-Aviv University; [3] Laboratoire de Psychologie et Neurocognition (LPNC), Université Grenoble Alpes</p>
<p>The relations between consciousness and integration are still unclear: studies demonstrate seemingly conflicting findings with respect to the ability to unconsciously integrate information, providing support both to the claim that consciousness is necessary for integration of information, and that it is not. A possible explanation to these contradictory results was put forward as part of the Windows of Integration hypothesis (WOI). According to this suggestion, the role of consciousness in integrating two representations into a novel one depends on the distance between these inputs, where distance can be defined spatially, temporally or semantically. This hypothesis seemed to reconcile previous findings, yet in recent years new studies have tackled the question of unconscious integration, allowing us to revisit the original hypothesis. These studies exhibit evidence for unconscious integration, but also demonstrate its limits with respect to time, space and semantic distance. In addition, the WOI perspective highlights the complexities of studying unconscious processing and the open questions to be studied in order to understand the depth and scope of unconscious integration.</p>	

Emotion

12	<p>The influence of inhibitory control on the subjective experience of negative emotions <i>Meital Gil, and Noam Weinbach</i> University of Haifa</p>
<p>Inhibitory control (IC) allows us to pursue goal-directed behavior while overcoming interference caused by irrelevant information. Studies report that IC can inhibit interference caused by negative emotions during task engagement. Furthermore, efficient IC is associated with adaptive emotion regulation strategies such as cognitive reappraisal. The current study aimed to examine whether triggering IC prior to viewing negative emotional images can modulate subjective negativity ratings of these images on a trial-by-trial basis.</p>	

	<p>Furthermore, it was tested if triggering IC can improve the ability to reappraise negative emotional content. Forty-nine participants performed a cognitive reappraisal task in which they reappraised or watched negative or neutral emotional images and rated their subjective negative value. On each trial, before the images appeared, participant performed a flanker task with congruent and incongruent targets in order to trigger IC. The results revealed a double-dissociation in the effect of incongruent targets on negativity rating as a function of the emotional content presented. Specifically, neutral images were rated as more negative after incongruent compared to congruent targets. In contrast, negative images were rated as less negative after incongruent compared to congruent targets. Congruency did not influence negativity rating in the reappraisal condition. The results suggest that triggering IC can help suppress negative emotional reactivity and improve the subjective experience while being exposed to negative emotional content. However, triggering IC leads to an aversive subjective experience in response to emotionally neutral content. Lastly, using reappraisal may override the effects of IC on subjective emotional experiences.</p>
<p>13</p>	<p>The effect of mood on food vs. non-food interference among high and low emotional eaters <i>Hilla Sambel, Noam Weinbach</i> University of Haifa</p>
	<p>Emotional eating refers to overeating triggered by emotional experiences. However, the process by which emotions influence reactions to food among emotional eaters (EE) is unclear. In fact, several studies have suggested that negative emotions do not trigger overeating among those who identify themselves as EE. The present study aimed to explore whether at the basic attentional level, negative mood leads to aberrant attentional responses to food among EE. Specifically, we examined if negative mood modulates the ability to ignore task-irrelevant food vs. non-food stimuli (i.e., interference control) among EE. A sample of 80 women who were high (N=40) or low (N=40) on an emotional eating scale participated in the study. Half went through a negative mood induction and the other half a neutral mood induction, followed by a food-flanker task. The task required participants to respond to a food or non-food target while ignoring irrelevant food or non-food flankers, allowing to measure food- vs. non-food interference, separately. The results showed that following a neutral mood induction, low EE had increased food-related interference compared to high EE. In contrast, high EE had increased non-food-related interference compared to low EE, suggesting a food-avoidance bias among high EE. The same pattern of results was observed following the negative mood induction. The results indicate an attentional avoidance from processing food stimuli among high EE, irrespective of their mood. The absent effect of mood on food-related interference poses a question regarding the impact of negative emotions on aberrant reactions to food among EE.</p>
<p>14</p>	<p>The contribution of seeing the other in emotional communication <i>Shir Genzer [1], Yonat Rum [1,2] & Anat Perry [1]</i> [1] The Hebrew University of Jerusalem; [2] University of Cambridge</p>
	<p>In the emotion recognition literature, it has been argued that facial expressions are essential for understanding other's emotions. However, a growing body of literature demonstrates that facial expressions do not necessarily enhance emotion recognition. Therefore, in the current study we ask – what role does seeing each other play in communication? We preregistered our hypothesis that seeing each other will not enhance emotion recognition but will affect the overall affective experience of both partners. Specifically, we measured a sense of togetherness, listening, empathy, loneliness, and anxiety. One hundred twenty same-gender pairs participated in an online dyadic empathic accuracy task. Within each pair, one participant ("Storyteller") was instructed to share with the other participant ("Perceiver") a negative autobiographical story, under one of two conditions: Audio Only - participants can only hear each other; or Audio+Video - participants can see and hear each other. They were then asked to each report what emotions the Storyteller felt while telling the story and their affective experience during the interaction. As hypothesized, there was no difference in emotion recognition between conditions. However, both partners reported a higher sense of togetherness and reduced loneliness and anxiety in the Audio+Video condition. Moreover, Storytellers reported experiencing higher sense of being listened to and empathized with in the Audio+Video condition. The findings add to the theoretical scientific debate regarding the role of facial</p>

