

The organizing committee:

Shahar Arzy (Hebrew University)

Morre Goldsmith (University of Haifa)

Nurit Gronau (The Open University of Israel)

Avishai Henik (Ben-Gurion University of the Negev)

Dominique Lamy (Tel Aviv University)

Michal Lavidor (Bar Ilan University)

The Second Conference on Cognition Research of the Israeli Society for Cognitive Psychology – Akko (2015)

Program overview

Tuesday, February 24th

13:30-14:30 Welcome, registration and coffee

14:30-14:55 Opening address

15:00-17:00 Talk session 1 (3 parallel sessions in rooms A, B and C)

15:00-15:20 Talk 1

15:20-15:40 Talk 2

15:40-16:00 Talk 3

16:00-16:20 Talk 4

16:20-16:40 Talk 5

16:40-17:00 Talk 6

17:00-17:30 Coffee break

17:30-18:30 Keynote lecture (Prof. Lionel Naccache)

18:30-20:00 Poster session 1 (and coffee break)

20:00 Dinner

Wednesday, February 25th

09:00-10:40 Talk session 2 (3 parallel sessions in rooms A, B and C)

09:00-09:20 Talk 1

09:20-09:40 Talk 2

09:40-10:00 Talk 3

10:00-10:20 Talk 4

10:20-10:40 Talk 5

10:40-11:10 Coffee break

11:10-12:50 Talk session 3 (3 parallel sessions in rooms A, B and C)

11:10-11:30 Talk 1

11:30-11:50 Talk 2

11:50-12:10 Talk 3

12:10-12:30 Talk 4

12:30-12:50 Talk 5

12:50-15:00 Lunch

15:00-17:00 Talk session 4 (3 parallel sessions in rooms A, B and C)

15:00-15:20 Talk 1

15:20-15:40 Talk 2

15:40-16:00 Talk 3

16:00-16:20 Talk 4

16:20-16:40 Talk 5

16:40-17:00 Talk 6

17:00-19:00 Poster session 2 (and coffee break)

19:00 Dinner

Thursday, February 26th

09:00-10:00 Business meeting

10:00-10:20 Coffee break

10:20-12:20 Talk session 5 (3 parallel sessions in rooms A, B and C)

10:20-10:40 Talk 1

10:40-11:00 Talk 2

11:00-11:20 Talk 3

11:20-11:40 Talk 4

11:40-12:00 Talk 5

12:00-12:20 Talk 6

12:20-13:20 Light lunch (provided by hostel)

13:20-15:20 Talk session 6 (3 parallel sessions in rooms A, B and C)

13:20-13:40 Talk 1

13:40-14:00 Talk 2

14:00-14:20 Talk 3

14:20-14:40 Talk 4

14:40-15:00 Talk 5

15:00-15:20 Talk 6

The Second Conference on Cognition Research of the Israeli Society for Cognitive Psychology – Akko (2015)

Tuesday, February 24th

13:30-14:30 Welcome, registration and coffee

14:30-14:55 Opening address

Tuesday, February 24th – Talk session 1 (15:00-17:00)

Talk session 1: Perception (Room A)

Chair: Avishai Henik

- 15:00-15:20 Simhi, N., and Yovel, G., Tel Aviv University.
The role of the body and motion in person recognition.
- 15:20-15:40 Tal, Z., Amedi, A., and Geva, R., The Hebrew University of Jerusalem.
Selective activation in the lateral occipital cortex and a massive occipital deactivation for passive touch.
- 15:40-16:00 Gabay, S., Kalanthroff, E., Henik, A., and Gronau, N., University of Haifa.
Conceptual size representation in ventral visual cortex.
- 16:00-16:20 Gilaie-Dotan, S., University College London.
Ventral visual pathway (and ventral EBA) only critical for person perception, not for biological motion perception: Evidence from patients and a model suggestion.
- 16:20-16:40 Maidenbaum, S., Buchs, G., and Amedi, A., The Hebrew University of Jerusalem.
Blind in a virtual world: Exploring non-visual spatial perception using sensory substitution and virtual environments.
- 16:40-17:00 Oron, J. and Yovel, G., Tel Aviv University, Israel.
What is the role of the face-selective area in the pre frontal cortex?

Talk session 1: Memory, Metamemory and Higher Cognitive Processes (Room B)**Chair:** Morre Goldsmith

- 15:00-15:20 Cohen, N., Ben-Yakov, A., Paz, R., and Dudai, Y., Weizmann Institute.
Pre-encoding activity in the anterior insula predicts memory outcomes.
- 15:20-15:40 Yacoby, A., Dudai, Y., and Mendelsohn, A., Weizmann Institute.
Can meta-memory predict reconsolidation?
- 15:40-16:00 Adiv, S., and Koriat, A., University of Haifa.
"Easily learned, slowly forgotten": The effects of ease of learning on remembering and forgetting.
- 16:00-16:20 Koriat, A., University of Haifa.
Data-driven and goal-driven metacognitive regulation during study: The role of effort attribution.
- 16:20-16:40 Ackerman, R., Technion.
Efficiency and labor-in-vain in problem solving under time pressure.
- 16:40-17:00 Kenett, Y., Anaki, D., and Faust, M., Bar-Ilan University.
Searching for neurocognitive differences between low and high creative persons.

Talk session 1: Language 1 (Room C)**Chair:** Inbal Arnon

- 15:00-15:20 Arnon, I., McCauley, S., and Christiansen, M. H., The Hebrew University of Jerusalem.
Digging up the building blocks of language: Age-of-acquisition effects for multiword phrases.
- 15:20-15:40 Meir, N., and Armon-Lotem, S., Bar-Ilan University.
The influence of bilingualism and socioeconomic status (SES) on language proficiency and verbal working memory.
- 15:40-16:00 Degani, T., and Kreiner, H., University of Haifa.
Production after brief exposure to a different language: A tip-of-the-tongue study.
- 16:00-16:20 Novogrodsky, R., and Shetreet, E., University of Haifa.
Quantification and levels of linguistic knowledge.

16:20-16:40 Norman, T., Degani, T., and Peleg, O., Tel Aviv University.
Morphological processing during visual word recognition in Hebrew as a first and a second language.

16:40-17:00 Kimel, E., and Ahissar, M., The Hebrew University of Jerusalem.
Linguistic performance as a case for statistical regularities for adequate readers and among Dyslexics.

17:00-17:30 Coffee break

Tuesday, February 24th – Keynote lecture (17:30 - 18:30)

Prof. Lionel Naccache, ICM, Paris.

To be or not to be an unconscious semantic representation? A tragi-comedy in V acts.

Tuesday, February 24th – Poster session 1 (18:30 - 20:00)

Memory

1. Tibon, R., Gronau, N., Scheuplein, A. L., Mecklinger, A., and Levy, D., Interdisciplinary Center Herzliya.
Semantic unitization modulates associative recognition processes.
2. Reggev, N., The Hebrew University of Jerusalem.
Semantic novelty is disadvantageous to encoding, even when distinct.
3. Ben-Zvi, S., Levy, D., and Soroker, N., Interdisciplinary Center Herzliya.
How cortical damage affects memory: The things that you li'ble to read in the manual – it ain't necessarily so.
4. Julius, M., and Adi-Japha, E., Bar-Ilan University.
Motor control strategies in the mirror drawing task: A comparison of three age groups.
5. Mark-Zigdon, N., and Katzoff, A., Levinsky College of Education.
Best conditions for multiplication facts memory.
6. Oren, N., Shapira-Lichter, I., Lerner, Y., Tarrasch, R., Hendler, T., and Nir, G., Tel Aviv University.
Challenges to episodic memory – the neural correlates of proactive-interference and divided attention.

7. Pell, L., and Dudai, Y., Weizmann Institute.
Modifying Episodic Memory via Reconsolidation.
8. Avivi Reich, M., Interdisciplinary Center Herzliya.
The effect of background noise on the ability to perceive and remember unrelated words in nonnative listeners.

Automatic processing and cognitive control

9. Entel, O., and Tzelgov, J., Ben-Gurion University of the Negev.
Focusing on task conflict in the Stroop effect.
10. Levin, Y., and Tzelgov, J., Ben-Gurion University of the Negev.
“Pure” informational conflict is not controlled: Evidence from cross-modal Stroop task.
11. Sela, M., Gilead, M., Eyal, H., and Maril, A., The Hebrew University of Jerusalem.
The opinion-congruency effect: Evidence for automatic acceptance/rejection of opinions.
12. Lavro, D., and Levin, D., Ben-Gurion University of the Negev.
Post-error adjustments: What do we really measure?
13. Sapir, M., Anholt, G., and Henik, A., Ben-Gurion University of the Negev.
Mental motion influence on inhibition.
14. Karsh, N., and Eitam, B., University of Haifa.
Motivation from control— A control based response selection framework.
15. Namdar, G., Algom, D., and Ganel, T., Ben-Gurion University of the Negev.
A new context effect of human resolving power distinguishes between perception and action.

Attention and consciousness

16. Weinbach, N., Shofty, I., Gabay, S., and Henik, A., Ben-Gurion University of the Negev.
Endogenous spatial and temporal orienting: Single or multiple attentional mechanisms?
17. Avital-Cohen, R., and Tsal, Y., Tel Aviv University.
Differentiation and very late selection in the flanker task.

18. Ariav, D., Rappel, P., Deouell, L., and Britz, J., The Hebrew University of Jerusalem.
Dissociating retinal eccentricity and covert spatial attention effects on visual evoked potentials: a gaze-controlled ERP study.
19. Max, R., Tel Aviv University.
Identities of target and flanking distractors are processed before their locations.
20. Avnit, A., Segev, R., and Henik, A., Ben-Gurion University of the Negev.
The effect of spatial expectancy on exogenous attention in the Archer Fish.
21. Peremen, Z., and Lamy, D., Tel Aviv University.
Non-visual information drives visual unconscious processing.
22. Ophir, E., Tel Aviv University.
Is the attentional blink an awareness blink?
23. Sklar, A., and Hassin, R., The Hebrew University of Jerusalem.
Unconscious algebra.
24. Shalev, N., Demeyere, N. and Humphreys, G., University of Oxford, UK.
The interaction of response mapping with visual perception.

Language

25. Havron, N., and Lancry, O., The Hebrew University of Jerusalem.
Literacy at time of immigration is negatively correlated with language proficiency in adulthood.
26. Yachini, M., Kesselman, A. and Friedmann, N., Tel Aviv University.
Dyslexia and SLI are two separate deficits: evidence from double dissociations between reading, syntax, and lexical retrieval.
27. Brice, H., The Hebrew University of Jerusalem.
Denominal verbs as a case study of Semitic verb structure.
28. Dubossarsky, H., Hills, T., and De Deyne, S., The Hebrew University of Jerusalem.
Association networks across the lifespan Language.
29. Assor, H., Eviatar, Z., Peleg, O., and Miller, P., University of Haifa.
Hemispheric specialization in reading ambiguous words: Differences between deaf and hearing readers.
30. Siegelman, N., and Arnon, I., The Hebrew University of Jerusalem.

The advantage of starting big: learning from unsegmented input facilitates mastery of grammatical gender in an artificial language.

31. Sukenik, N., and Friedmann, N., Tel Aviv University.
Reading in autism is not always hyperlexia.
32. Hadar, B., and Ben-David, B., Interdisciplinary Center Herzliya.
The impact of working memory load on the timeline for speech processing.
33. Guggenheim, R., and Friedmann, N., Tel Aviv University.
Phonological output buffer and its specific role in reading.
34. Makov, S., Golombic, E., and Beker, S., Tel Aviv University.
Neuronal tracking of speech during sleep.
35. Agmon, G., The Hebrew University of Jerusalem.
Why negative quantifiers are not really "negative".

Wednesday, February 25th

Wednesday, February 25th – Talk session 2 (09:00 - 10:40)

Symposium 1: Rhythmic Motifs in Perception and Attention (Room A)

Discussant: Ayelet Landau

- 09:00-09:20 Landau, A., The Hebrew University of Jerusalem.
Distributed attention is implemented through theta-rhythmic gamma Modulation.
- 09:20-09:40 Arzy, S., Hadassah Ein Kerem & Hebrew University of Jerusalem.
Pathologies in brain rhythms: the case of dissociative disorders.
- 09:40-10:00 Bonne, Y., and Adini, Y., University of Haifa.
Implicit temporal predictions revealed by microsaccades.
- 10:00-10:20 Zion Golumbic, E., Bar-Ilan University.
Focusing attention in time: how temporal regularities assist Perception.
- 10:20-10:40 Breska, A., and Deouell, L. Y., The Hebrew University of Jerusalem.
Revisiting the role of oscillatory entrainment in rhythm-based predictions.

Talk session 2: Automatic Processing and Cognitive Control (Room B)

Chair: Nachshon Meiran

- 09:00-09:20 Weil, R., Mayo, R., and Schul, Y., The Hebrew University of Jerusalem.
What's the truth?: Boundary conditions of Stroop-interference for truth congruent colors in false sentences.
- 09:20-09:40 Cohen, D., Shakuf, V., and Algom, D., Tel Aviv University.
Contingencies, pseudocontingencies and selective attention: An integrative study of speeded human decision making.
- 09:40-10:00 Dorchin-Regev, S., and Meiran, N., Ben-Gurion University of the Negev.
Two types of inhibition in task switching: Backward inhibition versus competitor rule suppression.
- 10:00-10:20 Dadon, G., Mesika, D., Berger, A., and Henik, A., Ben-Gurion University of the Negev.
The time course of consciousness in the Stroop task.

- 10:20-10:40 Amit, R., Eyal, A., and Yuval-Greenberg, S., Tel Aviv University.
On the temporal dynamics of microsaccades: inter-dependency of Greenberg microsaccades is modulated by retinal input.

Talk session 2: Language 2 (Room C)

Chair: Naama Friedmann

- 09:00-09:20 Friedmann, N., Tel Aviv University.
Letter position encoding and letter-to-word binding are separate functions: evidence from dyslexia.
- 09:20-09:40 Balaban, N., Belletti, A., Friedmann, N., and Rizzi, L., Tel Aviv University.
Using syntax and context in reference resolution.
- 09:40-10:00 Erel, H., Ben-David, B. M., Goy, H., and Schneider, B. A., Interdisciplinary Center Herzliya.
You can step into the same river twice – additive effects of cohort and aging on vocabulary scale across 16 years.
- 10:00-10:20 Yachini, M., Szterman, R., and Friedmann, N., Tel Aviv University.
Reading from a different angle.
- 10:20-10:40 Jaffe-Dax, S., Raviv, O., Jacoby, N., Loewenstein, Y., and Ahissar, M., The Hebrew University of Jerusalem.
Towards a computational model of dyslexia.

10:40-11:10: Coffee break

Wednesday, February 25th – Talk session 3 (11:10-12:50)

Symposium 2: Individual Differences in Perceptual and Cognitive Research (Room A)

Discussant: Leah Fostick

- 11:10-11:30 Fostick, L., and Babkoff, H., Ariel University.
Perceptual strategies in auditory temporal order judgment (TOJ).
- 11:30-11:50 Meiran, N., Pereg, M., and Braver, T. S., Ben Gurion University of the Negev.
Intention-based reflexivity and working memory: A conjoint experimental-correlational approach.
- 11:50-12:10 Mama, Y., and Icht, M., Ariel University.
Individual differences in the production effect in memory.

- 12:10-12:30 Algom, D., Tel Aviv University.
Individual differences pose a threat to the unique interpretation of a given Stroop effect.
- 12:30-12:50 Babkoff, H., and Fostick, L., Ashkelon Academic College.
Aging, speech comprehension and Individual differences.

Talk session 3: Attention (Room B)

Chair: Nurit Gronau

- 11:10-11:30 Gronau, N., Amar, R., Izoutcheev, A., Nave, T., and Ravreby, I., Open University of Israel.
The necessity of attention to scene 'Gist' perception: the role of local-global factors and of task relevance.
- 11:30-11:50 Carmel, T., and Lamy, D., Tel Aviv University.
Object-file updating and attentional capture.
- 11:50-12:10 Burnett, K., Arend, I., and Henik, A., Ben-Gurion University of the Negev.
Motion orients attention automatically.
- 12:10-12:30 Salti, M., El Karoui, I., Maillet, M., and Naccache, L., Ben-Gurion University of the Negev.
Choice induced preference change relies on episodic memory and attention.
- 12:30-12:50 Baruch, O., and Goldfarb, L., University of Haifa.
Attentional modulation of visual acuity has the shape of a Mexican Hat: implications to a bottom-up process.

Talk session 3: Numerical Cognition (Room C)

Chair: Dana Ganor

- 11:10-11:30 Ganor-Stern, D., Achva Academic College.
The computation estimation skills of adults with dyscalculia.
- 11:30-11:50 Ashkenazi, S., The Hebrew University of Jerusalem.
Domain-specific and domain-general effects on strategy selection in complex arithmetic: Evidence from ADHD and normally developed college students.

- 11:50-12:10 Dotan, D., and Friedmann, N., Tel Aviv University.
Three distinct components in the visual parsing of numbers.
- 12:10-12:30 Sar-Avi, O., Schiff, R., and Henik, A., Bar-Ilan University.
Domain-general and basic numerical processing abilities in developmental dyscalculia versus arithmetic fact retrieval deficit.
- 12:30-12:50 Goldman, R., and Tzelgov, J., Ben-Gurion University of the Negev.
The emergence of linear ordering in long term memory: the role of end stimuli.

12:50-15:00: Lunch

Wednesday, February 25th – Talk session 4 (15:00-17:00)

Symposium 3: Consciousness Research: Methods and Measures (Room A)

Discussant: Dominique Lamy

- 15:00-15:20 Lamy, D., and Peremen, Z., Tel Aviv University.
How to measure unconscious processing?
- 15:20-15:40 Mudrik, L., Maoz, U, Rivlin, R., Yaffe, G., Adolphs, R. & Koch, C., Tel Aviv University.
Neural precursors of decisions that matter – an ERP study of consciousness' role in deliberate versus random choices.
- 15:40-16:00 Goldstein, A., Rivlin, I., and Hassin, R., The Hebrew University of Jerusalem.
Unconscious processing of dynamic stimuli.
- 16:00-16:20 Hesselmann, G., Charité Universitätsmedizin Berlin.
Weighing the evidence for a dorsal processing bias under continuous flash suppression.
- 16:20-16:40 Symposium speakers
Discussion

Talk session 4: Emotion (Room B)**Chair:** Michal Lavidor

- 15:00-15:20 Goldstein, P., Weissman-Fogel, I., Yellinek, S., and Shamay-Tsoory, S., University of Haifa.
Getting in touch: empathy predicts an experimental pain reduction during touch.
- 15:20-15:40 Goldberg, H., Malach, R., Christensen, A., Flash, T., and Giese, M., Weizmann Institute.
Emotion is in the brain of the beholder – Selective cortical activation to perceived emotional stimuli induced by dynamic avatars.
- 15:40-16:00 Sidi, Y., Ackerman, R., and Erez, A., Technion.
The role of positive affect in metacognitive processes: Does happiness make us meta-smarter?
- 16:00-16:20 Davidovitch, S., Mor, N., and Yovel, I., The Hebrew University of Jerusalem.
Observer perspective as an effective method in relation to brooding thoughts.
- 16:20-16:40 Naor, N., Okon-Singer, H., and Shamay-Tsoory, S., University of Haifa.
Down (regulation) to a T: The regulation of empathy to pain and its effect on empathic accuracy.
- 16:40-17:00 Jospe, K., and Lavidor, M., Bar-Ilan University.
Embodiment and empathy: two sides of the same evolutionary coin?

Talk session 4: Perception and Learning (Room C)**Chair:** Yaffa Yeshurun

- 15:00-15:20 Freud, E., Avidan, G., and Ganel, T., Ben-Gurion University of the Negev.
Coarse to fine-grained representation of object 3D structure.
- 15:20-15:40 Szpiro, S., and Carrasco, M., New York University.
Perceptual learning of direction discrimination reflects increased overestimation.
- 15:40-16:00 Glicksohn, A., and Cohen, A., The Hebrew University of Jerusalem.
The role of multisensory information in statistical learning.
- 16:00-16:20 Eitan, R., The Hebrew University of Jerusalem.
Lateralization of emotional and cognitive functions of the human sub-thalamic nucleus.

- 16:20-16:40 Rashal, E., Yeshurun, Y., and Kimchi, R., University of Haifa.
Competition between grouping principles: a primed-matching study.
- 16:40-17:00 Schwartz, L., and Yovel, G., Tel Aviv University.
The role of perceptual and semantic information in face recognition.

Wednesday, February 25th – Poster session 2 (17:00-19:00)

Emotion

1. Yaniv, H., Bar-Ilan University.
A microgenetic approach to the effects of anxiety on cognition emotion.
2. Shafir, R., Schwartz, N., Blechert, J., and Sheppes, G., Tel Aviv University.
Emotional intensity influences pre-implementation and implementation of distraction and reappraisal.
3. Itkes, O., Kron, A., and Eviatar, Z., University of Haifa.
EMG study of mixed emotions.
4. Saban, W., University of Haifa.
Sometimes, the solution is in the middle. Re-examination of the interaction between negative stimuli and internal load.
5. Izoutcheev, A., Shuster, O., Perry, D., and Hendler, T., Tel Aviv University.
Can words create reality? Effects of framing on attentional bias.

Learning

6. Gabay, Y., Karni, A., and Banai, K., University of Haifa.
The effect of training protocol on the perceptual learning of time-compressed speech and its generalization.
7. Kahta, S., and Schiff, R., Bar-Ilan University.
Exploring the underlying mechanisms of statistical learning (SL) among adults with developmental dyslexia (DD): Evidence from artificial grammar learning (AGL).
8. Gavish, N., Krisher, H., and Madar, G., ORT Braude College.
The effect of feedback on puzzle completion task training.

Memory, Metamemory and Reasoning

9. Portnoy, S., and Pansky, A., University of Haifa.
Effects of initial question difficulty on eyewitness memory performance via metacognitive processes of monitoring and control.
10. Shapira, A., and Pansky, A., University of Haifa.
Eyewitness memory accuracy over time: Cognitive and meta-cognitive determinants.
11. Goldenberg, M., Babai, R., and Stavy, R., Tel Aviv University.
Conflict intervention improves students' ability to overcome intuitive interference in geometry.

Numerical Cognition

12. Pinhas, M., Shaki, S., and Fischer, M. H., Ariel University.
Addition goes where the big numbers are: Evidence for a reversed operational momentum effect.
13. Eidlin-Levy, H., Wohl, H., Akibili, O., and Rubinsten, O., University of Haifa.
A novel implicit task for the measurement of mathematic anxiety.
14. Cohen, Z., and Henik, A., Ben-Gurion University of the Negev.
Tactile enumeration using one hand and the effects of training.
15. Gliksman, Y., Naparstek, S., Ifergane, G., and Henik, A., Ben-Gurion University of the Negev.
A case study of acalculia.
16. Mannes, Y., Krimolowsky, M., Cohen, Z. Z., and Henik, A., Ben-Gurion University of the Negev.
The embodiment of finger counting strategy and tactile enumeration.
17. Melman, Y., and Henik, A., Ben-Gurion University of the Negev.
Conceptual size and numerical value interactions in picture-digit combined stimuli.
18. Dotan, D., and Dehaene, S., INSERM.
The origins of logarithmic number-to-position mapping.
19. Heimler, B., Behor, T., Deheane, S., and Amedi, A., The Hebrew University of Jerusalem.
Core knowledge of geometry develops without visual experience.

20. Furman, T., and Rubinsten, O., University of Haifa.

Mathematical proficiency: The involvement of approximate and exact symbolic and non symbolic operations.

Perception

21. Mardo, E., Hadad, B., and Avidan, G., University of Haifa.

Developing behavioral tools for diagnosing face perception difficulties in 6-14 years old children.

22. Fitousi, D., Ariel University.

Are composite faces processed holistically? Evidence from workload capacity measures.

23. Buchs, G., Maidenbaum, S., and Amedi, A., The Hebrew University of Jerusalem.

Non-visual obstacle detection and avoidance using the 'EyeCane' sensory substitution.

24. Hilo, R., and Yuval-Greenberg, S., Tel Aviv University.

Trans-saccadic processing of high-level feature information.

25. Tkacz-Domb, S., and Yeshurun, Y., University of Haifa.

The effects of precueing the target location on temporal crowding.

26. Hochmitz, I., and Yeshurun, Y., University of Haifa.

Temporal and spatial integration at different regions of the visual field.

27. Soloveichick, M., Kimchi, R., and Gabay, S., University of Haifa.

Subcortical involvement in global and local processing.

28. Lev, M., and Polat, U., Tel Aviv University.

Reaction time predicts implicit processing load and visual crowding effect.

29. Peer, M., and Lyon, R., The Hebrew University of Jerusalem.

Orientation and disorientation: lessons from patients with epilepsy.

30. Hahamy, A., and Behrmann, M., Weizmann Institute.

The idiosyncratic brain: Spatial distortion of spontaneous connectivity patterns in adults with autism spectrum disorder.

31. Yitzhak, N. and Aviezer, H. The Hebrew University of Jerusalem.

Less is more: A new set of subtle and dynamic facial expressions.

32. Reznik, D., Henkin, Y., Levy, O. and Mukamel, R., Tel Aviv University.
Perceived loudness of self-generated sounds is differentially modified by expected sound intensity.
33. Wilf, M., Strappini, F., Harel, M., Golan, T. & Malach, R., Weizmann Institute.
More than meets the eye: Correspondence of retinotopic visual areas organization during resting state, beep detection and natural viewing.
34. Levy, J., Vidal, J. R., Fries, P., Démonet, J-F, & Goldstein, A., Bar-Ilan University.
Evidence of Piecemeal Conscious Perception through Distinct High-frequency Markers in the Visual Word Form Area.

Visual Working Memory

35. Allon, A., and Luria, R., Tel Aviv University.
Compensation mechanisms for poor filtering ability in visual working memory.
36. Balaban. H., and Luria, R., Tel Aviv University.
The online updating of separating items in visual working memory.
37. Hansel-Lesmy, M., Kilner. J., and Goldstein, A., Bar-Ilan University.
Evidence for predictive coding in the human motor system: a MEG study.
38. Rac, R., and Kessler, Y., Ben-Gurion University of the Negev.
The n-reference task: Separating the contribution of WM updating, automatic updating, matching and gating to n-back performance.

Attention in Aging and Childhood, ADHD

39. Erel, H., Levy, D., and Ben-David, B., Interdisciplinary Center Herzliya.
Aging influences on the ventral and dorsal fronto-parietal attentional networks.
40. Kolodny, T., Misgav, K., Keha, E., Luria, R., and Shalev-Mevorach, L.,
The Hebrew University of Jerusalem.
ERP correlates of sustained attention and response inhibition among adults with and without ADHD.
41. Benoni, H., Yurowitz, R., Abogov, Y., Shalev-Mevorach, L., and Gronau, N., Open University of Israel.
Stimuli-intensive environments may, counter-intuitively, decrease distraction in ADHD.

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42. Margalit-Shalom, L., Pollak-Lachisch, S., and Shalev-Mevorach, L., Tel Aviv University.
The relation between visual perception, attention and behavioral symptoms in preschoolers.
 43. Mohaban, D., Shalev-Mevorach, L., and Luria, R., Tel Aviv University.
The relations between visual working memory and visual attention in adults with and without ADHD.
 44. Shoham, R., Pollak, Y., and Yaniv, I., The Hebrew University of Jerusalem.
Do people with ADHD symptoms seek more risks?
 45. Strommer, N., Okon-Singer, H., Lichtenstien-Vidne, L., and Richter-Levin, G., University of Haifa.
Is ADHD solely an executive attention problem? Interference effects of visual emotional distractors in adults with ADHD.
 46. Tron, T. and Weinshall, D., The Hebrew University of Jerusalem.
Automated analysis of non-verbal behavior in schizophrenic patients.

Thursday, February 26th

09:00-10:00 Business meeting

10:00-10:20 Coffee break

Thursday, February 26th – Talk session 5 (10:20-12:20)

Symposium 4: Working Memory: Structure and Processes (Room A)

Discussant: Roy Luria

- 10:20-10:40 Luria, R., Balaban, H., and Allon, A., Tel Aviv University.
How complex information is represented in visual working memory?
- 10:40-11:00 Pertzov, Y., The Hebrew University of Jerusalem.
Forgetting in working memory: mechanisms and implications.
- 11:00-11:20 Makovski, T., Open University of Israel.
Working memory and long-term memory: A two-way street.
- 11:20-11:40 Kessler, Y., Ben-Gurion University of the Negev.
The role of controlled gating in working memory updating.
- 11:40-12:00 Symposium speakers
Discussion

Talk session 5: Attention in Aging and Childhood, ADHD (Room B)

Chair: Boaz Ben-David

- 10:20-10:40 Salner, N., Friedmann, N., and Chajut, E., Tel-Aviv University.
Spatial attention affects letter position errors in short exposure.
- 10:40-11:00 Shalev-Mevorach, L., Luria, R., Saar, K., Nesterovsky, I., Stern, P., and Styr, B.,
Tel Aviv University.
Executive attention in adults with and without ADHD – an ERP study.
- 11:00-11:20 Shakuf, V., and Ben-David, B. M., Interdisciplinary Center Herzliya.
Stroop effects in Alzheimer's disease: Selective attention, speed of processing
or color-naming?

- 11:20-11:40 Ben-David, B. M., Eidels, A., and Donkin, C., Interdisciplinary Center Herzliya. Effects of aging and distractors on detection of redundant visual targets and capacity: Do older adults integrate visual targets differently than younger adults?
- 11:40-12:00 Segal, D., Shalev-Mevorach, L., and Mashal, N., The Hebrew University of Jerusalem. Attenuated hemispheric specialization in metaphor processing among adults with ADHD.
- 12:00-12:20 Naveh, C., Azulai, O., Shoham, D., Baruch, S., and Shalev-Mevorach, L., Tel Aviv University. The relation between attentional functioning and spatial representation of Arabic numbers in children.

Talk session 5: Metacognition, Reasoning, Judgment and Decision Making (Room C)

Chair: Baruch Eitam

- 10:20-10:40 Marciano-Romm, D., Bourgeois-Gironde, S., Bentin, S., and Deouell, L. Y., The Hebrew University of Jerusalem. Looks like a bad sign: EEG and behavioral data reveal a biased perception of correlation between the outcomes of choice options.
- 10:40-11:00 Shoval, R., and Eitam, B., University of Haifa. Going to extremes: Accentuation of option features as an integral part of the process of choice.
- 11:00-11:20 Moran, R., Teodorescu, A., and Usher, M., Tel Aviv University. After the choice comes confidence: Post choice information integration as a causal determinant of confidence.
- 11:20-11:40 Abofol, T., Yechiam, E., and Pachur, T., Technion. The seller's sense: How well do selling and buying prices track an object's actual value?
- 11:40-12:00 Guterman, Y., Tel Hai College. Gender moderates self-construal priming effects in visual context sensitivity, but not in reasoning.

12:20-13:20 Light Lunch (provided by hostel)

Thursday, February 26th – Talk session 6 (13:20-15:20)**Symposium 5: From Numeric Cognition to Decision-Making: Common Processes and Interactions (Room A)****Discussants:** Marius Usher and Avishai Henik

- 13:20-13:40 Usher, M., and Henik, A., Tel Aviv University.
Introduction – numerical representations and decision processes.
- 13:40-14:00 Kallai, A., Stavy, R., and Babai, R., Emek Yezreel Academic College.
Not all ratio comparisons are created equal: an fMRI study.
- 14:00-14:20 Algom, D., Rapp, J., and Kareev, Y., Tel Aviv University.
Violations of standard statistical and mathematical theory in human cognition.
- 14:20-14:40 Brezis, N., Bronfman, Z., and Usher, M., Tel Aviv University.
Averaging numerical values: behavioral data and neural mechanism.
- 14:40-15:00 Levy, D., and Sela, T., Tel Aviv University.
The precedence of global features directs value-based decisions.
- 15:00-15:20 Yechiam, E., Rakow, T., and Newell, B., Technion.
Processing of rare events: When numeric information leads to super-underweighting of rare events.

Talk session 6: Consciousness and Attention (Room B)**Chair:** Dominique Lamy

- 13:20-13:40 Bronfman, Z., and Usher, M., Tel Aviv University.
We see more than we can report: “cost free” color phenomenality outside focal attention.
- 13:40-14:00 Gelbard-Sagiv, H., Faivre, N., Mudrik, L., and Koch, C., Tel Aviv University.
Pulling the rug from under high-level unconscious processing: low-level awareness during continuous flash suppression.
- 14:00-14:20 Bergerbest, D., Shilkrot, O., Joseph, M., and Salti, M., Academic College of Tel Aviv-Yaffo.
Right-field advantage in the attentional blink: Hemispheric differences in mechanisms behind attentional episodes.
- 14:20-14:40 Zivony, A., and Lamy, D., Tel Aviv University.
Capture and engagement of attention during the attentional blink.

- 14:40-15:00 Pirkner, Y., and Kimchi, R., University of Haifa.
Multiple levels crowding: Between object parts and between object configural representations.

Talk session 6: Neuropsychiatry (Room C)

Chair: Yoram Bonne and Michael Peer

- 13:20-13:40 Bergmann, E., & Kahn, I., Technion.
Resting state functional MRI: Tools for studying brain systems organization in health and disease.
- 13:40-14:00 Hahamy, A., Sotiropoulos, S., Henderson Slater, D., Malach, R., Johansen-Berg, H., and Makin, T. Weizmann Institute.
Normalization of brain connectivity through compensatory behavior despite congenital hand absence.
- 14:00-14:20 Saadon Grosman, N., Tal, Z., Itshayek, E., Amedi, A., and Arzy, S., The Hebrew University of Jerusalem.
Disorganization of somatosensory cortical gradients reflects pathological signal conduction.
- 14:20-14:40 Katz, G., Adini, Y., Hetzroni, O., and Bonne, Y., University of Haifa.
Procedural skill learning in young low-functioning autistic children and the effect of vestibular stimulation.
- 14:40-15:00 Hendler, T., Tel Aviv University.
Affective dysregulation as Ups and Downs of the Motivation Pendulum.

ABSTRACTS

KEYNOTE LECTURE

TUESDAY, FEBRUARY 24th 2015, 17:30

To be or not to be an unconscious semantic representation? A tragi-comedy in V acts.

Prof. Lionel Naccache, ICM (Paris)

One of the most debated issues in the field of unconscious cognition deals with semantics: is it possible to process a non-consciously reportable visual (or auditory) stimulus up to semantic representational levels? During this lecture, I will present the five acts of this major scientific story of cognitive psychology which began in the early 80s. Interestingly, each of these acts provided important theoretical and methodological insights which structured successive stages of research. For instance, the methodology used to probe conscious visibility evolved from a loosely defined approach to a rigorous combination of both objective and subjective measures. Similarly, interpretation of priming effects increased in subtlety and complexity. Moreover, beyond the mere issue of unconscious semantics, this story revealed unexpected findings such as the existence of major top down influences originating from the current conscious posture (e.g.: instructions, task setting, stimulus sets, expectations, endogenous spatial and temporal attention,...) on many unconscious cognitive processes. These recent studies challenge the traditional view of unconscious processes conceived as being necessarily automatic and modular, and they convey important principles constraining any scientific theory of consciousness. Finally, I will compare conscious and unconscious semantic processing, and show how semantic processing can be probed in non-communicating patients.