expression in social interactions and emphasize the contribution of seeing each other for speakers and perceivers' overall affective experience.	
15	<p>When two minds are not better than one: The effect of peer presence on enjoyment <i>Argaman Bell [1] and Yaara Yeshurun-Dishon [1,2]</i> [1] School of Psychological Sciences; [2] Sagol School of Neuroscience, Tel Aviv university</p>
<p>Previous studies have demonstrated that peer presence can have an effect on performance in certain tasks (e.g. social facilitation). However, previous research has not thoroughly explored the impact of peer presence on enjoyment. In this study, we set out to test the hypothesis that peer presence will enhance the enjoyment of pleasant real-life stimuli. In our online study 83 participants were asked to watch a short and funny animated video clip either alone or with a friend. Following the clip, participants rated how much they enjoyed the clip, and how much they estimate that their friend enjoyed it. We found that, in contrast to our hypothesis, participants enjoyed watching the video-clip alone more than watching it with their friend ($U=1101$, $p=0.028$, $N1=43$, $N2=40$). Moreover, exploratory analysis revealed that participants in the pair condition did not accurately estimate how much their friend enjoyed the clip, and this effect was more pronounced when participants underestimated their friend's enjoyment ($U=49.5$, $p<0.001$, $N1=17$, $N2=18$). To further understand these surprising results, we are now running online experiments in a more controlled (but natural) settings, while varying the videos' content.</p>	

Face Perception

16	<p>What type of experience is needed to generate a human-like representation of face identity? Evidence from Deep Convolutional Neural Networks <i>Mandy Rosembaum, Idan Grosbard, Naphtali Abudarham, and Galit Yovel</i> Tel Aviv University</p>
<p>Face recognition depends on the generation of a view-invariant representation of face identity. We have recently discovered a subset of view-invariant facial features that humans use to define the identity of the face. But what type of experience is needed in order to generate this face representation? This question is hard to answer in humans as we have no access to the type of experience humans have with faces during development. In previous studies we discovered that face-trained deep convolutional neural networks (DCNNs) are sensitive to the same subset of facial features humans use for face identification. This sensitivity emerges at high layers of the network, where a view-invariant representation of face identity is generated. These models enable us to ask what type of experience is required to achieve this human-like, view-invariant face representation. To that end, we systematically trained a DCNN (VGG-16) with varying numbers of identities and different numbers of images per identity. Interestingly, we found that the network generated a human-like, view invariant face representation, following training with only 5-10 different identities as long as the network was trained with 200 different images per identity. Thus, relatively little experience is sufficient for learning to generate a human-like face representation and extract identity-relevant view-invariant features. These findings may shed light on the initial stages of development of the human face recognition system, suggesting that infants who are exposed to a relatively small number of identities during their first year of life can already extract identity relevant facial information.</p>	
17	<p>Social status affects face recognition in learned and unlearned images <i>Maayan Trzewik, Nira Liberman, and Galit Yovel</i> Tel Aviv University</p>
<p>According to the Categorization-Individuation Model, considering others as distinctive individuals, rather than a homogeneous group, affects the way we perceive their faces and, as a result, improves face recognition. Such improvements in recognition were previously demonstrated when comparing ingroup faces to outgroup faces, when comparing powerful to non-powerful outgroup faces, and when comparing socially relevant- to irrelevant-faces. In all of these studies, the individuation was demonstrated only in same-image recognition paradigms. It was not examined whether this effect is generalized to new images of the learned faces. The current study examined whether differences in social status affect both same-image</p>	

	<p>recognition and recognition in new images. Specifically, we hypothesized that faces of high status individuals will be recognized better in learned and unlearned images, compared to faces of low status individuals. We further expected that recognition of high status individuals will be less dependent on the specific learned images, compared to low status individuals. Fifty participants performed a face recognition task in which they memorized faces labeled either as “Doctors” (i.e. high status) or “Cleaners” (i.e. low status). Then, they were asked to recognize those faces when they appeared in learned and in unlearned images. In line with our predictions, faces that were labeled as doctors were recognized better than faces labeled as cleaners. In contrary to our predictions, we did not find that high status faces were less dependent on the specific learned image.</p>
<p>18</p>	<p>Beyond faces: Conceptual similarity influences face identity decisions <i>Tal Honig and Galit Yovel</i> Tel Aviv University</p>
	<p>It is commonly assumed that face identity is determined by visual properties of the face. However, in real life familiar faces are typically learned together with non-facial information (e.g., voice, episodic information, semantic information) that is unique to each identity and can be used for identification. Here we hypothesized that conceptual similarity between different face images may influence face identity decisions beyond their perceptual similarity. To test this hypothesis, participants learned pairs of same and different identity faces. All faces were rated for perceptual similarity by an independent group of participants. Conceptual similarity was manipulated by presenting faces with same name label, different name labels or no labels during learning. During test, participants made identity decisions of same or different identity pairs of faces. We measured the proportion of same identity responses to all face pairs. We found higher proportion of same identity decisions to faces presented with the same label and lower proportion of same identity decisions for faces presented with different name labels. Overall proportion of same responses was higher for same identity than different identity faces. To dissociate face identity and perceptual similarity, we measured the effect of conceptual similarity on perceptually-matched same and different identities. Results indicate no effect of objective identity on identity decisions. We conclude that perceptual similarity determines identity decisions when no additional information is provided. When conceptual information is provided, it significantly influences identity decisions. Thus, both conceptual and perceptual information should be considered to understand the mechanisms of face identification.</p>
<p>19</p>	<p>Human face-selective cortex does not distinguish between members of a racial outgroup <i>Niv Reggev [1,2], Kirstan Brodie [2], Mina Cikara [2], and Jason P. Mitchell [2]</i> [1] Ben Gurion University of the Negev, [2] Harvard University</p>
	<p>People often fail to individuate members of social outgroups, a phenomenon known as the outgroup homogeneity effect. Here, we used fMRI repetition suppression to investigate the neural representation underlying this effect. In a pre-registered study, White human perceivers (N = 29) responded to pairs of faces depicting White or Black targets. In each pair, the second face depicted either the same target as the first face, a different target from the same race, or a scrambled face outline. We localized face-selective neural regions via an independent task, and demonstrated that neural activity in the fusiform face area distinguished different faces only when targets belonged to the perceivers’ racial ingroup (White). By contrast, face-selective cortex did not discriminate between other-race individuals. Moreover, across two studies (total N = 67) perceivers were slower to discriminate between different outgroup members and remembered them to a lesser extent. Together, these results suggest that the outgroup homogeneity effect arises when early-to-mid-level visual processing results in an erroneous overlap of representations of outgroup members.</p>