TUESDAY, FEBRUARY 24TH 2015 – TALK SESSION 1

Talk session 1: Perception (Room A)

The role of the body and motion in person recognition

Simhi, N. and Yovel, G. Tel Aviv University, Israel.

The majority of studies on person recognition have focused on the role of static faces. In this study we examined the contribution of the body and motion to the process. To this end we presented either videos of a person walking or multiple still images from videos and asked subjects to recognize the identities shown from novel images of either the full body, face or body alone. We found that the body contributed to person recognition beyond the face only after exposure to videos. When no dynamic information was available, person recognition from the full body was no better than person recognition from the face alone. Furthermore, we found that the body contributed more to person recognition when facial information was less available. Overall, these findings suggest that the body and motion contribute to whole person recognition from still images beyond the information that can be obtained from faces alone.

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Selective activation in the lateral occipital cortex and a massive occipital deactivation for passive touch

Tal, Z., Amedi, A. and Geva, R. The Hebrew University of Jerusalem, Israel.

Recent evidence suggests that many visual areas are task-oriented sensory modality input independent rather than sensory-specific to vision. However, this theory is still controversial in mainstream neuroscience. In the current study, we addressed this question using a series of fMRI experiments aimed to explore the responses in the visual cortex to passive touch (PT) on various parts of the body. Passive touch on the hand and shoulders triggers specific activation in the tool selectivity parts of the lateral occipital (LO) complex which is surrounded by massive deactivation in the entire visual cortex. This was further supported by a unique pattern of functional connectivity between visual cortex and Penfield's homunculus. We suggest that tactile LO is a fundamental hub which serves as a node between object-related areas in the visual cortex and the somatosensory hand representation, probably due to the critical evolutionary role of touch in tools recognition and manipulation.

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Conceptual size representation in ventral visual cortex

Gabay, S.¹, Kalanthroff, E.², Henik, A.³, and Gronau, N.⁴ [1] University of Haifa, Israel. [2] Columbia University, USA. [3] Ben-Gurion University of the Negev, Israel. [4] The Open University, Israel.

The present study examined the existence of an abstract size representation along the ventral temporal cortex. We presented participants with meaningless geometrical shapes, devoid of semantic or functional associations, which were associated with specific size representations by virtue of extensive training. Following training, participants underwent functional magnetic resonance imaging (fMRI) scanning while performing a conceptual size comparison task on the geometrical shapes. In addition, a size comparison task was conducted for digits denoting small and big numbers. A region-of-interest analysis revealed larger blood oxygenation level dependent (BOLD) responses for conceptually 'big' than for conceptually 'small' shapes, as well as for big vs. small numbers, within the parahippocampal place area. Processing of the 'big' visual shapes further elicited enhanced activation in early visual cortex. By using arbitrary shapes and numbers we minimized visual, categorical, or functional influences on fMRI measurement, providing evidence for an abstract conceptual size representation in the ventral visual cortex.

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Ventral visual pathway (and ventral EBA) only critical for person perception, not for biological motion perception: Evidence from patients and a model suggestion

Gilaie-Dotan, S. University College London, UK.

Different posterior cortical regions are consistently activated when viewing body movements or static body images (pSTS, FBA, and EBA), yet their distinct functional roles and how they code information remains elusive. Using paradigms that are sensitive to deficits in biological motion perception (Saygin 2007), we tested 6 patients with ventral visual lesions and 3 control groups (including n>50 brain damaged patients with spared ventral cortex). We found that ventral visual cortex is not critical for biological motion perception and sensitivity, as evident from the patients' effortless recognition of point light displays and their normal perceptual thresholds. Importantly, ventral patients performed significantly better than patients with damage to regions critical for biological motion perception. Fine grained lesion-function comparison revealed that ventral aspects of the form pathway are not critical for biological motion perception. However, these ventral patients have form perception deficits including form and face agnosia where they cannot recognize people from full-body static images. Following these and previous findings I propose a model that outlines the critical functional contribution of pSTS to biological motion perception, and of the ventral aspect of the form pathway to human form perception. pSTS processes kinematics of self-moving objects partly by relying on low resolution static body-in-motion snapshots. Fusiform regions that engage in form representations retain high resolution representation of human form, with enhanced

multi-view/posture representation for self-moving objects due to their varying appearances. The model posits that these representations are experience-based, explaining the sensitivities to biological motion [human body] in pSTS [FBA], the biological motion inversion effect (absence of exposure to inverted stimuli leads to absence of representation), and other findings. Furthermore, the model provides testable predictions.

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Blind in a virtual world: Exploring non-visual spatial perception using sensory substitution and virtual environments

Maidenbaum, S., Buchs, G. and Amedi, A. The Hebrew University of Jerusalem, Israel.

There are many known differences between the spatial perception of sighted and blind individuals. Are these differences based on innate differences in spatial processing stemming from lack of visual information or simply on impaired perception of their environment due to this missing visual information and experience? To explore this question, we utilized auditory Sensory Substitution Devices (SSDs) as they allow the transfer of full raw visual information to blind user via other senses, and a series of tasks in dedicated graphical virtual environments which included only visual information. We demonstrate that congenitally blind participants using the EyeMusic SSD can perform virtual tasks normally impossible without vision such as finding specific objects, navigating to targets and even performing allocentric landmark-based navigation – considered extremely difficult for blind people. These results support the a-modal theory of spatial-representation, and demonstrate that the blind can indeed perform such tasks if offered the proper perceptual information.

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What is the role of the face-selective area in the pre frontal cortex?

Oron, J. and Yovel, G. Tel Aviv University, Israel.

Recent neuroimaging studies have identified a face-selective region in the human inferior frontal gyrus (IFG) but the specific role of this area remains unclear. Based on data from monkey electrophysiology, we hypothesized that the face-selective IFG located outside the visual cortex would respond to multi-modal stimuli portraying person related information. To this end we presented dynamic stimuli of human faces, human bodies and audio clips of human voices. Consistent with our hypothesis, we found that the face-selective IFG was highly selective to voice stimuli. The response to bodies was lower than the response to faces and voices. In contrast, face-selective areas in the lateral occipital cortex and fusiform gyrus were not responsive to voice stimuli. We further showed that the response of the face-selective IFG

was significantly higher to human voices than to non-vocal sounds. We conclude that the face-selective area in the IFG represents multi-modal person related information.

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Talk session 1: Memory, Metamemory and Higher Cognitive Processes (Room B)

Pre-encoding activity in the anterior insula predicts memory outcomes

Cohen, N., Ben-Yakov, A., Paz, R. and Dudai, Y. Weizmann Institute of Science, Israel.

Most studies on memory-predictive brain mechanisms have so far focused on brain activity occurring immediately after the onset of the to-be-remembered stimulus. These studies showed that regions in the medial temporal lobe (MTL), including the hippocampus, play an essential role in memory formation. The current work investigated whether memory for real-life events (simulated by audio-visual clips) is predicted by brain activity occurring prior to event onset. In two studies, participants viewed short audio-visual clips (~8 seconds) while in a 3T fMRI scanner. Following the brain scan, they performed a memory test assessing the gist of the event. We examined whether pre-encoding activity predicts subsequent memory performance, focusing on BOLD activity in the 4 seconds preceding clip onset. In both studies, anterior insula exhibited higher pre-encoding activity for subsequently remembered vs. subsequently forgotten clips. This activity may reflect the initiation of encoding processes seconds before the occurrence of the to-be-remembered event.

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Can meta-memory predict reconsolidation?

Yacoby, A.¹, Dudai, Y.¹ and Mendelsohn, A.². [1] Weizmann Institute of Science, Israel. [2] University of Haifa, Israel.

We examined whether subjective ratings of memory reactivation, assessed by Feeling-of-Knowing (FOK), could predict changes in long-term episodic memories subjected to post-retrieval manipulations, thereby informing on reconsolidation processes. A day after learning a short movie, participants were required to reactivate it by assessing their FOK regarding scenes from the movie. This was followed either immediately or one day later by learning a second unrelated movie. A final test revealed that for those who learned the new movie immediately after reactivation, the higher was their FOK ratings for the original movie, the greater their final memory declined. Conversely, no such relationship was found when the second movie was presented one day after reactivation. Our findings suggest that the extent of perceived memory accessibility upon its retrieval may interact with its susceptibility to

immediate intervention by new information, refining the conditions by which reconsolidation of episodic memory is achieved.

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"Easily learned, slowly forgotten": The effects of ease of learning on remembering and forgetting

Adiv, S. and Koriat, A. University of Haifa, Israel.

Ever since Ebbinghaus' research on verbal learning, it has been known that recall increases as a function of number of presentations. In addition, many studies indicated that recall also increases with the amount of time invested in studying the material. However, recent studies indicated that under self-controlled conditions recall actually decreases with both study time and number of presentations. Results obtained by Koriat (2008) supported the Easily Learned, Easily Remembered principle: When items were repeatedly presented for study, recall and judgment of learning (JOL) decreased with number of trials to acquisition (TTA). A recent study by Adiv and Koriat suggests that easily learned items are not only remembered better at one point in time, but are also associated with slower decline in memory with increasing retention interval. Thus, ease of learning predicts both successful recall as well as rate of forgetting.

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Data-driven and goal-driven metacognitive regulation during study: The role of effort attribution

Koriat, A. University of Haifa, Israel.

When the regulation of study effort is goal driven, monitoring affects control so that increased effort enhances feelings of competence and judgments of learning. In contrast, when regulation is data driven, monitoring may be based on the feedback from control processes, and therefore judgments of learning decrease with increasing study effort (Koriat et al., 2006, 2013, 2014). The occurrence of both types of relationship within the same task implies the operation of a delicate computation in which the total amount of study effort invested is partitioned into two components. Each of these is attributed to its source, and the opposite implications of the two components for judgments of learning are derived. Results will be presented in support for the attribution that is postulated to mediate between perceived effort and judgments of learning.

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Efficiency and labor-in-vain in problem solving under time pressure

Ackerman, R. Technion – Israel Institute of Technology.

The metacognitive literature is rich in investigations of study time regulation, while little is known about time regulation in problem solving. Memorization studies suggest that under time pressure people use adaptive strategies—lower their target level and waive the most challenging items. However, they also work by items' presentation order, which is inefficient. The present study examined the parallel regulatory behavior when solving problems, with and without time pressure. Overall, time pressure promoted efficiency, while loose timeframe induced labor-in-vain. However, participants under time pressure also showed labor-in-vain, by investing longer in the initial problems than in later ones, with equivalent outcomes. Finally, the participants wasted time in struggling with the most challenging problems. This labor-in-vain replicated even when the most challenging problems were marked, and when receiving explicit explanation encouraging waiving the challenging problems. Methods for improving problem solving efficiency are called for.

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Searching for neurocognitive differences between low and high creative persons

Kenett, Y., Anaki, D. and Faust, M. Bar-Ilan University, Israel.

According to the associative theory of creativity, higher creative individuals should have a richer and more flexible associative network than less creative individuals. Based on this theory, we propose that semantic creativity involves efficient search processes constrained by semantic memory structure. We suggest that what differentiates between low and high creative persons is the structure of their semantic memory and the search processes commenced upon it. To empirically examine these differences, we employ a multidisciplinary research on low and high creative persons, combining computational, behavioral and electrophysiological paradigms. In a series of studies, we show how high creative persons, compared to low creative persons, (a) have a more flexible semantic memory network, (b) are quicker to generate associative responses, and (c) generate more unique associative responses. Furthermore, high creative persons are better at processing long associative distances, as manifested by differential EEG evoked response potentials (e.g., the N400 component).

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Talk session 1: Language 1 (Room C)

Digging up the building blocks of language: Age-of-acquisition effects for multiword phrases

Arnon, I.¹, McCauley, S.² and Christiansen, M. H.². [1] The Hebrew University of Jerusalem, Israel. [2] Cornell University, USA.

Early-acquired words show processing advantages in a variety of tasks. Lexical age-of-acquisition (AoA) effects highlight the role of words as early building blocks and provide a way of examining language learning by looking at adult processing. Here, we show that AoA effects are not limited to words, but are also found for multiword sequences, providing evidence for the importance of multiword units in language learning. We use a phrasal decision task to compare processing times for matched early- and late-acquired three-word sequences: both variants occurred equally often in adult language and were matched on part-frequencies and lexical AoA but differed in multiword AoA. Three-word sequences that were learned earlier – estimated using corpus frequencies and subjective ratings – were responded to faster and more accurately than later-acquired sequences. Our findings provide novel support for usage-based models of learning and undermine the traditional distinction between words and larger patterns in processing.

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The influence of bilingualism and socioeconomic status (SES) on language proficiency and verbal working memory

Meir, N. and Armon-Lotem, S. Bar-Ilan University, Israel.

Our study explores the influence of bilingualism and socio-economic status (SES) on the linguistic skills and verbal working memory (VWM) of preschool children. 120 children with typical language development aged 5;7-6;7 were classified into four groups by language status (bilinguals vs. monolingual) and SES (low vs. mid-high). The four groups were matched on age and non-verbal IQ. Children's language proficiency (LP) in Hebrew was measured using the Goralnik Screening Test for Hebrew. VWM was measured by: (1) Forward Digit Span (FWD-S), (2) Non-word repetition (NWR) task and (3) Sentence repetition (SR). FWD-S, NWR and SR, all underpin VWM, however, they differ in linguistic load. No effect of bilingualism was associated with verbal working memory (FWD-S and NWR); bilingualism was associated with lower LP and lower performance on the SR task, which has the highest verbal load. SES was associated with lower LP and decreased verbal working memory capacity (FWD-S and SR).

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Production after brief exposure to a different language: A tip-of-the-tongue study**Degani, T.¹ and Kreiner, H.²** [1] University of Haifa, Israel. [2] Ruppin Academic Center, Israel.

We examined how production in one language is affected by recent brief experience with a different language. Using a Hebrew picture-naming task, Tip-of-the-Tongue (TOT) rates of Russian-Hebrew bilinguals who acquired Hebrew early or late were compared to those of native Hebrew speakers, before and after watching a short Russian movie. The results show that before the movie, late bilinguals exhibited higher TOT rates than monolinguals and early bilinguals who did not differ from each other. Critically, following the movie late and early bilinguals showed a larger increase in TOT rates compared to native Hebrew speakers. These findings highlight a dynamic bilingual system in which both sustained and transient language factors operate to influence performance. Further, a small increase in TOTs for Hebrew speakers following the Russian movie suggests that even exposure to an unknown language may hinder performance, presumably by changing the activation balance and accessibility of one's native language.

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Quantification and levels of linguistic knowledge**Novogrodsky, R.¹ and Shetreet, E.²** [1] University of Haifa, Israel. [2] Tufts University, USA.

Quantifiers ("each", "all" or "kol" in Hebrew) interface language and conceptual structures. In Hebrew, their distributive and collective meanings are represented in morphology (kol yeled/kol hayeladim). We examined the developmental trajectory of this knowledge. Ten preschool children and 10 adults were asked to match a sentence to one of two pictures which represented the two meanings of the quantifier (Mother put each cat/all cats in the basket). They were also asked to draw pictures (Draw a boat to each dwarf/all dwarfs). Children performed significantly lower than adults in both tasks. Children showed no difference between the conditions in the picture-matching task, but they were better drawing the distributive meaning compared with the collective. These results show that preschoolers already have some linguistic and cognitive quantification knowledge, and that presenting the two contrastive meanings facilitates their performance. Differences with English (where quantifier meanings are represented in the lexicon) will be discussed.

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Morphological processing during visual word recognition in Hebrew as a first and a second language

Norman, T.¹, Degani, T.² and Peleg, O.¹ [1] Tel Aviv University, Israel. [2] University of Haifa, Israel.

The present study compared patterns of morphological processing in Hebrew as a first and a second language. To examine the influence of L1's morphological background, three groups of Hebrew readers were tested in a visual lexical decision task: Native Hebrew readers, proficient L2 Hebrew readers who's L1 was English, and proficient L2 Hebrew readers who's L1 was Arabic. Critical stimuli included non-word letter-strings manipulated to include or exclude real Root and Word-Pattern morphemes. Results demonstrate a significant interaction between Root and Word-Pattern in all groups. Thus, native and non-native proficient readers exhibited increased sensitivity to the joint presence of the two morphemes, irrespective of L1 background. Further, the latency data of the Native Hebrew readers show that a Word-Pattern alone was more confusing than a Root alone for this group, highlighting the crucial role of the Word-Pattern in the identification of the Root and in Hebrew word processing more generally.

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Linguistic performance as a case for statistical regularities for adequate readers and among dyslexics

Kimel, E. and Ahissar, M. The Hebrew University of Jerusalem, Israel.

The "anchoring-deficit" hypothesis (Ahissar et al., 2006) suggests that Dyslexics have a difficulty in automatic extraction of stimulus regularities in sound sequences. This suggestion is supported by experimental findings using verbal and non-verbal stimuli, where novel regularities were introduced during the session. The current study was aimed to assess the impact of long-term regularities with which listeners had life long experience (e.g. native language). Our assumption was that this familiarity would enhance Controls' performance more than Dyslexics'. We addressed this in a series of three experiments: syllable span with frequent and infrequent syllables, digit spans in English and Hebrew (all subjects were native Hebrew speakers) and a vocabulary acquisition experiment, in which some of the words had familiar structure (Hebrew morphology) and some did not. Consistent with our hypothesis, in all three experiments Dyslexics did not benefit as much as Controls from the long term statistics associated with the input.

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TUESDAY, FEBRUARY 24TH 2015 – POSTER SESSION 1

Memory

Semantic unitization modulates associative recognition processes

Tibon, R.¹, Gronau, N.², Scheuplein, A. L.³, Mecklinger, A.³ and Levy, D.¹ [1] Interdisciplinary Center Herzliya, Israel. [2] The Open University, Israel. [3] Saarland University, Germany.

Although memory of episodic associations is generally considered to be recollective, it has been suggested that when stimuli are experienced as a unit, familiarity processes might contribute to their subsequent associative recognition. To investigate the effect of semantic relatedness during episodic encoding on associative retrieval processes, we had participants interactively encode pairs of object-pictures, vertically arranged so as to suggest a functional or configural relationship between them. Half the pairs were related objects (e.g., a lamp over a table) and half were unrelated objects (e.g., a key-ring over an apple). At test, participants discriminated between intact, recombined, and new pairs while ERPs were recorded. In an early ERP marker of associated with familiarity processes, differences related to associative memory only emerged for related pairs, while differences associated with item memory emerged for both related and unrelated pairs. This may indicate that retrieval of episodic associations formed between semantically related visual stimuli can be supported by familiarity-related processes.

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Semantic novelty is disadvantageous to encoding, even when distinct

Reggev, N. The Hebrew University of Jerusalem, Israel.

Novelty is a key player in cognitive studies. In its typical episodic instantiation, novelty is characterized by superior memory. However, some models suggest that our cognitive system should have a preference for repetition (familiarity). Support for this notion is seen, for instance, in the robust congruency effect, which utilizes a different novelty/familiarity manipulation - in/congruency with previous knowledge. Note, however, that in contrast to most novelty paradigms, congruency studies utilize similar proportions of novel and familiar events, thus possibly explaining away the differences by rendering novel events indistinct. We demonstrated that even when novelty was infrequent it still did not gain an advantage over repetition, both in a context involving several novel stimuli (experiment 1) or a single one (experiment 2). These results suggest that the congruency (repetition) advantage cannot be attributed to paradigmatic artifacts; thus it continues to challenge models that focus on the mnemonic advantage of novelty per-se.

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How cortical damage affects memory: The things that you li'ble to read in the manual – it ain't necessarily so

Ben-Zvi, S.¹, Levy, D.¹ and Soroker, N.^{2,3} [1] Interdisciplinary Center Herzliya, Israel. [2] Tel-Aviv University, Israel. [3] Lowenstein Rehabilitation Hospital, Israel.

The Wechsler Memory Scale (WMS) is a neuropsychological test battery widely used as a diagnostic tool for memory impairments. However, little is known about how brain damage affects performance on its various tests and indices. Examining stroke patients with mainly middle cerebral artery territory lesions, we studied the neural basis of WMS-III performance using the voxel-based lesion-symptom mapping (VLSM) and area lesion extent-performance correlations. Results suggest a complex pattern of correlations between lesions and memory impairments, implicating areas not traditionally identified as affecting memory competence. Furthermore, examination of the coherence between test components of WMS indices yields results that may question the interpretative value of those indices. Our data suggests the need for alternative methods of memory test categorization and interpretation.

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Motor control strategies in the mirror drawing task: A comparison of three age groups

Julius, M. and Adi-Japha, E. Bar-Ilan University, Israel.

Procedural learning was examined in 60 participants (20 kindergarteners, 20 grade two children and 20 young adults) using the Mirror Drawing task. Two sessions per day over two consecutive days were studied. The number of sides completed, correctly produced sides, segment-error ratio (errors divided by sides) and reversals were measured in both the learning and consolidation (the improvement from the second session on day1 to the first session on day 2) stages. Our results show that kindergarten children did not produce even a single no-error side and did not achieve consolidation. Children in grade two and adults improved their performance between days in terms of the number of correct sides produced and the segment-error ratio. The motor control strategies that each age group used in attempting to adapt to visual distortion differed and possible implications will be discussed.

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Best conditions for multiplication facts memory

Mark-Zigdon, N. and Katzoff, A. Levinsky College of Education, Israel.

The aim of this study is to explore the best conditions for declarative memory formation in the classroom. As a model, we used learning of basic multiplication facts (e.g., $8 \times 7 = 56$), since neurocognitive studies provided evidence that memorized multiplication facts involve verbal

brain areas. Declarative memory formation consists of 2 labile phases requiring stabilization: consolidation and reconsolidation. In these phases, memory can be impaired if new competing learning tasks turn up. In this study, third graders were trained to memorize multiplication facts. For the consolidation phase we used different kinds of interferences and at the reconsolidation phase different time measures for reactivation. We found that memory was disrupted if there was interference during the two labile phases with new competing learning especially with similar information. Furthermore, timing influences the strength of the interference on reconsolidation. These results have practical application for learning and teaching declarative mathematical information. .

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Challenges to episodic memory – the neural correlates of proactive-interference and divided attention

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In everyday life memory is encumbrance by internal and external interferences, yet it is unclear to what degree resolving both types of interferences relies on shared neural substrates. Using functional magnetic resonance imaging (fMRI), we investigated the issue, introducing internal interference by proactive interference (PI) and external interference by divided attention (DA). Short movies were presented at encoding. Activation and inter-subject correlation (inter-SC) analyses were used to capture aggregated neural responses and moment-by-moments dynamics, respectively. PI and DA overlapped in the precuneus and ventro-medial prefrontal cortex (vmPFC). Precuneus' activation increased due to PI and decreased due to DA, possibly owing to changes in the representations of information. The vmPFC had increased inter-SC under both challenges, presumably reflecting its generic role in tracking and resolving interferences from different sources. The use of two analytic methods suggested that each region supported different cognitive process.

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Modifying episodic memory via reconsolidation

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Reconsolidation is initiated by cued reactivation that renders long-term memory transiently susceptible to amnesic agents. It is considered to involve memory updating. We investigated whether episodic memory could be modified via reconsolidation by new learning that does not involve updating. Subjects studied and were tested on narrative movie clips, which 48h later were allocated to three conditions: cued-reactivation, cued-reactivation followed by learning new clips unrelated to the reactivated ones, or no reactivation. The final memory performance

relative to the initial one was higher for clips of which the reconsolidation was uninterrupted by the new learning. Moreover, the new learning following cued-reactivation resulted in a qualitative impairment of memory, rendering it less detailed and preserving only its crux. Thus, interference with reconsolidation by new learning can impair memory performance even if the new memorandum does not update the original one.

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The effect of background noise on the ability to perceive and remember unrelated words in nonnative listeners

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Nonnative listeners find it more difficult to meet the challenges presented by additional background noise than do native listeners, but it is not known whether it is more difficult for them to remember what was said in noise than for native listeners. The present study investigates auditory memory performance in nonnative younger adults, using a paired-associate paradigm in three conditions: quiet, continuous babble and babble during word presentation only. Noise levels were adjusted to equate for individual differences in the ability to identify single words in noise. The initial results suggest that nonnative listeners perform similarly to native young adults in the quiet and continuous conditions but worse in the babble during the word-presentation-only condition. These results suggest that stream segregation may be slower in nonnative listeners when the masker and the target words start at the same time.

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Automatic processing and cognitive control

Focusing on task conflict in the Stroop effect

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To investigate the proportion effect in the Stroop task we manipulated the ratio of congruent-to-neutral trials. In our first experiment no incongruent trials were included, thus allowing examining a pure task conflict situation. The results revealed an impressively large facilitation when most of the stimuli were congruent, and a smaller facilitation when most of the stimuli were neutrals. Exposing participants to incongruent trials during practice reduced the impressive facilitation found in the mostly congruent condition, and resulted in a negative facilitation in the mostly neutral condition. In an item-specific paradigm we found an item-specific proportion effect which was eliminated once incongruent trials were added to

practice. Thus our findings support the notion that experiencing informational conflict is essential to reveal and control task conflict.

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“Pure” informational conflict is not controlled: Evidence from cross-modal Stroop task

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MacLeod and MacDonald (2000) and Goldfarb and Henik (2007) proposed that two types of conflict create Stroop interference: the task conflict (TC), and the informational conflict (IC). According to the models of cognitive control (Botvinick et al., 2004; De Pisapia & Braver, 2006; Blais et al., 2007; Verguts & Notebaert, 2008); the detection of conflict, and therefore triggering of the entire control process requires the IC. However, whereas IC is the target of conflict-detection stage, it is not the target of control-exertion stage, in fact, the TC is (Levin & Tzelgov, 2014). By using proportion manipulation technique in the context of cross-modal version of the Stroop task we tested whether, contrary to the existing models, (pure) IC can be a target of control. The results showed no conflict adaptation effect, meaning that IC is indeed not controlled by the system even when the latter is strongly triggered to do so.

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The opinion-congruency effect: Evidence for automatic acceptance/rejection of opinions

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The frustrating tendency of people to remain entrenched in their opinions is evident in most every aspect of human life. And so, the question arises - why are people so stubborn? While much research has investigated how people deliberately protect their opinions, we suggest that opinion confirmation can also occur in an automatic manner. We present evidence from a Stroop-like paradigm showing that people automatically accept (reject) assertions that describe subjective (i.e., non-factual) opinions that are congruent (incongruent) with their own personal opinions. In addition, we present evidence that the size of this Stroop-like effect is correlated both with people's estimation of the consensus regarding their opinions and with the extent of bias in their consensus estimation. These findings suggest that opinion-confirmatory information enjoys privileged access to the cognitive system – even without the explicit intention of the perceiver, and therefore may help explain why opinions are sometimes change-resistant.

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Post-error adjustments: What do we really measure?

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The posterror slowing (PES) effect has been thought to reflect posterror behavioral adjustments. Accordingly, a common measure of posterror adjustment is a comparison between posterror and postcorrect accuracy. However, higher accuracy on posterror trials is not always observed, thus casting doubt on the idea that posterror adjustments take place. We investigated the relation between PES and posterror accuracy. We found that, on average, participants responded slower and less accurately on posterror trials compared to postcorrect trials; nevertheless, subjects with larger PES had higher posterror accuracy. Moreover, a spectral analysis on trial-by-trial accuracy indicated that higher posterror accuracy was associated with higher fluctuations in accuracy. These results provide evidence for negative and positive relationships between PES and posterror accuracy, highlighting the difficulty in assessing posterror adjustment. Furthermore, we demonstrate an association between posterror accuracy and overall accuracy fluctuations, a behavioral feature that the common measure of posterror adjustment fails to capture.

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Mental motion influence on inhibition

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Mental motion describes the way one thinks and is characterized by two elements: "thought speed" - the quantity of thoughts per time unit, and "thought variability" - the degree to which thoughts revolve around a central theme. Previous studies have shown that increasing the speed of mental motion can induce risk-taking behavior (Chandler & Pronin, 2012). We examined whether manipulating thought speed can influence inhibition. Fifty-two participants were assigned to either a normal or fast-paced manipulation. Subsequently, they completed the Stop-Signal Task (Logan, 1994). In this task participants are presented with stimuli and are asked to respond as fast as possible. On random trials a stop signal is presented, which indicates to withhold response. The index of inhibition is called stop-signal reaction time (SSRT), and a shorter SSRT indicates better inhibition. Our findings suggest that fast thought speed increases inhibitory abilities (i.e., decreased SSRT), contrary to previous findings.

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Motivation from control— A control based response selection framework**Karsh, N. and Eitam, B.** University of Haifa, Israel.

For decades, the mechanisms underlying motivation have been studied in relation to a response's outcome value (e.g., obtaining food or money) to the degree that a positive reinforcer has become practically synonymous to a positive outcome. The current study shows that mere control over the environment influences action selection independently of the outcomes such control brings. Participants freely choose responses in a task that subtly pitted a response's outcome value (success in a task) against its control value (a response-contingent effect). We found that actions that lead to an effect are selected faster and more frequently, even at the cost of damaging current task performance. These results suggest that control itself is rewarding to humans. Reward from control may explain everyday 'addictions' such as prolonged engagement in arcade games and pathological behaviors, such as stereotypy. It also sheds new light on what is reinforced by the brain's 'reward system'.

Contact: noamkarsh@gmail.com**A new context effect of human resolving power distinguishes between perception and action****Namdar, G.¹, Algom, D.² and Ganel, T.¹** [1] Ben-Gurion University of the Negev, Israel. [2] Tel Aviv University, Israel.

The current study describes a new effect of context concerning the perceptual resolution for object size. The Difference Threshold or Limen (DL) or the Just Noticeable Difference (JND) for a given standard stimulus changes as a function of the spread of the other standard stimuli for which the JND is measured simultaneously. The larger that range, the larger is that stimulus specific JND. This new Range of Standards Effect (RSE) was present when the measurements were made using routine perceptual responses. Notably, the RSE was absent when resolving power (i.e., the JND) was measured via actual grasping of the same stimulus objects. These findings lend further support for the idea that computations that mediate the visual perception of object size are different from those mediating the visual control of action.

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Attention and consciousness

Endogenous spatial and temporal orienting: Single or multiple attentional mechanisms?

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The present study examined whether endogenous temporal and spatial orienting of attention is supported by a single or multiple attentional mechanisms. Participants completed three consecutive target detection tasks: in the first two tasks a central cue provided predictive information regarding either the temporal delay of the target or its spatial location. In a third task the temporal and spatial cues were combined into a single cue. Temporal and spatial information provided by the combined cue could be valid or invalid for each type of information separately. Results from the combined temporal-spatial task revealed that temporal and spatial validity effects were significant. Importantly, the validity conditions of temporal and spatial orienting did not interact. The results suggest that participants were able to extract temporal and spatial information provided by a single cue simultaneously and independently. We conclude that temporal and spatial endogenous orienting are fundamentally orthogonal constructs.

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Differentiation and very late selection in the flanker task

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In a series of modified flanker experiments we found that distractors are processed on the basis of prior information regarding their possible identity, independently of central target processing. Thus, target and distractors are subjected to high level thorough processing based on separate top-down sets. We propose that attentional selection is practically the decision as to which of the already-identified stimuli – target or distractor – should be responded to. However, in order to apply the separate top-down set to each stimulus type, attention also entails the early differentiation of target and distractors. We further propose that independent distractor processing does not necessarily reflect a failure of selective attention but rather the operation of an advantageous evolution-based mechanism.

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Dissociating retinal eccentricity and covert spatial attention effects on visual evoked potentials: a gaze-controlled ERP study

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Central support for early attentional selection comes from the finding that stimuli appearing at attended locations elicit stronger early visual evoked responses (VEPs; < 200 ms). In a typical experiment, observers fixate their gaze on a central marker and respond to lateral stimuli that follow a cue to attend left or right. However, it was shown that following the cue, involuntary microsaccades tend to be directed toward the cued location. Thus, attended stimuli may have reduced retinal eccentricity relative to the unattended stimuli. Using simultaneous eye tracking and EEG, we asked whether this eccentricity difference, instead of covert attention, could explain the enhanced VEPs. Subjects indeed biased their microsaccades toward the cued side. However, the classic VEP spatial attention effects were replicated, both in the typical design and when eccentricity was strictly controlled using gaze-contingent display. Thus, we conclude that spatial attention effects on VEPs are not attributable to stimuli eccentricity.

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Identities of target and flanking distractors are processed before their locations

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The mutations paradigm provides behavioral measurements of the time window during which distractors are processed in flanker tasks. Distractors mutate once, at a random time, either from incongruent to neutral, vice versa, or from neutral to neutral (control). Our previous studies showed that incongruent distractors delayed responses only if presented during the initial 50 ms following onset. We concluded that suppressions of distractors (consummated at 50 ms) derived solely from their locations. Results of two new experiments presenting very easy targets showed that if a distractor's identity was neutral during the first 30 ms, the distractor became irrevocably suppressed at 50 ms. Yet, if a distractor was incongruent within the initial 30 ms, it increasingly delayed responses for as long as presented. We suggest that (a) distractors were suppressed according to their initial identity and not according to their locations. (b) Identities were processed before the targeted location was selected.

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The effect of spatial expectancy on exogenous attention in the Archer Fish

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Commonly in cueing experiments, reaction time (RT) to a target at a cued location (i.e., valid trial) is shorter than RT to an opposite (uncued, invalid) location, regardless of whether the cue is predictive or non-predictive of the target location. When the cue predicts the opposite location, RT to the cued but non-predictive location is fast when the cue-to-target interval is short and becomes slower at longer intervals, whereas RT to a non-cued and predicted location speeds up. We investigated whether archer fish can similarly develop spatial expectancy. An archer fish was trained to perform an exogenous cueing task involving manipulation of spatial expectancy in two conditions—75% and 25% valid trials. Results indicated that the archer fish developed spatial expectancy—responses were faster to predicted vs. unpredicted locations in both conditions. Unlike humans, this pattern did not differ for targets appearing in expected uncued locations after short cue-to-target intervals.

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Non-visual information drives visual unconscious processing

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Recent research suggests that when subjective perception is assessed using sensitive measures, forced-choice performance at discriminating various properties of a target reported as invisible is at chance level. A notable exception is blindsight: following a lesion to V1, patients report no subjective awareness of stimuli that they can localize or discriminate way above chance level. However, the information that allows the patients to discriminate between different states of the critical stimulus may not necessarily be visual. Here, we investigated whether healthy subjects can rely on non-visual (somato-sensory) information that is paired with an invisible stimulus to achieve better-than-chance discrimination of this stimulus. We found that although subjects did not notice the somato-sensory information or its relation with the subliminal visual stimuli, their discrimination performance was better than chance. These results show that objective performance may rely on non-visual information rather than on the visual information that observers deny perceiving consciously.

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Is the attentional blink an awareness blink?

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Severe processing limitations during identifications of visual targets have been identified using tasks such as the psychological refractory period or the attentional blink. We suggest that there is a processing limitation that is unrelated to an attentional bottleneck or a response selection limitation but instead emerges in the aftermath of the conscious perception of an event. Previous research from our lab has shown that under exactly the same stimulus conditions, observers are much slower at responding to a target when a cue that precedes it is consciously perceived than when it is not. Here, we demonstrate that this cost reflects a perceptual limitation that is independent of attention. We show that when one experiences an event consciously, perceiving a second event is impaired if it follows the first event by less than half a second or so – even if this event occurs at an unattended location. Relying on the similar time courses of the two costs, we suggest that attentional blink findings may be accounted for (at least in part) as an “awareness cost” rather than as an attentional limitation.