Judgment and decision-making

<p>20</p>	<p>The influence of irrelevant dimensions on similarity judgments <i>Yahav Atas, Michael Gilead</i> Ben-Gurion University of the Negev</p>
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	<p>Similarity is considered as one of the milestones of the humane cognition, yet many researchers argue about the mechanisms beneath its formation. Whereas early theories downplayed the role of context, following theories stated that similarity judgments are informative just in a specific context. While this new approach expanded our understanding in the domain of similarity, it is still not clear whether people, can ignore irrelevant information during a deliberative similarity judgment. Our study aimed to investigate whether it is possible to disregard irrelevant information during a similarity judgment task, and if not, to what extent it affects the similarity judgments. We hypothesized that participants would not be able to completely ignore irrelevant information. In our study, participants were asked to memorize the association between ten Chinese letter and their (fabricated) meaning. Then, participants had to rate the similarity between two letters based on one of three dimensions: their visuality (visual dimension); the proximity between the stimuli occurrence during the memorizing phase (temporal dimension); and their meaning (semantic dimension). For each dimension, we created a regression equation with the exogenous (objective-like) rating of the relevant dimension and the subjective ratings of the irrelevant dimensions as three predictors. Results partially supported the suggested hypothesis: Semantic information significantly affected visual rating, and visual information effect over semantic rating was found close to significance. These results indicate that people indeed fail to completely ignore irrelevant dimensions during a comparison task. Therefore, an updated conceptualization of the processes of similarity and representation formation is required.</p>
<p>21</p>	<p>Counterfactual credit-assignment to outcome-irrelevant task-representations <i>Inbal Alon and Nitzan Shahar</i> Sagol School of Neuroscience, Psychology Department, Tel Aviv University</p>
	<p>Goal-directed behavior requires actors to hold in mind accurate action-outcome associations. When choosing between alternatives, no (or very little) information is gained in regards to the outcome of an unchosen action. However, previous findings have suggested that not only outcome-relevant features of an action are reinforced. There might be some extent of credit assignment to outcome-irrelevant features, involved in the execution of a chosen action. Here, we explored the extent of credit assignment to outcome-irrelevant features of an unchosen action. Participants performed a multiple-armed bandit task, where they were asked to choose cards to gain rewards or avoid losses. The task included four cards with varying reward probabilities, while on each trial two cards were randomly selected to be offered to the participant. Both model-agnostic and computational modeling analyses suggested counterfactual credit assignment to a deliberated, yet unchosen alternative. We discuss our findings in light of limited cognitive control mechanisms and call for a revision of current reinforcement learning models.</p>
<p>22</p>	<p>People average experienced information more accurately if they integrate it with communicated information <i>Guy Grinfeld and Nira Liberman</i> Tel Aviv University</p>
	<p>Humans learn both directly, from their own experience, and via social communication, from the experience of others. In many situations, these two sources of knowledge must be integrated to guide behavior. We explored the possibility that the interface with social communication alters personal experience. Specifically, we predicted that when learners face a need to integrate communicated information into what they have learned from their experience, they represent personal experience in more abstract, perspective-invariant terms. Participants (N = 118) were asked to estimate the average of series of consecutively and rapidly presented numbers. Those numbers represented the bonuses that different experimenters ostensibly paid to other participants. In the "Experience-only" condition, participants only averaged each series. In the "Experience-plus-prediction" condition, after estimating the average, participants predicted the next bonus. In the "Communicated information" condition, after estimating the average, participants received verbal information according to which the experimenter was expected to increase/decrease/not change the bonuses and only then predicted the next bonus. We found that estimations in the "Communicated information" condition were more accurate compared to estimations in the "Experience-only" condition. However, the difference in accuracy between the "Communicated information" condition and the "Experience-plus-prediction" condition was non-significant.</p>