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Unconscious algebra

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We present initial evidence for unconscious mathematical cognition with highly abstract concepts, namely variables. Algebraic problems (e.g. $3+X=8$, $X-7=2$) were presented unconsciously using Continuous Flash Suppression. After either a short, 200ms, or long, 500ms ISI (varied between participants) problems were followed by a conscious target number which participants were asked to name. Target numbers were either congruent with the X value which would yield a true statement (e.g. $3+X=8$ followed by 5) or incongruent with it (e.g. $3+X=8$ followed by 1). A marginally significant effect of Congruence, $F_{1,10}=4.481$, $p=0.06$, and a marginally significant interaction of Congruence by ISI, $F_{1,10}=4.447$, $p=0.061$ were found. In the long-ISI condition, participants responded significantly faster on congruent trials than on incongruent trials, $F_{1,4}=7.924$, $p=0.048$. No significant effect was found in the short-ISI condition. This is a first indication that mathematical computations with highly abstract concepts can be performed unconsciously.

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The interaction of response mapping with visual perception

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The process of response selection has often been treated as reflecting a separate stage of processing to visual perception. In a series of five experiments, we investigated whether this is the case by examining the influence of motor response mapping on a simple classification task (based on the direction of an arrow). Using mathematical modeling, we demonstrate that motor mapping modulates low level processes including the perceptual threshold and stimulus processing speed. Furthermore, we illustrate how manipulating attention and motor mapping can invert these effects. Finally, we discuss the implications of multi-modal integration within a general framework of attention as a proactive cognitive function, which predicts and formulates visual percepts.

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Language

Literacy at time of immigration is negatively correlated with language proficiency in adulthood

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Younger children immigrating to a new country will usually reach higher levels of proficiency in their second language (Newport & Johnson, 1989). Some mark the age of 7 as the age when language learning starts deteriorating (Hyltenstam, 1992). Literacy acquisition usually begins around this age, but its effect on language learning has never been tested. Literacy may lead literate learners to focus more on words (Havron & Arnon, in prep), hindering learning of grammatical relations between words (Arnon & Ramscar, 2012). To examine the possibility that literacy is affecting language learning, an online English grammatical judgment task was administered to native Spanish speakers, who immigrated to the USA between the ages 4-8. Adults who immigrated before learning to read in their native language outperformed those who could already read. Literacy at immigration was found to (marginally) negatively predict performance, even when controlling for age of arrival to the USA.

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Dyslexia and SLI are two separate deficits: Evidence from double dissociations between reading, syntax, and lexical retrieval

Yachini, M., Kesselman, A. and Friedmann, N. Tel Aviv University, Israel.

This research examined the relation between dyslexia and specific language impairment (SLI) by looking for double dissociations between reading and syntactic and lexical impairments. Whereas some research found correlations or comorbidity between the two, causality can be refuted via the demonstration of double dissociations. The participants were 90 Hebrew speakers aged 10-14 with learning disabilities. We examined each participant using a diagnostic battery that included reading, syntactic comprehension and production, lexical retrieval, and phonological tests. Participants were considered to have dyslexia or SLI when their error rate was significantly higher than the control group in the relevant domain. We found that 45 of the children had dyslexia without lexical SLI, 10 had dyslexia without syntactic SLI and 10 had syntactic SLI without any dyslexia. Thus, reading disabilities and language disorders are separate, and can occur independently, indicating that dyslexia does not result from a language impairment in either syntactic, lexical, or phonological abilities.

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Denominal verbs as a case study of Semitic verb structure

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The current study compares various data regarding the morphological structure of Semitic languages from the arenas of generative linguistics and cognitive-psychology, and proposes a more complex lexicon structure for Semitic languages in which to accommodate the different theoretical frameworks and the empirical data from both arenas. With a masked-priming lexical-decision paradigm in Hebrew it was shown that presumed denominal verbs (such as *טתקל*) were primed significantly more by the noun they were derived from (*טקלי*) than by another verb derived from the same root (*טקל*). These results suggest a more complex mental lexicon than previously assumed in various network models, in that denominal verbs are not root-derived. Alongside previous work on root priming in Hebrew, this supports the theoretical and empirical notion of a root-based morphology, providing an alternate explanation for the data brought to bear against such a notion. Implications can be seen for theoretical linguistics and network models.

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Association networks across the lifespan

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In this cross-sectional study, we investigate how the continuous linguistic input we are exposed to throughout our lives shapes our mental lexicon. We addressed this question using free association data acquired from nearly 14 thousand individuals, ranging from 7 to 84 years of age. These data provide a direct way to explore the lifelong accumulation of information as a function of age related cognitive abilities and expanding vocabulary. Our results indicate that over the lifespan semantic network connectivity represented in this network gradually evolve in a non-linear fashion. Through the formative years (until age 18) the network converges and becomes increasingly structured. In adulthood, convergence and structure reach a plateau. From the age of 40, the network connectivity diverges again and becomes less structured. Moreover, these changes depend on the words' existing associations, with less associated-words tend to be more dynamic and gain new associations patterns.

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Hemispheric specialization in reading ambiguous words: Differences between deaf and hearing readers

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There is an ongoing debate about the necessity of phonological information in literacy acquisition. One claim is that phonological skills are required, and this is the reason that prelingual deaf readers are poor readers. However, Miller (2010) found that good deaf readers can have poor phonological, but good orthographic skills. Peleg & Eviatar (2012) suggested that orthography, phonology, and semantics are fully interconnected in the LH, but not in the RH, where phonological processes are mediated by semantics. The purpose of the present research was to find out whether or not this is the case for prelingually deaf readers. We measured access to the meanings of two types of ambiguous words: homophonic homographs and heterophonic homographs. The latter allow a role for phonology in the process of disambiguation. We show that although deaf readers are sensitive to the presence of phonological information, their hemispheric division of labor is somewhat different from the one shown by hearing readers.

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The advantage of starting big: learning from unsegmented input facilitates mastery of grammatical gender in an artificial language

Siegelman, N. and Arnon, I. The Hebrew University of Jerusalem, Israel.

Why is it difficult to learn a second language as an adult? We focus on the way adults' existing knowledge of words impacts learning. We suggest adults' prior knowledge leads them to rely less on multiword units, and that this hinders learning certain grammatical relations. We test this prediction in an artificial language learning study of grammatical gender (n=30) where we manipulate how segmented language is during initial learning. Our results show that learning from unsegmented speech led to more article-noun units, and to better learning. Adults who were more likely to treat the article and noun as one unit showed better learning, confirming the link between unit-size and learning outcomes. The findings provide novel evidence for the advantage of learning grammar from multiword units, highlight the benefit of learning segmentation and structure simultaneously, and offer an experience-based explanation for L1-L2 differences that relates building blocks to learning outcomes.

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Reading in autism is not always hyperlexia

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Hyperlexia is the ability to read single-words at a higher level than one's intellectual abilities, or accurate reading without comprehension. Past-studies found hyperlexia in 5-10% of children with autism. We examined participants' reading aloud and comprehension of written and heard words in order to assess their reading and comprehension skills. Participants were 18 native Hebrew-speaking children with ASD. Three tasks were used: Tiltan— oral reading, Dwarf-camel—horse—word comprehension, Pyramids-and-associations —association of words and pictures. All tasks were compared to an age-matched control group of TD-children. Results: none of the participants with ASD had hyperlexia. 10 were found as having poor reading skills, mainly in reading irregular words and reading via the sublexical route. 8 also had difficulties in comprehension, of them 3 had problems in comprehension of heard words. Although the results do not point to hyperlexia, they indicate that some children with ASD have trouble accessing semantics from reading.

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The impact of working memory load on the timeline for speech processing

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How does a working memory load affect the time-line for spoken word recognition? As the speech signal unfolds, several alternatives are activated in response to phonemic information, i.e., CAND leads to candy and candle. In order to successfully achieve word identification, one has to inhibit phonological alternatives, once the contradictory information is accumulated (DY). The 'Visual World' eye-tracking paradigm was used, as eye movements are tightly time-locked to aspects of linguistic processing. Load was manipulated using the digit-span task, where participants had to retain either one or four spoken digits while identifying the picture that depicts the spoken word. A high-load was found to delay the point of discrimination between the target word and the phonological onset competitor.

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Phonological output buffer and its specific role in reading

Guggenheim, R. and Friedmann, N. Tel Aviv University, Israel.

The phonological-output-buffer is a phonological working memory component in the process of word production. It has two main roles: it holds the sounds of the word until its production, and is responsible for assembling phonological units into a whole: phonemes into words, and morphemes into morphologically complex words. This buffer forms a crucial junctions in various processes of speech production, including word (and nonword) reading aloud, picture naming, and free speech. The participants were 15 adolescents and adults aged 13-28, whose phonological buffer was severely impaired: 7 had phonological-output-buffer impairment, 3 had phonological-input-buffer impairment, and 5 had a mixed input-output impairment. They showed poor nonword repetition, poor manipulation of phonological units, and length effect. In an extensive test battery, the phonological-output-buffer participants showed impaired reading of nonwords, long words, and morphologically-complex words, alongside good comprehension of these words, and good reading of their component syllables. The input buffer patients showed normal reading.

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Neuronal tracking of speech during sleep

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During sleep, external stimuli fail to elicit meaningful behavioral responses and rarely affect perceptual awareness, but the extent to which the sleeping brain continues to process external stimuli remains unclear. Studies examining ERP responses to brief sounds during sleep yielded mixed results and their interpretation is complicated by the occurrence of K-complexes. Instead, focusing on neuronal tracking of speech holds great potential since it may allow (a) to probe sleep processing with continuous stimulation, and (b) to determine how sleep affects different levels of processing (e.g. acoustic vs. phoneme/word segmentation vs. semantic). Here we used speech stimuli with varying degrees of vocoding to affect intelligibility, as well as speech that contains periodicities thereby enabling data analysis with frequency-tagging techniques. We first characterized behaviorally how our manipulations affected intelligibility. We are now comparing the neuronal tracking of speech across states of wakefulness and sleep using high-density (256ch) EEG.

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Why negative quantifiers are not really "negative"

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Typically, the response to sentences with explicit (sentential) negation (not) takes longer compared to affirmative sentences. Likewise, sentences that contain negative quantifiers (e.g. less) also show longer reaction times compared to their positive counterparts (e.g. more). In both the linguistic and the psychological literature, it has been suggested that negative quantifiers are mentally represented and processed as containing negation (e.g. less than $x = \text{not } [x \text{ or more than } x]$), and should therefore have a processing signature that resembles that of negation. In the present study, we directly compare the processing signatures of negative quantifiers and of explicit negation. A careful analysis of the pattern of reaction times indicates different strategies and different mental representations of negative quantifiers and explicit negation.

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WEDNESDAY, FEBRUARY 25TH 2015 – TALK SESSION 2

Symposium 1: Rhythmic Motifs in Perception and Attention (Room A)

Distributed attention is implemented through theta-rhythmic gamma Modulation

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When subjects monitor a single spatial location, target detection depends on the pre-target phase of an ~8 Hz brain rhythm. When multiple locations are monitored, performance decrements suggest a division of the 8 Hz rhythm over the number of locations. This suggests that different locations are sequentially sampled. Indeed, when subjects monitor two locations, performance benefits alternate at a 4 Hz rhythm. These performance alternations followed a reset of attention to one location. Although resets are common and important events for attention, it is unknown, whether in the absence of resets, ongoing attention operates rhythmically. Here, we examined whether spatially specific attentional sampling can be revealed by ongoing pre-target brain rhythms. Specifically, visually induced gamma-band activity plays a role in spatial attention and therefore, we hypothesized that performance can be predicted by a theta-rhythmic gamma modulation. Brain rhythms were assessed with MEG, while subjects monitored bilateral grating stimuli for a unilateral target. The corresponding contralateral gamma-band responses were subtracted from each other to isolate spatially-selective, target-related fluctuations. The resulting lateralized-gamma activity (LGA) showed opposite 4 Hz phases prior to detected versus missed targets. The 4 Hz phase of pre-target LGA accounted for a 14% modulation in performance. These findings suggest that spatial attention is an ongoing theta-rhythmic sampling process, with each sampling cycle implemented through gamma-band synchrony. This extends previous findings by demonstrating that in the case of distributed attention, gamma-band synchrony is shaped by the slower sampling rhythm that governs performance benefits.

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Pathologies in brain rhythms: the case of dissociative disorders

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Dissociative disorders--that is, disturbances in the organization of identity, memory, perception, or consciousness--are among the most mysterious and intriguing phenomena in neuropsychiatry. People with a dissociative disorder "dissociate themselves from reality". During a dissociative event a fundamental component of the self is separated as people "lose" their self-identity, sometimes identify themselves with an external agent. Thus, the investigation of dissociative disorders might be valuable for the scientific study of the self. Not much is known about the neurophysiological basis of these disorders. We will present several types of dissociative disorders, including dissociative amnesias, ecstatic seizure, psychogenic seizure and conversion, which were recorded by means of intra- and extra-cranial video-EEG.

Analysis revealed several neuroanatomical and neurophysiological findings, that maybe formulated into a coherent framework for a neurophysiological basis of dissociative disorders.

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Implicit temporal predictions revealed by microsaccades

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Temporal regularities in the environment and especially rhythmic stimuli are known to facilitate the response to events that appear temporally in-phase with these regularities, presumably reflecting unintentional and implicit predictions about the time of upcoming events. However, not much is known about the underlying mechanisms, and the level of automaticity or dependence on behavioral responses. Here we used the time course of microsaccades, which are small involuntary saccades occurring during fixation, to explore the buildup of temporal anticipation and its underlying mechanisms. In a set of experiments, observers passively viewed and silently counted sequences of 90 high-contrast Gabor patches, briefly flashed in around 1 Hz repetition rate at fixation. We first found that the microsaccade rate modulation was entrained by a fixed stimulus repetition rate, with anticipatory inhibition that reached its maxima around stimulus onset. To explore the buildup of temporal anticipation, we used two inter-stimulus onset intervals of 1000 and 1500ms randomly interleaved. We found that repetition of the same interval shortened the microsaccade inhibition period for the corresponding stimulus, while a change of interval increased it, with a magnitude that changed systematically with the number of recent (4-5) preceding events. Similar results were obtained with a small interval difference of 100ms which observers did not notice, demonstrating the high precision of the anticipation mechanism and its independence of perceptual awareness. We interpret the results as reflecting an ongoing process that computes implicit temporal predictions based on the recent past. Rhythmic stimuli induce a gradual buildup and tuning of this predictive mechanism resulting in a proportionally faster processing and shorter microsaccade inhibition for in-phase stimuli.

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Focusing attention in time: how temporal regularities assist perception

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The recently emerging 'Attention in Time' hypothesis suggests that attention can be directed towards particular points in time when task-relevant stimuli are expected to occur. Supporting this perspective, we find that neural processing of rhythmic stimuli is more efficient than processing of stimuli occurring at unpredictable times, and that selective attention

performance is improved for rhythmic vs. arrhythmic sounds. Moreover, new data indicates that rhythmic stimuli are also easier to ignore, and we find evidence for active suppression of neural responses of to-be-ignored sounds, but only if they are presented rhythmically. These findings broaden the perspective of the 'Attention in Time' hypothesis, suggesting that not only can attention be focused towards particular points in time to enhance neural processing of attended stimuli, but that neural responses can be actively 'suppressed' for unattended stimuli, but only if the system can predict when they will occur.

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Revisiting the role of oscillatory entrainment in rhythm-based predictions

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Rhythmic input can be used to form temporal predictions and facilitate performance, supposedly through entrainment of ongoing brain oscillations to the external periodicity. Using EEG, we investigate the mechanisms of synchronization to visual rhythms. The first study investigated the unique signatures of rhythm-based predictions. Participants detected targets in a stream that was either rhythmic, or had an arrhythmic temporal regularity that enabled memory-based prediction. Rhythm-based predictions still resulted in larger behavioral costs of temporally unexpected targets and earlier resolution of the contingent negative variation (CNV), indicating that rhythm effects cannot be explained by repeated interval timing. However, phase-locking of slow neural activity did not differ between conditions, suggesting that it is not a unique signature of rhythm-induced entrainment but could reflect intentional formation of temporal predictions based on memorized intervals. The second study examined the ability to disengage from distracting rhythms. Participants viewed rhythmic stimuli and detected targets that appeared with high probability at off-beat times. We found that providing accurate temporal information regarding the expected off-beat timepoint resulted in facilitated performance in off-beat relative to on-beat times, and a shift the CNV buildup towards the off-beat times. These results define the unique markers of rhythm entrainment and its limitations.

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Talk session 2: Automatic Processing and Cognitive Control (Room B)

What's the truth?: Boundary conditions of Stroop-interference for truth congruent colors in false sentences

Weil, R., Mayo, R. and Schul, Y. The Hebrew University of Jerusalem, Israel.

We hypothesized that Stroop-interference is reduced if the color of the last word of a false sentence (e.g., "a cucumber is red") matches the true color of the object (i.e. green) described in the sentence. In order to test this, we embedded words in different colors in true and false sentences. The colors of the words were either congruent or incongruent with the meaning of the word (e.g., "green" in green or red font). Moreover, incongruent colors in false sentences were either congruent or incongruent with the true color of the object described in the sentence. Our experiments show that for false sentences Stroop-interference is reduced under specific conditions, although the color of the word and the meaning of the word are incongruent. Thus, we provide evidence that Stroop-interference is sensitive to contextual influences, such as falsity and that true information is automatically activated under specific conditions.

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Contingencies, pseudocontingencies and selective attention: An integrative study of speeded human decision making

Cohen, D., Shakuf, V. and Algom, D. Tel Aviv University, Israel.