Language

23	<p>Audiovisual processing and selective attention in adult dyslexic readers: An ERP study <i>Shay Menashe</i> The Edmond J. Safra Brain Research Center for the Study of Learning Disabilities, University of Haifa</p>
	<p>Developmental dyslexia is a specific reading disability characterized by decoding and spelling deficits that continue into adulthood. Because reading involves both attentional functions and audiovisual (AV) processing, the aim of this study was to explore the associations between the two factors in adult dyslexic readers. Adult non-impaired and dyslexic readers undertook alphabetic and non-alphabetic tasks, each composed of three experimental blocks. Two experimental blocks contained left and right spatial selective attention manipulations, and another block included central presentations of the stimuli. Event-related potential (ERP) and behavioral parameters were collected and analyzed, particularly with respect to the N1-P2 ERP complex. The dyslexic readers showed deviant patterns of amplitudes when it came to alphabetic stimuli processing. However, there was no difference between the two groups with regard to the non-alphabetic stimuli. These results imply that adult dyslexic readers allocate altered attentional resources when it comes to the processing of AV alphabetic stimuli.</p>
24	<p>The Effect of Catha Edulis (Khat) on reading <i>Rakefet Lorber (Keidar) and Naama Friedmann</i> Tel-Aviv University</p>
	<p>Catha Edulis (Khat) is traditionally used in Yemen and Israel in gathering of bible reading. This is the first study to examine the short-term effects of chewing Khat on reading.</p> <p>The Participants were 22 adults who chew Khat as part of their culture. They were tested twice -- once without and once under the influence of Khat. Their reading was tested through a series of reading tasks: Oral reading of word and nonword lists under unlimited exposure (a total of 746 words, and 40 nonwords), reading of words in very short exposure durations, and silent reading tasks. Additional domains that may have a role in the effect of Khat on reading were tested: lexical retrieval, phonological working memory, sustained attention, and response inhibition.</p> <p>Chewing Khat improved the participants' overall reading accuracy and reduced the total number of reading errors. Khat also reduced the rate of "surface errors", errors that result from reading via grapheme-to-phoneme conversion instead of via the lexical route, for participants who read sub-lexically. It seems that chewing Khat helped them stay on the lexical route while reading. This effect may have been mediated by attention, as Khat also reduced omission errors in the Go/no-go task (Tsal et al., 2005) suggesting improved sustained attention.</p> <p>In the short exposure task in which word-pairs were presented for 300ms, Khat speeded up the transition through the orthographic-input-buffer, resulting in faster reading times for normal readers, who managed to read more words correctly with Khat. In contrast, participants with reading impairments in the orthographic-input-buffer or phonological-output-buffer, showed increased number of reading errors and reduced number of words they managed to read with Khat. No effect was found for naming and phonological working memory.</p>
25	<p>Greater Reading Gain Following Intervention is associated with decreased Magnetic Resonance Spectroscopy Derived Glutamate-Glutamine Concentrations in Children <i>Tzipi Horowitz-Kraus [1,2,3], Kelly J. Brunst [4] and Kim M. Cecil [5,6]</i> [1] Educational Neuroimaging Center, Faculty of Biomedical Engineering, Faculty of Education in Science and Technology, Technion Israel Institution of Technology, Israel; [2] Reading and Literacy Discovery Center; [3] Division of General and Community Pediatrics, Department of Pediatrics, University of Cincinnati College of Medicine; [4] Department of Environmental and Public Health Sciences, University of Cincinnati College of Medicine; [5] Imaging Research Center, Cincinnati Children's Hospital Medical Center; [6] Department of Radiology, University of Cincinnati College of Medicine</p>

	<p>Aim: The “neural noise” hypothesis suggests that individuals with dyslexia have increased levels of glutamate associated with their reading challenges. Different reading intervention programs have showed decreased GLX (a combined measure for glutamine and glutamate used for in vivo magnetic resonance spectroscopy) in association with reading improvement following training. Several studies demonstrated an improved reading ability and increased activation in the anterior cingulate cortex and increased functional connectivity within networks associated with this region (cingulo opercular) following an-executive-functions (EF)-based reading intervention. The goal of this study was to examine if reading improvement is also associated with decreased GLX levels within the anterior cingulate cortex.</p> <p>Methods: Children with Reading Difficulties (RD) and typical readers were recruited and trained on the EF-based reading program for 4 weeks, 5 times a week. Reading ability was assessed pre and post intervention using the Letter-Word standardized test and spectroscopy data was obtained at the end of training. The association between change in reading scores following intervention and GLX levels was examined while controlling for age and sex.</p> <p>Results: Greater “gains” in word reading scores assessed using the Letter-Word subtest were associated with decreased GLX (95%CI -0.05, -0.001, $p < .05$) for children with RD and typical readers.</p> <p>Conclusions: These results suggest that the improvement reported following the EF-based reading intervention program also involved a decreased GLX level, which may point at the decreased neuronal noise, especially in the anterior cingulate cortex, as a possible mechanism for the effect of this program.</p>
26	<p>N400 modulations in metaphor processing and its associations to attentional systems: A behavioral and ERP study</p> <p><i>Shay Menashe [1,3], Nira Mashal [1,2], and David Anaki [2,3]</i></p> <p>[1] School of Education; [2] Department of Psychology; [3] The Gonda Multidisciplinary Brain Research Center. Bar-Ilan university</p>
	<p>Although metaphoric language is one of the most common expressions of creativity in everyday life, the neurocognitive mechanisms underlying conventional and novel metaphors processing are not yet well understood. The first aim of the current study was to explore the nature of the N400 event-related potentials (ERP) component in metaphor processing. The N400 is thought to reflect an online neurocognitive measure of the meaning processed in the brain. The second aim of this study was to investigate whether the processing of conventional and novel metaphors is related to different attentional systems. Twenty-three students from Bar-Ilan university performed a metaphor novelty assessment (MNA) task while ERPs were recorded. In this task, expressions (for example: feeling sad is like crying a river) were presented on the screen and the participants were asked to decide how creative and novel is each expression. In addition, a short version of the attention network test (ANT) was administered to investigate three attention networks, alerting, orienting, and executive control. The behavioral results of the MNA task indicated that novel metaphors were rated as more novel compared to the conventional metaphors. Also, reaction times indicated that the novel metaphors were rated significantly slower compared to the conventional metaphors. The ERP parameters indicated that the N400 amplitudes, induced by the novel metaphors, were enhanced and peaked later compared to those produced by the conventional metaphors. Moreover, conventional metaphor processing was associated with the orienting attentional system, while novel metaphor processing was associated with executive control and the alerting system. The findings are discussed in terms of different cognitive demands on conventional and novel metaphor processing, and that different attentional systems may contribute to the processing of the two metaphor types.</p>
27	<p>Priming from crowded words in an alphabetical language</p> <p><i>Mario Francis [1], Felipe Luzardo [1], Su-Ling Yeh [2], Yaffa Yeshurun [1]</i></p> <p>[1] University of Haifa; [2] National Taiwan University</p>
	<p>Previous studies demonstrated that crowded words that were unrecognizable, nevertheless generated semantic priming for subsequent words. This finding challenged leading models of crowding, which claim that we do not have access to individual identities of crowded stimuli, but only to their pooled signal. Interestingly, when these studies examined phonological priming with crowded words, with a similar paradigm, no priming was found. The language in these studies was Chinese, which is a non-alphabetical</p>

	<p>language that may be processed differently. Here, we tested whether these findings can be replicated with an alphabetical language – Hebrew. To that end, we employed a lexical decision task in which the participants had to indicate whether or not a target is a valid word. Prior to the target onset, a prime word was briefly presented and it was either crowded (i.e., surrounded by pseudo-words) or not (isolated). The prime was either related semantically/phonologically to the target or not. Additionally, we measured prime visibility. First, we found that crowded words were unrecognizable. Second, we found phonological priming (faster response to targets when the prime had the same sound than when it had a different sound) with both isolated and crowded conditions. But we did not find semantic priming for either crowding condition. These findings suggest that with an alphabetical language, access to the phonology of a crowded word seems possible but we may not have access to its meaning.</p>
28	<p>Consolidation in language and motor learning: evidence for common and distinct mechanisms <i>Dafna Ben Zion [1,2,3], Ella Gabitov [6], Anat Prior [1,2] and Tali Bitan [4,5]</i> [1] Department of Learning Disabilities, University of Haifa, Haifa, Israel; [2] Edmond J. Safra Brain Research Center for the Study of Learning Disabilities, University of Haifa, Haifa, Israel; [3] The Language and Brain Plasticity Lab, Institute of Information Processing and Decision Making, University of Haifa, Haifa, Israel; [4] Department of Psychology, University of Haifa, Haifa, Israel; [5] Department of Speech Language Pathology, University of Toronto, Toronto, ON, Canada; [6] McConnell Brain Imaging Center, Montreal Neurological Institute, McGill University, Montreal, Quebec H3A 2B4, Canada.</p>
	<p>The role of sleep in consolidation of language learning is still unclear. The goal of the current study is to explore the effect of sleep on the consolidation of a novel language learning task containing both item specific knowledge and the extraction of grammatical regularities. By comparing consolidation effects in the language domain to consolidation effects in a motor task we address the question of whether consolidation mechanisms are domain general. A sample of 39 typical adults learnt to apply plural inflections to novel words based on morpho-phonological rules embedded in the input. The same participants also learnt a motor sequence task in separate sessions. Both tasks were administered in a design that enabled us to probe the effect of sleep on consolidation, as one group was trained in the morning and the other in the evening, and both groups were retested 12 and 24 hrs. post training. The results reflected a stabilizing effect of sleep for item specific learning and an enhancement effect of sleep for regularity extraction, consistent with the notion that these two types of learning rely on hippocampal vs. skill learning mechanisms respectively. Nevertheless, both aspects of language learning benefit from an active role of sleep in consolidation. Our findings for the motor task showed time dependent enhancement only after 24 hours, that did not depend on the timing of sleep. Correlation across individuals, between the consolidation in the language and motor tasks suggest that indeed some aspects of consolidation are domain-general.</p>

Learning and implicit learning

29	<p>Stimulus variation-based training seems to enhance artificial grammar learning <i>Pesi Ashkenazi, Ayelet Sasson, Kahta Shani, Rachel Schiff</i> Bar-Ilan University, Israel</p>
	<p>The current study was designed to explore whether statistical learning ability is affected by the diversity of the stimulus set used in the training phase. The effect of stimulus diversity was assessed by controlling and manipulating the number of exposures to a given set and the number of unique strings presented to the learner during the training phase. 147 students participated in two studies. In the unvaried stimulus study, 71 participants learned the same basic set of 15 exemplars, once (15x1 exposure), twice (15x2 exposures=30 total strings) and 3 times (15x3 exposures=45 total strings). In the varied stimulus study, 75 participants learned 15, 30 and 45, all of which were unique, unrepeatable exemplars. All groups were asked to classify test strings for their grammaticality following training. Results of the d' measures in the unvaried stimulus study indicate similar performance across the groups. Conversely, the results of the varied stimulus study show that the group presented with 45 unique strings performed significantly better than the baseline group</p>

<p>(15 strings). Analysis of the differences across the equivalent groups in the two studies (15X2 exposures vs. 30 unique strings and 15X3 exposures vs. 45 unique strings) indicates differences in performance only between the group who was presented with the same 15 strings three times and the group presented with 45 unrepeated strings. Taken together, our results shed additional light on the central role of stimulus variation in Artificial Grammar Learning.</p>	
30	<p>The contribution of explicit and implicit learning to the emergence of habitual responses <i>Inbar Avni, Khen Heller, and Lior Shmuelof</i> Ben-Gurion University, Beer-Sheva, Israel</p>
<p>Habitual responses emerge following prolonged training, and are believed to be driven by implicit learning processes that act in parallel to explicit learning processes that drive the initial learning. We assessed the contribution of explicit and implicit learning processes to the emergence of habitual responses by embedding a sequence of stimuli within a stimulus response association learning task. 30 subjects trained on a visuomotor association task for two consecutive days (1000 trials a day), while an embedded 4-stimuli sequence was presented during training (100 repetitions a day). On the third day, the association between two stimuli and two keys switched. Following a short training on the new associations, participants completed a timed-response block, in which the responses of the participants to each stimuli were examined at various reaction times. Consistently with previous findings, we show that when the reaction times for the stimuli that were switched were shortened, participants made habitual errors. Participants also learned the embedded sequence, as indicated by shorter reaction times for stimuli inside of the sequence vs. out of sequence. Participants' awareness of the sequence was a central determinant of the sequence learning, but awareness, as well as other measures of sequence learning, were not correlated with the magnitude of the habitual responses. Our results demonstrate that the process of acquiring habitual responses is not associated with the inter-subject variability measures of explicit and implicit learning, and suggest that habitual responses are the outcome of response reinforcement rather than a direct outcome of the learning process.</p>	
31	<p>Causal Effect of Working Memory Load on Outcome-Irrelevant Reinforcement Learning <i>Ido Ben Artzi [1] and Nitzan Shahar [1,2]</i> [1] Psychology Department, Tel Aviv University; [2] Sagol School of Neuroscience</p>
<p>To learn accurate action-outcome associations, observers need to exert control so that value will be assigned only to outcome-relevant features of the environment. For example, the visual and tactile cues of a fruit might predict its taste, while its position on a tabletop might be arbitrary, and do not encode its value. Here, we examined to what extent working memory load, a system devoted to the maintenance of relevant information in mind, influences credit-assignment to outcome-irrelevant features in the environment. Participants completed a dual-task, where they were asked to choose cards to gain rewards (multiple-armed bandit task) during maintenance of a visual array (change detection task). To manipulate working memory load the task was performed with low vs. high set-size for the visual array. Importantly, only cards predicted reward, but not the response-keys used to report selection. We demonstrate an effect of set-size on credit assignment to the outcome-irrelevant response-key. We discuss the influence of working memory load on outcome-irrelevant learning in light of depleted cognitive control resources.</p>	