Accurate assessment of the contingency between variables in the environment is critical for adaptation, inference, and informed decision making. Even in the absence of joint observation of the variables in each individual item (necessary for computing correlation), people employ a useful illusion, pseudocontingency, as a proxy for the actual contingency. However, this adaptive cognitive function has not been tested under requirements of speedy responding characteristic of everyday life. Moreover, the role of pre-existing semantic relationship between the variables has not yet been appreciated. Of equal importance is the measurement of actual performance and the quality of attention to each of the pertinent variables. Our study presents a comprehensive portrayal of the statistical sources of human decision making under speeded and non-speeded responding using explicit and implicit measures.

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Two types of inhibition in task switching: Backward inhibition versus competitor rule suppression

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Backward inhibition (BI) reflects the proactive inhibition of a recently abandoned task set to allow for a better transition to a new task. Task inhibition can also be measured in terms of the competitor rule suppression (CRS) effect, which reflects online inhibition of irrelevant conflicting task rules. We assessed whether BI and CRS are differentially affected by difficulty in retrieval of category-response mappings. Retrieval demands of task mappings were manipulated via the information provided by the task cues, which either indicated the relevant dimension (dimension cues; “color”) or the relevant dimension with its category-to-key mapping (mapping cues; “red green”). CRS was larger on dimension compared to mapping cues, when retrieval demands vary across experimental contexts and on a trial-by-trial basis. In contrast, BI was not influenced by cue type. These results suggest that task switching involve two distinct inhibitory processes, with CRS reflecting inhibition at the level of category-response mappings.

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The time course of consciousness in the Stroop task

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The time course of conscious cognitive processes is an important factor in understanding cognitive control. The Stroop task, in which participants name the ink color of printed words (Stroop, 1935), is one of the most researched tasks that involves cognitive control. In the current study we examine the time course of facilitation (reaction time for neutral trials minus congruent trials) and interference (reaction time for incongruent trials minus neutral trials) in the Stroop task. Twenty four participants took part in an ERP study. The task was a modified Stroop task in which the interval between the target stimuli (color words) and a mask changed randomly (we had five intervals: 0,16,30,50 and 100ms). Our findings suggest that facilitation and interference start at different levels and might indicate a graded change in consciousness.

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On the temporal dynamics of microsaccades: inter-dependency of-Greenberg microsaccades is modulated by retinal input

Amit, R., Eyal, A. and Yuval-Greenberg, S. Tel Aviv University, Israel.

Following the abrupt onset of a stimulus, fast discrete eye movements called microsaccades are suppressed for 100-200 ms. and then rebound above baseline level. When no stimulus change is present, the temporal distribution of microsaccades reportedly reflects a simple random process (homogenous Poisson) and modeled as such. We replicated the finding that microsaccade rate drops following a visual stimulation and demonstrated a similar drop 0-150ms following a microsaccade. This implies a temporal dependency between microsaccades, which is inconsistent with a Poisson distribution. In addition, by examining Inter-Microsaccade Intervals (IMSI) we found that the rate drop following a microsaccade depends on the viewing conditions and is less pronounced in complete darkness. We conclude that microsaccades are interdependent and distribute approximately in an Ex-Gaussian fashion. We hypothesize that since a microsaccade changes retinal image, it modulates the probability and timing of following microsaccades, similarly to the rate modulation caused by actual onset of a stimulus.

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Talk session 2: Language 2 (Room C)**Letter position encoding and letter-to-word binding are separate functions: Evidence from dyslexia**

Friedmann, N. Tel Aviv University, Israel.

The first stage of word reading involves letter identification and letter position encoding. Whereas researchers of reading often regard letter position encoding within and between words to be a single function, I will present evidence from acquired and developmental dyslexia showing that these are two separate functions that can be selectively impaired. I will present two types of evidence to support this idea: double dissociation in approximately 100 dyslexic patients, demonstrating individuals with letter position dyslexia who make migrations within words but no migrations between words; and individuals with attentional dyslexia who make letter migrations between words but no migrations within words. Another type of indication for the dissociability of the two functions comes from letter position preservation in between-word migrations in attentional dyslexia. These data from dyslexia shed light on the normal reading process, suggesting that letter position encoding within words and letter-to-word binding are two separate functions.

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Using syntax and context in reference resolution

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Understanding pronouns and other referring expressions (e.g., identifying the reference of he, herself, etc.) requires two kinds of abilities: syntax and the consideration of the knowledge shared between the speaker and the hearer. Individuals with an impairment in Theory-of-Mind (the ability to consider others' point of view), experience difficulty in assessing shared knowledge, but may have intact syntax. We tested which types of pronouns and sentences such individuals can understand, as a window to the division of labor between syntax and TOM. The participants were 31 brain-damaged patients with TOM Impairment, 10 children aged 9-11 with Autistic-Spectrum-Disorders, and matched control groups. We tested them in the comprehension and judgment of sentences that included violations of syntactic principles or of shared-knowledge cues. The results indicated that TOM-impaired individuals failed on pronouns that required the use of shared-knowledge but were able to rely on syntactic principles to arrive at appropriate identification of referents.

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You can step into the same river twice – additive effects of cohort and aging on vocabulary scale across 16 years

Erel, H.¹, Ben-David, B. M.¹, Goy, H.² and Schneider, B. A.² [1] Interdisciplinary Center Herzliya, Israel. [2] University of Toronto, Canada.

You can step into the same river twice – additive effects of cohort and aging on vocabulary scale across 16 years. There is a consensus in the literature that crystalized knowledge (e.g., vocabulary) increases with age and stabilizes in older age. However, most vocabulary studies take a snapshot of age-related differences, comparing two age-groups that differ both in age and in cohort. Our goal was to tease apart the effects of aging and cohort on vocabulary. We collected data on the abbreviated Mill-Hill vocabulary scale across 16 years with over 2,200 younger and older participants in the same lab. After controlling for the effect of years-of-education, results indicated a significant decrease in vocabulary scores across 16 years, an advantage for older- over younger-adults, with the two effects additive in nature. Results imply that seniors are just as susceptible to cohort-related changes in the language as younger adults. As age-related differences on vocabulary scores were impervious to the year of testing, results suggest the ability to compare studies across the years.

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Reading from a different angle

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When inverted faces are presented, people perceive them differently than faces in normal orientation. What happens when we see inverted text? Does reading in this condition use the same reading processes or rather general object-perception processes? Previous studies suggest that whenever words are too degraded, they cannot be processed by the lexical route and therefore are processed through the sub-lexical route, converting each letter to sound sequentially. In this study we explored this assumption by analyzing the reading errors of Hebrew readers who read inverted vs. normally-presented words. The participants were 30 skilled readers aged 18-65. They read 240 words twice, once inverted and once in normal presentation. Reading of inverted words yielded significantly more errors than the normally-presented words. The reading errors were of two main types: reading through the sub-lexical route and transposition of middle letters. We will discuss the way inverted word reading sheds light on the normal reading process.

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Towards a computational model of dyslexia

Jaffe-Dax, S., Raviv, O., Jacoby, N., Loewenstein, Y. and Ahissar, M. The Hebrew University of Jerusalem, Israel.

Dyslexics are diagnosed for their poor reading skills. Yet, they characteristically also suffer from poor verbal memory, and often from poor auditory skills. This combined profile was previously explained in broad cognitive terms. We now hypothesize that Dyslexia can be understood computationally as a deficit in integrating prior information with noisy observations. To test this hypothesis we analyzed performance in an auditory discrimination task using a two-parameter computational model. One parameter captures the internal noise in representing the current event and the other captures the impact of recently acquired prior information. We found that Dyslexics' perceptual deficit can be accounted for by inadequate adjustment of these components: low weighting of their implicit memory in relation to their internal noise. Using ERP measurements we found evidence for Dyslexics' deficient automatic integration of experiment's statistics. Taken together, these results suggest that Dyslexia can be understood as a well-defined computational deficit.

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WEDNESDAY, FEBRUARY 25TH 2015 – TALK SESSION 3

Symposium 2: Individual Differences in Perceptual and Cognitive Research (Room A)

Perceptual strategies in auditory temporal order judgment (TOJ)

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Background. Previously, Warren (e.g., 1974, 1976) suggested two types of sequence perception are employed while performing different perpetual tasks: (1) direct identification of the elements in the sequence and (2) global perception of the components within a sequence. In the current study we identified different strategies applied for the same sequence by different participants. *Method.* Participants performed spectral TOJ in which they reported the order of two 15 msec. 1 and 1.8 kHz. 40 dB SL pure tones. *Results.* Mean threshold = 65.594 msec (± 96.229). 58% of the participants had TOJ threshold < 5 msec; 20% had threshold of 5-120 msec; and 23% had TOJ threshold > 120 msec. These results are consistent with previous studies on spectral TOJ that found similar distribution of thresholds. A closer look on the individual data show that these thresholds correspond to three patterns of response: < 5msec group have consistently correct answers regardless of ISI duration; 5-120 msec group have correct answers for long ISIs and incorrect answers for short ISIs; 120< group consistently correct answers regardless of ISI duration. *Discussion.* We posit that these response patterns reflect different perceptual strategies. Adapting from Warren's suggestion, those whose responses vary according to ISI duration, use the direct perception, while those who perform the task (correct or incorrect) regardless of ISI duration, use global perception.

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Intention-based reflexivity and working memory: A conjoint experimental-correlational approach

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When participants prepare to execute a choice reaction-time task that they have never executed beforehand, they need to hold the new stimulus-response mapping information in working memory. Prior research has established that such holding of task information in mind leads to unintended activation of responses when the corresponding stimuli are presented, indicating 'Intention-Based Reflexivity'. Moreover, Intention-Based Reflexivity is eliminated in conditions of high working-memory load. Based on these previous results, we predicted that participants with high working memory abilities would show stronger Intention-Based Reflexivity effects and would also show better task preparation. Participants (N=175) completed two reasoning tests, serving as indices of fluid intelligence, two complex-span tests, indexing working-memory capacity. Additionally, their Intention-Based Reflexivity and task-

readiness were assessed in the NEXT paradigm. This paradigm consisted of mini-blocks, beginning with instructions mapping two new stimuli to the right/left keys. Then, participants received a series of NEXT trials (stimuli appearing in RED, in which response should be withheld and participants need to advance the screen by means of a key press) and two GO trials (stimuli appearing in GREEN) in which the instructions were executed. Intention-Based Reflexivity was indexed by the NEXT Compatibility effect (slower NEXT responses to stimuli mapped to the hand that was not used to advance the screen as compared with stimuli that were mapped to the hand that was used to advance the screen). Task readiness was indexed by the GO Trial effect (slower responses in the first than the 2nd GO trial). The results were analyzed using a Structural Equations Model, which fit the results well and yielded the correlations between the four hypothetical constructs. Fluid intelligence was significantly correlated with high working-memory capacity ($r=.51$, replicating prior work) and better task-preparation ($r=.53$). Surprisingly, high Intention-Based Reflexivity was significantly correlated with poor task-preparation ($r=.42$) and low fluid intelligence ($r=.37$). The implications of this apparent paradox will be discussed.

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Individual differences in the production effect in memory

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Words read aloud are better remembered relative to silently read words. This phenomenon is called the production effect (PE). Despite the consistent evidence, the PE is mainly found in mixed lists (in which half of the study words are read aloud, and half are read silently), and its source is not fully clear.

Using a meta-analysis we show that participants with a positive PE did not differ in overall remembered words from participants with negative (or no) PE. Specifically, the 'vocal advantage' did not yield any overall benefit in memory. Hence, the enhancement in memory for aloud words is (mainly) due to a toll taken on the non-produced words. In conclusion we argue that the source of the PE in memory is actually detracting in memory for silent words rather than advantage for the produced words. This result provides a strong support for the cost account over the distinctiveness account.

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Individual differences pose a threat to the unique interpretation of a given Stroop effect

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Virtually all published research on the Stroop effect report mean results. The effect is gauged by the difference in mean RT or error between congruent and incongruent stimuli. Those means are nominally based on all the experimental trials presented. However, one cannot rule out temporary distraction, fatigue, or daydreaming on the part of the observer such that the observer does not engage the carrier words on a small minority of the trials. If so, the nominal number of trials sustaining the means lacks psychological reality. This hypothesis is supported by recent research using a 'forced reading' condition in which the observer must read each and every word in the experiment.

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Aging, speech comprehension and individual differences

Babkoff, H.¹ and Fostick, L.¹ [1] Ashkelon Academic College. [2] Ariel University

Cross-sectional studies published over the past 25 years have consistently reported a significant decline in speech comprehension among the elderly when speech is rapid or accompanied by background noise. In a cross-sectional study we conducted 10 years ago, we found that in addition to the age-related decline in speech comprehension, there was increased variance among the middle aged and elderly population especially when speech was presented with background speech noise. These findings were consistent with other studies that reported significant decline in cognitive and perceptual abilities in the elderly along with significant increases in both intra-individual and inter-individual variance.

The rationale for the current study was based on the assumption that increased variance indicates the presence of numerous sources of variance. We posited that the increased variance in speech comprehension in the elderly population implies additional sources of variance, whose effects accumulate with aging. Three possible causes for the age-related decline in speech comprehension under difficult conditions have been suggested: 1) age-related increases in hearing thresholds; 2) age-related decreases in cognitive abilities; 3) age-related deficit in auditory temporal processing. Accordingly, we retested approximately 64 % of the original participants in the second phase of a study of age-related difficulties in speech comprehension after a 7 year interval. We found that the change in: 1) age; 2) hearing thresholds; 3) digit span and matrices; and 4) auditory temporal processing could significantly predict changes in speech comprehension in speech noise and rapid speech, but not speech presented against a quiet background.

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Talk session 3: Attention (Room B)

The necessity of attention to scene 'Gist' perception: The role of local-global factors and of task relevance

Gronau, N., Amar, R., Izoutcheev, A., Nave, T. and Ravreby, I. The Open University, Israel.

During a brief visual glance people mainly grasp the main category, or the "gist" of a scene. Are scenes categorized automatically in the absence of attention? Participants searched for a superordinate scene category (e.g., "nature") among briefly presented pairs of images positioned below and above fixation. Within pairs containing scenes from non-searched categories (e.g., "urban", "indoor"), items either belonged to same or to different categories. When both scenes were attended, RT for same-category pairs was significantly shorter than for different-category pairs, indicating that scene category was registered. When participants were cued to respond to one of two scenes in a pair, while its counterpart scene served as an unattended (irrelevant) distractor, the categorical effect was eliminated, suggesting that the unattended scene category was only minimally processed. An irrelevant scene presented outside the focus of attention affected behavior only if it served as a to-be-detected target, or if it appeared as a background to a central scene.

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Object-file updating and attentional capture

Carmel, T. and Lamy, D. Tel Aviv University, Israel.

We recently reported that updating the information stored about an object in visual memory when this object changes incurs a cost. This effect had been mistakenly attributed to attentional factors in previous literature. Here, we present novel evidence supporting the claims (1) that the object-updating cost is related to visual working memory rather than to an earlier sensory memory store, (2) that it is contingent on the spatio-temporal continuity of the object undergoing the change and (3) that taking this cost into account resolves apparent inconsistencies with regard to the spatial effects associated with salient objects outside the current attentional control settings.

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Motion orients attention automatically

Burnett, K., Arend, I. and Henik, A. Ben-Gurion University of the Negev, Israel.

Does motion orient attention? We designed a conflict cue containing direction information from shape and motion, by presenting a group of left- or right-pointing arrows that translated left or right. Between groups, either arrow direction or motion direction predicted target location with 80% reliability in a Posner cueing paradigm with a simple detection task. The irrelevant – uninformative – dimension was equally likely to be congruent or incongruent with the relevant dimension. Both relevant cue dimensions produced a validity effect, and, importantly, reaction time was influenced by irrelevant dimension congruity, suggesting that motion can orient attention both automatically and with volition. When motion was the relevant dimension, the arrow congruity effect was similar across SOAs. In contrast, when arrow was the relevant dimension, the congruity effect was different across SOAs, suggesting that motion processing has a different timecourse to arrow processing. This finding has theoretical implications for automaticity and attentional orienting.

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Choice induced preference change relies on episodic memory and attention

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The notion that our past choices affect our future behavior is one of the most influential concepts of psychology since its first experimental report in the 50's. Using the free choice paradigm (FCP), it was shown that choosing between two similarly rated items made subjects reevaluate the chosen items as more attractive and the rejected items as less attractive. However, in 2010 a major work by Chen and Risen revealed a severe statistical flaw casting doubt on previous studies, showing that change in ratings could be achieved without actual change in preference. In the present study we applied their framework to study the dynamics that underlie choice induced rating change. We created a cognitive model that would account for the change in ratings. Testing this model demonstrated that attention and episodic memory drive the change induced rating observed in the FCP.

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Attentional modulation of visual acuity has the shape of a Mexican Hat: Implications to a bottom-up process

Baruch, O. and Goldfarb, L. University of Haifa, Israel.

Classical models of exogenous attention suggest that attentional enhancement at the focus of attention degrades gradually with distance from the attended location. Here we present first evidence in support of a Mexican Hat shaped modulation in a visual acuity task. Participants had to decide the location of a small gap in a target circle that was preceded by a non-informative attention capturing cue. The distance between cue and target and the latency between their onsets were varied. Enhancement at the focus of attention was accompanied, at short latencies, by suppression at the surrounds, exhibiting a Mexican Hat shaped modulation of performance, whereas at latencies over 200ms performance decreased gradually with distance. Our results suggest that a rapid Mexican Hat modulation is an inherent property of the mechanism underlying exogenous attention and that a monotonically degrading trend, such as advocated by classical models, develops only at later stages of processing.

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Talk session 3: Numerical Cognition (Room C)

The computation estimation skills of adults with dyscalculia

Ganor-Stern, D. Achva Academic College, Israel.

Past research on individuals diagnosed with dyscalculia (DD) has documented their difficulties in performing exact calculations. However, in everyday life an approximate answer is often sufficient. The computation estimation skills of adults with DD were investigated using a task requires estimating the results of multi-digit multiplication problems relative to a standard. Despite the difficulties DD face with arithmetic, their accuracy was above chance level for most problems. DDs relied more often than controls on an intuitive sense of magnitude strategy, rather than on approximate calculation strategies. In contrast to controls, DD's did not demonstrate a robust advantage for smaller problem sizes, probably due to their difficulty in performing calculations, even for relatively small problem sizes. Thus, the present results suggest that the main difficulty of adults with DD is with the operations to be performed on magnitudes rather than with the magnitudes representations.