Numerical cognition

32	<p>Math anxiety and size congruency <i>Yarden Gliksman [CANCELLED]</i> Ruppin Academic Center</p>
<p>Math anxiety (MA) is an adverse emotional reaction to math or the prospect of doing math. MA interferes with math performance. Not much attention was given to the performance of those with MA in basic numerical mechanisms, such as automatic processing of numerical symbols. The current study presents the performance of students with MA in the size congruity task. In this task, participants were presented with pairs of digits that differed in either numerical value or physical size, and were asked to choose the physically</p>	

	<p>larger digit. The two digits were either congruent (i.e., the numerically larger digit was also physically larger; e.g., 3 5), incongruent (i.e., the numerically larger digit was physically smaller; e.g., 3 5), or neutral (i.e., the two digits differed only in physical dimension, e.g., 3 3). Both groups presented congruity effect. Furthermore, the MA group congruity effect was composed only from the interference effect (difference between incongruent and neutral conditions) and no facilitation effect (difference between congruent and neutral conditions). This result was previously described in children, in patients with acalculia following an infarct, and in developmental dyscalculia. This result ties emotional and cognitive processing in math anxiety, and has implications for diagnosis and intervention.</p>
<p>33</p>	<p>Dysnumeria in sign language: a specific impairment in constructing decimal structure of written multidigit-numbers in a deaf ISL signer <i>Naama Friedmann, Neta Haluts, and Doron Levy</i> Language and Brain lab, Tel Aviv University, Tel Aviv, Israel</p>
	<p>We present the first in-depth analysis of a specific type of dysnumeria (number-reading deficit) in sign language, in Nomi, a 45-year-old signer of Israeli Sign Language (ISL). In reading-then-signing multidigit-numbers Nomi made mainly decimal, number-structure errors—reading the correct digits in an incorrect (smaller) decimal-class, mainly in longer numbers of 5-6-digits. We ruled-out the numeric-visual analysis as the source of Nomi's dysnumeria using a unique property of ISL: when the multidigit-number signifies objects' number, it is signed with a decimal-structure; but a parallel system exists (e.g., for height, age, bus numbers), in which multidigit-numbers are signed non-decimally, as a sequence of number-signs. When Nomi read-then-signed the exact same numbers non-decimally, she performed significantly better. She also detected length-, digit-order-, or identity-differences flawlessly. Her decimal-errors did not result from a deficit in the phonological-sign-output either (no decimal-errors in number-repetition, and in signing multidigit-numbers written as Hebrew-words). Nomi had similar error-pattern in number-comprehension (number-size comparison), suggesting that her deficit lies in a component shared by reading and comprehension. In contrast to her number-reading, Nomi's reading-then-signing of Hebrew-words was in the high-range of hearing and deaf controls, and significantly better than her multidigit-number reading. This demonstrates a dissociation between impaired number-reading and spared word-reading. These results point to a specific type of dysnumeria whereby the conversion from written multidigit-numbers to the abstract decimal number-frame is impaired, affecting both reading and comprehension. The results support abstract, non-verbal decimal-structure generation, shared by reading and comprehension, and suggest the existence of a decimal number-reading route.</p>
<p>34</p>	<p>Can you learn multiplication facts with dyscalculia? Yes, if they're dissimilar <i>Ella Shalit, Mariam Ghadeer, and Dror Dotan</i> Mathematical Thinking Lab, School of Education, Tel Aviv University</p>
	<p>Our memory is affected by similarity: memorizing similar items is harder than memorizing dissimilar ones, presumably because similar representations interfere with each other in memory. Tasks requiring to memorize several similar items, e.g., the multiplication table, are hard – especially for individuals with excessive sensitivity to similarity-induced interference. Interestingly, one study showed, for a single participant, that hyper-sensitivity to interference may be overcome by teaching multiplication facts one set at a time, with each set containing only dissimilar facts.</p> <p>Here, we replicate and extend these findings. Four individuals with dyscalculia were trained on multiplication facts they did not previously know. Each week we taught a set of 4 facts, using several rounds of memorization and retrieval. When the facts in a given set were dissimilar from each other, the participants learned them better and more quickly than the sets with similar facts. This effect of similarity was observed for each of the participants at the end of each training week, at the end of the whole training period, and again after a one-month retention period. We conclude that learning multiplication facts in low-similarity conditions helps people with dyscalculia memorizing the multiplication table.</p> <p>Crucially, although the similarity-based training was effective for all four participants, not all of them had hyper-sensitivity to similarity; two of them did not. This suggests that sensitivity to similarity may not be a domain-general characteristic; for some individuals, it may be specific to multiplication facts.</p>