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Domain-specific and domain-general effects on strategy selection in complex arithmetic: Evidence from ADHD and normally developed college students

Ashkenazi, S. The Hebrew University of Jerusalem, Israel.

The solution of multi-digit addition problems involves numerous strategies (e.g., retrieval or backup strategies). Here, we investigated the role of domain specific factors related to math ability, versus domain general factors such as executive functions on strategy selection and accuracy in complex addition problems. In order to examine the role of domain general processing, typically developed college students were compared to Attention-Deficit Hyperactivity Disorder (ADHD) students due to the ADHD deficits in executive function and sustained attention. We discovered that both domain specific factors and domain general factors play a significant role in the strategy selection process and accuracy. Importantly, domain specific and domain general abilities uniquely impact the complex arithmetical condition (carry over; e.g., $59+63$) but not the simple arithmetical condition (non-carry; e.g., $52+63$). Hence, the present finding suggests that superior executive function or superior sustained attention abilities can serve as a compensatory mechanism to low approximate number system acuity.

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Three distinct components in the visual parsing of numbers

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Visual parsing of digital numbers involves separate processes for encoding the digit identities and their relative positions. We examined the hypothesis that a third sub-process encodes the number length (how many digits it has) by analyzing the reading of two individuals with developmental number reading disorders. One of them had a selective deficit in digit position encoding, and the other had a selective deficit in number length encoding. This double dissociation supports the three-component view of number parsing. We discuss the importance of this model for the assessment of number reading disorders.

Furthermore, we showed that the number-length encoder also encodes the positions of 0's and 1's – presumably because number length, 0, and 1 determine the structure of the corresponding verbal number. Apparently, the visual system has a special process that encodes redundant information (number length, 0, and 1) in order to optimize subsequent processing stages of number naming.

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Domain-general and basic numerical processing abilities in developmental dyscalculia versus arithmetic fact retrieval deficit

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Developmental Dyscalculia (DD) is a difficulty in arithmetic abilities. It is debated if people suffering from DD are characterized by domain general (working memory and executive function) or domain specific (basic numerical processing only) difficulties. Recently, it has been suggested that a major difficulty in DD is arithmetic fact retrieval. We studied 7th grade children suffering from DD versus fact retrieval deficit only. Three groups were created on the basis of their math abilities: DD (N=19) – characterized by math difficulty in various aspects of math including arithmetic fact retrieval, Arithmetic fact retrieval deficit (N=17) – characterized by difficulty in arithmetic fact retrieval and nothing else, and controls (N=19) – no difficulty in math. Compared to control group, DD presented difficulties in domain-specific and domain-general tasks, while the fact retrieval group showed difficulties only in domain-specific (subitizing) but not in domain general tasks.

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The emergence of linear ordering in long term memory: the role of end stimuli

Goldman, R. and Tzelgov, J. Ben-Gurion University of the Negev, Israel.

The current study examined the role of end stimuli (i.e., the smallest and the largest member of a set) in formation of linear ordering relations in LTM. Pairs of artificial symbols corresponding to adjacent magnitudes (e.g., $A > B$, $B > C$) were presented during training. The number of training sessions was manipulated across experiments. Following the learning phase, participants selected the physically larger symbol within pairs of adjacent and non-adjacent symbols. An increased Stroop-like size congruity effect (SiCE) was found for pairs containing end stimuli. Non-end pairs demonstrated an inversed SiCE after short training and a relatively small inversed SiCE after longer training. These results emphasize the importance of end stimuli as anchors for generating the symbolic mental line in LTM. This suggests a reinterpretation of the increase of the SiCE with intra-pair numerical distance found in earlier studies and replicated in this study.

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WEDNESDAY, FEBRUARY 25TH 2015 – TALK SESSION 4

Symposium 3: Consciousness Research: Methods and Measures (Room A)

How to measure unconscious processing?

Lamy, D. and Peremen, Z. Tel Aviv University, Israel.

Delineating the limits of unconscious processing in order to understand the function of consciousness in vision has been a central goal for research in the last decades. However, what methodology is best suited to index unconscious processing remains controversial. The gold standard for demonstrating unconscious processing has been to show evidence for perceptual processing of a subliminal stimulus using an indirect measure and then to confirm that this stimulus was indeed subliminal by showing that it cannot be discriminated better than at chance level, in a separate block of trials. Here, we critically evaluate this standard based on a review of recent research from our lab, with special emphasis on the roles of (1) the measure used to gauge conscious perception, (2) the paradigm used to prevent conscious perception and (3) top-down factors, namely attention and template availability. Relying on these findings, we suggest methodological guidelines for future research on unconscious processing.

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Neural precursors of decisions that matter – an ERP study of deliberate versus random choices

Mudrik, L., Maoz, U, Rivlin, R., Yaffe, G., Adolphs, R. & Koch, C. Tel Aviv University, Israel.

Voluntary actions can be predicted from brain activity prior to subjects' conscious decision. These findings lead to claims that consciousness doesn't have a causal role in decision-making. However, they were typically obtained for purposeless, random actions, without consequences. We used EEG to directly compare deliberate and random decisions. Subjects participated in a donation-preference task, using either their left or right hand to indicate their preferred organization, leading to actual donations (deliberate decisions), or similarly pressing those buttons irrespective of their preference, so that both organizations on screen received donations (random decisions). Early ERPs differentiating left- and right-hand movements appeared only for random decisions, starting from 900ms before the decision. We interpreted these ERPs to reflect random bias activity rather than an actual unconscious decision mechanism. Our findings thus challenge previous studies, by implying that such early neural activations do not generalize to meaningful decisions, and do not index unconscious decision-making.

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Unconscious processing of dynamic stimuli

Goldstein, A., Rivlin, I. and Hassin, R. The Hebrew University of Jerusalem, Israel.

The vast majority of unconscious research focuses on the processing of static stimuli. This research focuses in the ability to unconsciously process dynamic ones. In this research we examined whether it is possible to unconsciously extract the trajectory and speed of an unconscious moving object, and use this information to make an accurate prediction about its future location. In a set of three experiments we show that Reaction Times to targets that are congruent with the route and speed of an unconscious probe are significantly shorter in comparison to incongruent targets. These results indicate that it is possible to unconsciously process movement, extract its trajectory and speed, and make a prediction regarding the location of a future target. This is one of the first indications of unconscious processing of dynamic stimuli and it adds an important ability to the unconscious capabilities arsenal.

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Weighing the evidence for a dorsal processing bias under continuous flash suppression

Hesselmann, G. Charité Universitätsmedizin Berlin, Germany.

With the introduction of continuous flash suppression (CFS) as a powerful method to study unconscious visual processing, a novel hypothesis has gained popularity. It states that processes typically ascribed to the dorsal visual stream can remain functional, while ventral stream processes are suppressed when stimuli are invisible under CFS. This notion of a CFS-specific “dorsal processing bias” is usually discussed within the influential dual-stream framework of visual processing which proposes a dissociation between vision-for-action (dorsal) and vision-for-perception (ventral). I will provide an overview of neuroimaging and behavioral studies that either examined this dorsal processing bias or based their conclusions on it. I will show that both evidence for preserved ventral processing as well as lack of dorsal processing can be found in studies using CFS. I will conclude that a dorsal processing bias under CFS cannot be universally assumed.

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Talk session 4: Emotion (Room B)

Getting in touch: empathy predicts an experimental pain reduction during touch

Goldstein, P., Weissman-Fogel, I., Yellinek, S. and Shamay-Tsoory, S. University of Haifa, Israel.

Skin-to-skin touch is a special form of tactile sensation that typically is perceived as pleasurable and has important social and affective values. Social touch has been shown to affect our emotional well-being and diminish distress or pain in various settings. Although previous studies provide first evidence for the pain alleviating effects of touch the underlying mechanisms that explain this effect is largely unknown. The goal of the current study was to examine the analgesic effects of social touch in the context of romantic intimacy and to test the moderating role of toucher's empathy in this process. The analysis revealed less pain in "partner touch" relatively to all control conditions. Furthermore, we found a significant relationship between the toucher's empathy and the pain experience his partner, which occurred only during the touch condition. Currently, we test biological mechanisms that underlie our results using a pioneering hyperscanning dual EEG approach.

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Emotion is in the brain of the beholder – Selective cortical activation to perceived emotional stimuli induced by dynamic avatars

Goldberg, H.¹, Malach, R.¹, Christensen, A.², Flash, T.¹ and Giese, M.² [1] Weizmann Institute of Science, Israel. [2] University Clinic Tübingen, Germany.

Accurate judgment of the emotional state of others is a prerequisite for successful social interaction, and can be decoded also from body movements. Here, we aimed to examine the neuronal correlates of emotion recognition from gait, using highly controlled body-movement stimuli (animated avatars). Subjects underwent fMRI scans while classifying the emotions and the emotional intensity level, expressed by faceless, dynamic avatars. Our results reveal robust brain selectivity to emotional compared to neutral gait stimuli, in brain regions which are involved in emotion and biological motion processing such as: Extrastriate body area, fusiform body area, superior temporal sulcus, and the amygdala. BOLD fMRI activation of the amygdala reflected emotional awareness; for visually identical stimuli it was significantly more responsive when the stimulus was perceived as emotional. Significantly, in avatars gradually morphed along an emotional expression axis- there was a parametric correlation between amygdala activity and emotional intensity.

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The role of positive affect in metacognitive processes: Does happiness make us meta-smarter?

Sidi, Y.¹, Ackerman, R.¹ and Erez, A.² [1] Technion – Israel Institute of Technology. [2] University of Florida, USA.

Decades of research in psychology did not resolve the question whether positive affect improves or harms cognitive functioning. In the current research, we take an innovative approach by investigating whether metacognitive processes can inform this discourse. In three experiments we manipulated positive affect and social motivation and examined these variables interactive effect on how participants answer general knowledge questions that allow flexibility in detail level of the answers. Results showed that participants induced with positive affect, by a picture-tagging task, gave more accurate answers than participants that were shown neutral pictures. While regulation (effort investment and answering strategy) was not influenced by positive affect, metacognitive monitoring was clearly affected. Specifically, participants in the positive affect condition were more confident in their answers, yet exhibited distinct overconfidence. However, overconfidence was attenuated when social motivation was induced. Practical and theoretical implications for both affect and metacognition bodies of literature are discussed.

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Observer perspective as an effective method in relation to brooding thoughts

Davidovitch, S., Mor, N. and Yovel, I. The Hebrew University of Jerusalem, Israel.

Negative experiences may lead us to think thoughts such as: why am I always reacting the way I do? This kind of thoughts is called brooding, the harmful subtype of rumination, characterized by a repetitive self-critical thinking. This study examine whether adopting an observer perspective from brooding can alleviate its negative consequences. We compared two types of perspectives toward brooding - an “observer perspective” and an “actor perspective”, when focusing on the content of brooding. These conditions were compared to each other, and to a control distraction condition. The results indicated that participants in the Observer group reported less negative emotions than participants in the Actor group, but showed higher levels on this measure than did participants in the Distraction group. In addition, participants in the Observer group reported less avoidance than participants in the Distraction group. The findings demonstrate that an observer perspective from brooding is an effective method.

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Down (regulation) to a T: The regulation of empathy to pain and its effect on empathic accuracy

Naor, N., Okon-Singer, H. and Shamay-Tsoory, S. University of Haifa, Israel.

Over the past two decades, neuroscientists and psychologists have devoted a considerable amount of attention to the topic of empathy, defined as our ability to understand, share and act upon the feelings and thoughts of others. By and large empathy is viewed as a positive prosocial emotion, and as such it is not surprising that most scientific attention has been directed at its positive aspects. Nevertheless, we contend that when empathic accuracy is inaccurate due to exaggerated empathy levels resulting from the improper use of emotion regulation techniques, it may impair rather than facilitate accurate social perception and interaction. In the proposed study we focus on empathy to pain, a well-studied component of emotional empathy.

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Embodiment and empathy: two sides of the same evolutionary coin?

Jospe, K. and Lavidor, M. Bar-Ilan University, Israel.

Research suggests that the mirror neuron system plays a part in both empathy and embodiment mechanisms. In the current study, we tried to understand where empathy and embodiment overlap, hypothesizing that restricting the embodiment will impair performance in a gesture recognition task, and that empathy levels will modulate this effect. Thirty-eight participants with various empathy scores performed a semantic decision task of hand gesture comprehension under restricted and unrestricted hand conditions. As expected from previous literature, under the unrestricted condition, empathetic participants performed better. Curiously however, participants with low empathy, and only them, significantly improved their performance under the restricted hand condition. Furthermore, this pattern was not found in a control task of facial emotion recognition. This selective interaction suggests that empathy modulates individual differences in the way people employ embodiment leading to the potential of embodiment-induced therapy to improve empathetic abilities.

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Talk session 4: Perception and Learning (Room C)

Coarse to fine-grained representation of object 3D structure

Freud, E., Avidan, G. and Ganel, T. Ben-Gurion University of the Negev, Israel.

The representation of object 3D structure is a fundamental requirement for object recognition. Yet, the mechanisms that support this process are not fully understood. To this end, we utilized possible and spatially impossible objects. Importantly, at the 2D level, the physical differences between these stimuli are minor; however their perceived 3D structure is fundamentally different. In a series of behavioral and imaging studies we provide novel evidence that the representation of object 3D structure is generated by a multi-level process that includes a coarse description as well as a fine-grained representation. Additionally, our findings show that the visual system successfully generates a coarse description of impossible objects. Nevertheless, spatial impossibility impairs fine-grained representation. Taken together, our findings shed new light on the processes that mediate the representation of object 3D structure in the visual cortex and provide insights about the visual properties which are necessary for successful perceptual representation.

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Perceptual learning of direction discrimination reflects increased overestimation

Szpiro, S. and Carrasco, M. New York University, USA.

Goal. Estimation-training leads to increased overestimation of motion direction ^[1]. Here we examine whether training related improvement in direction discrimination is due to a change in the mean or variance in perceived directions, by assessing both discrimination and estimation tasks. *Methods.* We determined discrimination coherence thresholds for 4° motion directions and used it for training and testing. During pre and post-test, we presented directions of $\pm 2^\circ$, $\pm 4^\circ$ and $\pm 8^\circ$. Observers were tested on two tasks: motion direction discrimination (up vs. down) and direction estimation by rotating a mouse. Then two groups of observers trained during three consecutive days with 4° directions; one with estimation (n=7); the other on discrimination (n=7). *Results.* Training on estimation significantly increased overestimation and improved discrimination for trained and untrained directions. Training on discrimination significantly improved discrimination accuracy and increased overestimation for trained and the easy untrained direction. Hence, learning direction discrimination reflects a change in the mean of perceived directions. ^[1] Szpiro, S., Spering, M., & Carrasco, M. (2014). Perceptual learning modifies untrained pursuit eye movements. *Journal of Vision*, 14(8):8, 1-13.

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The role of multisensory information in statistical learning

Glicksohn, A. and Cohen, A. The Hebrew University of Jerusalem, Israel.

Statistical learning refers to our ability to learn the statistical regularities of our environment. While most research explored unisensory learning, we ask whether learning benefits from multisensory information. Two streams were built, each composed of four triplets consisting of 3 successive stimuli (shapes or syllables). The streams were interleaved randomly into a single interleaved stream. In the unisensory condition the two sets consisted of 4 visual triplets (shapes) each. In the separate senses condition one set were visual triplets (shapes) and one set were auditory triplets (syllables). Lastly, in the multisensory condition both sets were composed of mixed auditory (syllables) and visual (shapes) stimuli. Participants were presented with the interleaved stream, and subsequently tested on the triplets of each set. Robust learning occurred in the multisensory and separate senses conditions, while no learning occurred in the unisensory condition. This suggests that multisensory information enhances statistical learning, even for multisensory triplets.

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Lateralization of emotional and cognitive functions of the human sub-thalamic nucleus

Marmor, O., Bick, A., Valsky, D., Arkadir, D., Linetsky, E., Shamir, R., Israel, Z., Bergman, H. and Eitan, R. The Hebrew University of Jerusalem, Israel.

Background: The sub-thalamic nucleus (STN) can be divided into three functional regions: sensorimotor, emotional and cognitive areas. Although many studies have investigated the sensorimotor area of the STN, the non-motor (emotional-cognitive) areas are far less studied.

Objective: We hypothesize that the cognitive and emotional areas of the STN are lateralized to a dominant and non-dominant hemisphere, respectively.

Methods: In this study, during surgery for deep brain stimulation (DBS) in human Parkinson's disease patients (n=27), electrophysiological recording of the STN were performed. Microelectrodes were utilized to record the STN spontaneous spiking activity and responses to vocal non-verbal emotional stimuli and Go-No-Go cognitive task.

Results: The oscillation properties of the STN neurons were used to map the dorsal oscillatory and the ventral non-oscillatory regions of the STN. Beta oscillations (12-30Hz) are restricted to the dorsolateral part of the STN that corresponds to the sensorimotor STN. Emotive auditory stimulation evoked activity in the ventral non-oscillatory region of the right STN whereas cognitive tasks evoked activity in the ventral non-oscillatory region of the left STN.

Conclusions: Our results suggest that the ventral non-oscillatory regions are asymmetrically associated with non-motor functions, with the right ventral STN associated with emotional processing and the left ventral STN associated with cognitive processing. These results suggest that DBS of the right or left ventral STN may be associated with beneficial or adverse emotional and cognitive effects observed in PD patients. DBS of the right ventral STN should be considered in order to relieve mental symptoms in other neuropsychiatric diseases.