Perception

35	<p>Experimental evidence for subcortical involvement in mental rotation</p> <p><i>Gily Mozes and Shai Gabay</i></p> <p>University of Haifa</p>
	<p>It has been argued that when participants take part in mental rotation tasks, they recruit visuospatial perceptual circuits primarily located in cortical areas. We designed a noninvasive behavioral experiment (using the stereoscope method) to examine whether such an account applies to mental rotation processes. By presenting two rotated images (0°, 50°, 100° or 150°, identical or mirrored) to one eye (monocular) or segregated between the eyes (interocular), we were able to explore the contribution of monocular portions to the mental rotation. We found a monocular involvement (mainly subcortical), indicated by better performance when the identical objects were presented in a high angular disparity (100°, 150°) to a single eye compared to the interocular presentation. Furthermore, the results indicate that the processes involved in the perception of mirrored and identical objects already operate at the monocular channels' level. We argue that the cortical assumption cannot explain the monocular benefit observed in our results. The monocular benefit suggests that mental rotation processes require some of the cortico-subcortical loops that support visuospatial perception and the processes that transform them. Our results call for further studies that should examine the contribution of subcortical mechanisms in high cognitive faculties.</p>
36	<p>Time perception during the COVID-19 outbreak</p> <p><i>Keren Taub [1], Dekel Abeles [2], and Shlomit Yuval-Greenberg [1,2]</i></p> <p>[1] Sagol School of Neuroscience, Tel-Aviv University; [2] School of Psychological Sciences, Tel-Aviv University</p>
	<p>The COVID-19 outbreak in 2020 shocked the world in almost every aspect. Apart from its apparent medical, social and financial projections, many people reported having a distorted experience of time. While such distortions are not unique to a pandemic, the outbreak allowed for the rare opportunity to examine time perception in a situation in which many were exposed to the same life-altering situation, accompanied by diverse events. During the first lockdown in Israel, in April 2020, 468 participants were asked to retrospectively estimate the amount of time that has passed since prominent non-personal life events that have occurred in the past three months. The events were either related or unrelated to COVID-19. Results showed that participants perceived the events as earlier than their objective occurrence, indicating that they have experienced subjective inflation of time. This effect was significantly diminished when events were related to the pandemic, indicating that participants perceived COVID-related events as closer to the present time than unrelated events. This phenomenon was not explained by psychological factors as stress and anxiety, and was not affected by the perceived threat of the pandemic, occupation status, or being at high risk for COVID-19. We conclude that, whereas time perception was generally inflated during a crisis situation, this was less so for events that were part of the crisis itself. We hypothesize that events related to the crisis are perceived as a part of a long ongoing situation that extends to the present time and where each event revives previous ones.</p>
37	<p>Exploring the interference of temporal crowding with Mixture-Model Analysis</p> <p><i>Tomer Sahar [1,2], Tal Makovski [1], Yaffa Yeshurun [2]</i></p> <p>[1] The Open University of Israel; [2] University of Haifa</p>
	<p>One example of the limitation in our visual system is that target identification is impaired when other visual items (i.e., distractors) appear in spatial proximity to the target - compared to when the stimulus appears alone. We have recently shown that target identification is also impaired when distractor items appear before- and after the target. That is, target identification is impaired by 'crowding' the stimuli in the temporal domain. Importantly, such impairment exceeds the classical time-course of masking. Yet, the exact nature of impairment is not clear. The current study used a continuous-report task with a Mixture-Model Analysis to examine which aspect(s) of visual processing is impaired, and establish the relative contribution of each (temporal) distractor. To this end, participants were shown a rapid sequence of three orientated</p>

	<p>lines, presented one after the other, and we manipulated the time interval between stimuli. Critically, unlike most previous studies, the sequence of stimuli was presented at the center of the screen. Participants were asked to adjust a probe to match the orientation of the second line (the target). Furthermore, due to social distancing constraints, the experiments were conducted on-line. Experiment 1 used high-contrast stimuli embedded in noise, and Experiment 2 used low contrast stimuli without noise. The results of both experiments showed that target identification was impaired mainly through a decrease in report precision, along with both substitution and guessing errors suggesting that temporal crowding can occur even with foveal presentation.</p>
38	<p>Top-down effect on pupillary response: evidence from shape from shading <i>Ronen Hershman [1], Ayelet Sapir [2], and Avishai Henik [1]</i> [1] Ben-Gurion University of the Negev; [2] Bangor University</p>
	<p>Shaded 2D images often create an illusion of depth, due to the shading information and assumptions regarding the location of the light source. Specifically, 2D images that are lighter on top usually appear convex while images that are darker on top, usually appear concave, reflecting the assumption that light is coming from above. The process of recovering the 3D shape of a shaded image is called Shape from Shading. Here we examined whether the pupil responds to the illusion of depth in a shape from shading task. In three experiments we show that pupil size is affected by the percept of depth, so that it dilates more when participants perceive the stimulus as concave, compared to when they perceive it as convex. This only happens if participants make a judgment regarding the shape of the stimulus or when they view it passively but are aware of the different shapes. No differences in pupil size were found with passive viewing if participants were not aware of the illusion, suggesting that some aspects of shape from shading require attention. All stimuli were equiluminant, and the percept of depth was created by manipulating the orientation of the shading, so that changes in pupil size could not be accounted by changes in the amount of light in the image. We posit that the perception of depth is translated to a subjective perception of darkness, due to the “darker is deeper” heuristic and conclude that the pupillary physiological response reflects the subjective perception of light.</p>
39	<p>3D flight experience eliminates distortions in human spatial perception <i>Gily Ginossar* [1], Ehud D. Karpas* [1], Idan Weitzner [2], and Nachum Ulanovsky [1]</i> [1] Department of Neurobiology, Weizmann Institute of Science; [2] Sackler School of Medicine, Tel Aviv University</p>
	<p>Humans typically locomote horizontally much more than vertically, but it remains unknown whether the individual’s 3D locomotion experience affects 3D perception. Here we addressed this question by studying a subpopulation of experts with unique locomotion experience – fighter pilots – who move and navigate volumetrically in 3D space. Using an Air-Force F-15 flight-simulator with highly realistic virtual-reality, we compared subjects’ 3D perception of surrounding space – where they assessed 3D directions to objects, with their 3D perception of traveled space – assessing 3D directions of self-motion. Both pilots and control-subjects perceived their surrounding space in a vertically-compressed, anisotropic manner. However, when assessing traveled space, pilots displayed un-distorted isotropic 3D perception, while control-subjects exhibited anisotropy. Thus, 3D experience strongly affected 3D perception of traveled space – but did not affect 3D perception of surrounding space. This suggests that the underlying plasticity in the pilots’ brains occurred in regions involved in spatial representation during self-movement, such as dorsal visual stream or hippocampal formation.</p>

Working memory and cognitive control

40	<p>Automatic effects of instructions: A Tale of Two Paradigms <i>Inbar Amir and Nachshon Meiran</i> Ben Gurion University of the Negev</p>
	<p>When examining rapid instructed task learning behaviorally, one out of two paradigms is usually used, the Inducer-Diagnostic (I-D) paradigm and the NEXT paradigm. Even though both paradigms are supposed to examine the same phenomenon of Automatic Effect of Instructions (AEI), there are some meaningful differences between them, notably, in the size of the AEI. In current work, we examined, in two pre-</p>

	<p>registered studies, the influence data-analytic approach and instructions' format on AEI size. The first study examined the influence of the data-analytic approach by comparing two existing relatively large datasets, one from each paradigm (Braem et al., 2019; Meiran et al., 2016). The second study examined the influence of instructions' format (concrete, as in NEXT, and verbal-abstract as in I-D) while using variants of the NEXT paradigm, some with modifications that approximated it to the Inducer-Diagnostic paradigm. Results from Study 1 indicate that the data analytic approach partially explains the differences between the paradigms in terms of AEI size, but the paradigms remained different with respect to individual differences. Results from Study 2 indicate that instructions' format does not influence AEI size, thereby providing further support for the notion that instructions are represented abstractly by default, even when the instructions themselves are concrete.</p>
<p>41</p>	<p>Cognitive impairments after stroke are associated with prepotent inhibition and not with proactive inhibition.</p> <p><i>Reut Binyamin-Netser, Anat Shkedy Rabani and Lior Shmuelof</i></p> <p>Ben Gurion University of the Negev</p>
	<p>Executive functions are impaired in stroke survivors. Among these functions, inhibition refers to the ability to knowingly suppress actions in order to select a more adequate response. Inhibition can be divided to prepotent inhibition, the ability to suppress dominant responses (such as eye movement to a salience stimulus), and proactive inhibition, or interference inhibition, which is the ability to suppress recently learned responses, in face of conflicting task requirements. These inhibition abilities were found to be independent.</p> <p>We study deficits in prepotent and proactive inhibition control of chronic stroke subjects in comparison to age matched healthy controls.</p> <p>11 post-stroke and 18 healthy control subjects completed a cognitive clinical test (MoCA) and three inhibition control tasks: anti-saccade for assessing prepotent inhibition, and delayed stimulus-response tasks, where interference was introduced within trial (NEXT paradigm) and between trials (adapted GO paradigm), for proactive inhibition assessment.</p> <p>Stroke subjects showed lower MoCA scores and decreased prepotent inhibition responses (lower accuracy rates in the antisaccade task), than healthy controls. However, stroke subjects did not show deficits in the proactive inhibition tasks compared to healthy control. MoCA scores were correlated with prepotent inhibition and not with the proactive inhibition scores.</p> <p>Our results indicate that cognitive impairments in stroke are associated with prepotent inhibition and not with proactive inhibition.</p>
<p>42</p>	<p>Self-initiated spatial working memory in children 7-10 years old</p> <p><i>Neta Gorohovsky, Tamar Koor and Hagit Magen</i></p> <p>The Hebrew University of Jerusalem</p>
	<p>Numerous studies have examined the development of spatial working memory (WM), yet these studies focused almost exclusively on memory tasks in which children had no control over the content of the representations they memorized. In contrast, in everyday life, children as adults, often shape the content of their memory representations themselves. In this study, we explored the development of this aspect of memory, termed self-initiated (SI) WM, in the spatial domain. A modified spatial span task was used, in which children aged 7-10 years old and young adults memorized spatial sequences they constructed themselves, or random sequences provided to them.</p> <p>Similar to adults, all children constructed structured efficient spatial sequences. Accuracy was lower in children across all conditions, yet they benefited from self-initiation to the same extent as adults. The reaction time data demonstrated that young adults planned the spatial sequence they constructed before they executed their selections, while children implemented structure online during the construction of the spatial sequence. Overall, when given control over encoding, children in middle to late childhood demonstrate metacognitive knowledge on the structure of efficient memory representations, knowledge they utilize to construct efficient spatial WM representations that benefit their performance.</p>

17:30 – 18:30 – Keynote Address II:

Resisting the Knowledge Dementors: The Truth about “Post-Truth”

Stephan Lewandowsky, University of Bristol

We are said to live in a “post-truth” era in which “fake news” has replaced real information, denial has compromised science, and the ontology of knowledge and truth has taken on a relativist element. I argue that to defend evidence-based reasoning and knowledge against those attacks, we must understand the strategies by which the post-truth world is driven forward. I depart from the premise that the post-truth era did not arise spontaneously but is the result of a highly effective political movement that deploys a large number of rhetorical strategies. I focus on three strategies: The deployment of conspiracy theories, the use of “micro-targeting” and “bots” online, and agenda-setting by attentional diversion. I present evidence for the existence of each strategy and its impact, and how it might be countered.