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Competition between grouping principles: a primed-matching study

Rashal, E., Yeshurun, Y. and Kimchi, R. University of Haifa, Israel.

Previous research on the competition between grouping principles focused mainly on their relative strength as measured by subjective reports. Not much is known about the processes underlying this competition. A 'winner-take-all' approach predicts that only the dominant organization is represented, hence, ultimately reaches conscious perception. We hypothesized that multiple organizations are represented, and compete for dominancy. We used the primed matching paradigm: a prime stimulus was followed by a pair of test figures that are either identical to one another, or different. "Same" responses were predicted to be faster and/or more accurate when test figures were similar to the prime than when they were dissimilar to it. Our primes depicted either a single grouping principle, or two grouping principles in competition. The time course of representations construction was examined by varying prime duration. Different time courses were found for individual and competing organizations, indicating that the two organizations were represented.

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The role of perceptual and semantic information in face recognition

Schwartz, L. and Yovel, G. Tel Aviv University, Israel.

While people excel at recognition of familiar faces, recognition of novel faces is usually very limited. In this study we examined possible factors that may play a role in making familiar face recognition superior and assessed the sole contribution of each of these factors to the learning of new faces: rich perceptual information (viewing a face in different angles and lightings), simple individuation (association of a face with an uninformative but unique label) and association of a face with person related semantic information (such as a name or occupation). The results indicated that mere exposure to perceptual information does not improve face recognition, whereas association of a face with a name does improve face recognition significantly. This improvement was not generalized to other types of individuations such as

associating faces with unrelated labels such as objects names or symbols, or incongruent labels such as opposite-gender names. These findings highlight the important role of person-related semantic information in face recognition.

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WEDNESDAY, FEBRUARY 25TH 2015 – POSTER SESSION 2

Emotion

A microgenetic approach to the effects of anxiety on cognition emotion

Yaniv, H. Bar-Ilan University, Israel.

The influence of emotion on cognitive processes can be investigated using visual stimuli. The stimuli we employed were visual hybrids, each presented as a microgenetic sequence of degraded images, subliminally. Subjects' verbalisations in response to the stimuli they viewed were recorded, and their behavioural responses were noted. The subjects also completed a number of written questionnaires at various points in the experiment; these questionnaires measured trait and state anxiety, trait impulsivity, and absorption. The main results of this study were firstly, the clear effects of exposure to visual hybrid stimuli in eliciting an emotional reaction, especially anxiety. In addition, it is also possible to see that subjects' verbalizations focused on the human part of the stimuli. By that, subjects could ignore the nonhuman threatening part. Cognitive development of this emotional change, documented according to its phases, revealed subjects' thoughts and emotions, which projected back on the stimuli.

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Emotional intensity influences pre-implementation and implementation of distraction and reappraisal

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While emotional-intensity powerfully challenges regulatory strategies, its influence remains largely unexplored. Accordingly, the present study addressed the moderating role of emotional-intensity on two regulatory stages – implementation and pre-implementation, of two cognitive emotion regulation strategies – distraction and reappraisal. According to our framework, because distraction implementation involves early attentional disengagement from emotional information, in high emotional-intensity it should be more effective than reappraisal, which modulates emotional processing only at a late semantic meaning phase. Supporting findings showed that in high (but not low) emotional-intensity, distraction implementation resulted in stronger modulation of negative experience and LPP magnitudes, relative to reappraisal. Related pre-implementation predictions confirmed that anticipating high-intensity stimuli leads to a preference for distraction. Anticipating low-intensity stimuli, however, leads to reappraisal preference, which is most beneficial in the long-term. These preferences were further illuminated in showing enhanced neural anticipatory readiness (SPN) required to override a preferred strategy when anticipating implementing a non-preferred strategy.

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EMG Study of mixed emotions

Itkes, O., Kron, A. and Eviatar, Z. University of Haifa, Israel.

The bipolar and dual unipolar models of valence draw different predictions regarding mixed emotions. The bipolar model does not permit simultaneous activation of pleasant and unpleasant emotions whereas according to the dual unipolar model, simultaneous activation is possible. In this study, we measured the activation of zygomaticus major and corrugator supercilii facial muscles during mixed emotions using fEMG. Previous studies showed the association between zygomaticus major and pleasant affect and corrugator supercilii and unpleasant affect was well established. Based on these associations and its high temporal resolution, we aimed to test whether zygomaticus major and corrugator supercilii are activated during mixed emotions and if so, whether this activation is serial (as bipolar model would predict) or simultaneous (compatible with the dual unipolar model). Preliminary results replicate previous findings and demonstrate that during mixed emotions, the two facial muscles are activated.

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Sometimes, the solution is in the middle. Re-examination of the interaction between negative stimuli and internal load

Saban, W. University of Haifa, Israel.

The processing of negative stimuli is fundamental to emotion models. Studies have shown that internal load affect the processing of negative stimuli, but still, there is a debate about the nature of interaction between them: while models show that relatively to low load, high load leads to less interference, it was demonstrated that high load can results in lower interference of emotional information. We asked if it's possible to bridge this gap by examining also intermediate level of load and subjects reported feeling. We manipulated three levels of working memory, while subjects were required to respond to neutral or negative real-life auditory voices. Subjects were then asked to indicate their feeling and manipulation of the load was tested. Preliminary findings indicate strong interaction between subjects reported feeling and load level. These findings challenge standard models of emotion, and highlight the importance of subjective reported feeling and intermediate levels of load.

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Can words create reality? The effects of framing on attentional bias

Izoutcheev, A.¹, Shuster, O.¹, Perry, D.² and Hendler, T.^{1,2} [1] Tel Aviv University, Israel. [2] Tel-Aviv Sourasky Medical Center, Israel.

This research aimed to examine the influence of text frames on emotional states, indicated by attentional bias. Two differently framed texts were given to subjects. Their influence on emotional processing was examined using attentional task. The results showed limited yet consistent effects of attentional bias. The findings indicate indirect individual-level effects of framing, manifesting mostly in guiding the interpretation of ambiguous stimuli, and encouraging frame-related interpretations.

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Learning**The effect of training protocol on the perceptual learning of time-compressed speech and its generalization**

Gabay, Y., Karni, A. and Banai, K. University of Haifa, Israel.

The perceptual learning of speech is typically studied using training protocols in which items are presented at a fixed level of difficulty throughout training. There is little data to suggest that such protocols are optimal for learning or its generalization. The aim of the current study was to determine whether adaptive training in which speech became gradually faster depending on each listener's performance, was preferable to training with a pre-determined (fixed speed) speech difficulty level. Both protocols yielded robust learning. Nevertheless, better learning and generalization to new tokens were observed with adaptive training. Training with incrementally increasing levels of difficulty may enhance the perceptual learning of speech.

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Exploring the underlying mechanisms of statistical learning (SL) among adults with developmental dyslexia (DD): Evidence from artificial grammar learning (AGL)

Kahta, S. and Schiff, R. Bar-Ilan University, Israel.

It has been recently suggested that individuals with DD are deficient in SL. However, little is known regarding the underlying mechanisms used among adults with DD during SL tasks. The aim of the current study was to address this question using AGL. Two underlying mechanisms are considered to be employed during AGL: superficial, similarity-based mechanisms and

abstractive, rule-based ones. In the current study similarity-based processes were examined using a similarity-balanced design and abstractive processes were examined using transfer paradigm that required applying learnt knowledge to new vocabulary. Results revealed a significantly lower performance among the DD group in both experiments. However, while no significant difference was found between the groups in sensitivity to similarities, a significant difference between the groups was found in the transfer paradigm, suggesting that the SL deficit of individuals with DD might be explained by a deficit in employing abstractive mechanisms.

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The effect of feedback on puzzle completion task training

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Two studies were performed in order to address the effect of feedback in a computerized system for the training of puzzle completion on learning and transfer of learning. Puzzle completion tasks requires both visual perception and executive functions skills. In the first study, trainees' task was to perform the puzzles with the smallest number of rotations and moves; hence, their focus was on improving their executive functions skills. Results demonstrated that having the option of getting the system's feedback improve performance even when participants did not take advantage of this option at all. In the second study, trainees were asked to complete three puzzles, this time as quickly as possible. Results demonstrated that auditory feedback impeded the performance of the weaker performers while improving the stronger performers' performance. Participants with ADD performed the task faster but without reducing the number of mouse clicks and moves.

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Memory, Metamemory and Reasoning

Effects of initial question difficulty on eyewitness memory performance via metacognitive processes of monitoring and control

Portnoy, S. and Pansky, A. University of Haifa, Israel.

We examined the effect of initial question difficulty on free-report eyewitness memory performance via monitoring and control processes. Intermediate-difficulty open-ended questions about details from a crime film were preceded by either difficult or easy questions. For each question, a forced-report answer was followed by a confidence judgment and a

decision of whether to report or withhold the answer for a potential monetary bonus (or penalty). As predicted, forced-report proportion correct was unaffected by initial difficulty. However, a metacognitive contrast effect was found: When preceded by a set of difficult questions, the answers to the target questions were more confidently held and hence were more likely to be reported, yielding an increase in free-report memory quantity. Our results demonstrate how changes in subjective experience can influence metacognitive monitoring and control, thereby affecting free-report memory performance independently of forced-report performance.

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Eyewitness memory accuracy over time: Cognitive and meta-cognitive determinants

Shapira, A. and Pansky, A. University of Haifa, Israel.

In the current study, we examined the cognitive and meta-cognitive underpinnings of free-report memory accuracy over time, using the Quantity-Accuracy Profile (QAP) methodology (Koriat & Goldsmith, 1996). The participants' memory was tested under both free and forced report conditions, either immediately or 24 and 48 hours after the event. High accuracy motivation was induced by an explicit high-incentive payoff schedule (Experiment 1) or an instruction manipulation (Experiment 2). Even when the participants were given the option to choose which items to report, and parallel to forced-report quantity reduction, the reliability of their accounts dropped substantially, largely due to deteriorating meta-cognitive monitoring effectiveness (the ability to differentiate correct from incorrect answers). It seems that with time, the participants tended to rely more on familiarity and constructive processes that brought to mind typical, schema-consistent information that was often incorrect yet was confidently held and freely reported, a result of false memory persistence.

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Conflict intervention improves students' ability to overcome intuitive interference in geometry

Goldenberg, M., Babai, R. and Stavy, R. Tel Aviv University, Israel.

Knowledge regarding intuitive interference and how we overcome it has pedagogical implications. Students often intuit that geometrical shapes with larger areas have larger perimeters. We focus on the comparison-of-perimeters task. In congruent trials accuracy is higher and reaction time is shorter than in incongruent (counterintuitive) trials. Previous studies showed that discrete mode of presentation of the geometrical shapes improves performance, as compared with continuous one. The current study examines the impact of an

intervention based on creating a conflict between students' responses to these two modes of presentations on success rate in the comparison-of-perimeters task. The study included 89 fourth graders divided into experimental and control groups. The findings showed significant improvement in success rate in incongruent trials for the experimental group. The positive effect of cognitive conflict intervention suggests that its implementation in a teaching process can help students overcome difficulties arising from intuitive interference.

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Numerical Cognition

Addition goes where the big numbers are: Evidence for a reversed operational momentum effect

Pinhas, M.¹, Shaki, S.¹ and Fischer, M. H.² [1] Ariel University, Israel. [2] University of Potsdam, Germany.

Number processing evokes spatial biases, both when dealing with single digits and in more complex mental calculations. Here we investigated whether these two biases have a common origin by examining their flexibility. Participants pointed to the locations of arithmetic results on a visually presented line with an inverted right-to-left number arrangement. We found directionally opposite spatial biases for mental arithmetic and for a parity task administered both before and after the arithmetic task. We discuss implications of this dissociation of our results for the task-dependent cognitive representation of numbers.

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A novel implicit task for the measurement of mathematic anxiety

Eidlin-Levy, H., Wohl, H., Akibili, O. and Rubinsten, O. University of Haifa, Israel.

A vast body of research indicate that mathematic anxiety (MA) emerge at elementary school, persist over the years and affect academic and daily performance. Traditionally, MA measurement base on introspective questionnaires, providing inconsistent and often unreliable data. Therefore, there is a need for a new research tool applicable across different age layers, in order to enable comparative and developmental research. For this purpose, we developed a novel cognitive task, the Numeric Dot Probe, based on the well-established dot probe. The task assesses attention allocation by brief presentation of stressful (exercise) and neutral (gibson) stimuli. Afterwards, a small probe replaces one of the stimuli and participants are requested to define it. The main hypothesis is that high MA participants will automatically allocate attention to stressful stimuli, producing faster RTs. Initial research (with college

students) yelled promising data, implying that the numerical dot probe is a suitable cognitive tool for MA measurement.

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Tactile enumeration using one hand and the effects of training

Cohen, Z. and Henik, A. Ben-Gurion University of the Negev, Israel.

Subitizing is a fast and accurate process of enumerating small quantities. Study 1 explored tactile enumeration of small quantities. Vibro-tactile stimulation was presented to between 1 to 5 fingertips of one hand. The results showed a moderate increase in RT up to 4 stimuli and a decrease with 5 stimuli. Hence, with one hand, the subitizing range is 4 rather than 3 (as suggested in the past). In order to increase accuracy, in Study 2 we examined the effect of training with 2 groups: daily training for 7 days and controls. We tested performance 1 week and 4 weeks after training. The results showed a decrease in RT and an increase in accuracy rates after training. Importantly, improved performance did not change the RT pattern found in Study 1. Moreover, preliminary results of exploring various tasks, before and after training, suggest that participants improved in tactile sensitivity and general enumeration.

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A case study of acalculia

Glikzman, Y.¹, Naparstek, S.¹, Ifergane, G.² and Henik, A.¹ [1] Ben-Gurion University of the Negev, Israel. [2] Soroka University Medical Center, Israel.

We describe NO, a 22 year old right handed female with acalculia following a cerebral infraction in the left medial cerebral artery (MCA). Neuropsychological testing showed NO had normal IQ with normal language abilities and lower than normal working memory abilities. We investigated intentional and automatic processing of magnitude employing a Stroop task; and the ability to mentally manipulate magnitude information, employing a mental clock task. In the Stroop task, NO's performance was similar to the controls. In the mental clock task, NO presented a larger difference effect compared to controls, suggesting a less distinct representation of magnitudes. These findings support an atypical pattern of magnitude processing following a left parietal lesion which appears not only for visually presented stimuli but also for imagery-based magnitudes.

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The embodiment of finger counting strategy and tactile enumeration

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Sequential finger counting (FC) creates an embodied association between spatial arrangements of fingers and numbers (space-number association, SNA). Usually, Westerners start counting with their thumb. Our previous study showed advantage in responding to simultaneously presented stimuli to neighboring (vs. non-neighboring) fingers. The current study examined embodiment and FC strategy using a tactile enumeration task. 1 to 5 vibrotactile stimuli were presented to the right or left hand, to neighboring fingertips. We measured starting hand (right/left) and finger (thumb/pinkie) FC preferences. There were three different finger stimulation combinations—cardinal, ordinal and other (e.g., for 2 stimulated fingers, respectively: index finger – middle finger; thumb – index finger; ring finger - pinkie). The results showed more efficient responses when the thumb was included (vs. pinkie), especially for numerosity 2 and 3. Also, cardinal and ordinal combinations were faster than other combinations. These results confirm previous suggestions for embodied enumeration of neighboring fingers and SNA.

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Conceptual size and numerical value interactions in picture-digit combined stimuli

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Theories in the field of numerical cognition suggest that our ability to process symbolic, discrete numbers is based on a primitive system of continuous magnitude perception. This claim is supported by many experiments presenting an interaction between numbers and other continuous magnitudes (size congruity effect), as well as similar processing patterns (e.g. distance effect). The goal of this study is to explore the relations between numbers and conceptual size—the subjective internal representation of size for real world objects. Participants compared either the numerical or the conceptual size of two stimuli, which were pictures of an object with a superimposed digit. The magnitude of each dimension was manipulated independently of the other dimension. Congruity effect was found for both tasks. Accordingly, we suggest that processing numerical and conceptual size interact. Moreover, the evaluation of these magnitudes is affected by the task relevant and irrelevant size distance of the comparable stimuli.

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The origins of logarithmic number-to-position mapping

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Some number processing models postulate two distinct quantity representation systems: exact linear representation, and approximate scalar/logarithmic representation. Here we asked adults to point to the location of two-digit numbers on a number line, with and without a distracter task, while continuously monitoring their finger location. We hypothesized that distraction would selectively interfere with the linear quantity representation, and create more logarithmic mapping to positions. This indeed occurred during a transient time window, but for different reason than hypothesized: two-digit numbers with low value are processed more quickly than larger numbers, so their finger trajectories deviate earlier towards the target position. The dual task enhanced this effect, but once we controlled for the finger first deviation times, we observed purely linear mapping with no effect of the distracter task. We conclude that in adults, number-to-position mapping involves two stages: decision, influenced by a scalar/logarithmic representation, and pointing, which is purely linear.

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Core knowledge of geometry develops without visual experience

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In the last decade the presence of core geometry intuitions has been demonstrated in young children as well as in adults completely lacking geometrical language or geometrical education. However, it remained still unknown whether such intuitions can arise without any access to visual experience throughout the lifespan. To unravel this issue, we took advantage of a visual deviant detection task consistently used in previous works to test sensitivity to geometric invariants, and we tested a group of congenitally blind adults in a tactile version of the same task. We found that congenitally blind participants spontaneously used geometric concepts such as curves, parallelism, right angles, quadrilaterals, relative distances among elements, to detect intruders in the tactile displays. These results provide evidence suggesting that core geometry intuitions do develop also in the absence of visual experience.

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Mathematical proficiency: The involvement of approximate and exact symbolic and non symbolic operations

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Background. Numerical representations are thought to rely on two representation systems: symbolic (e.g., Arabic numerals or number words) and non-symbolic approximate (ANS) representation (e.g., a group of dots). The fact that these representations are related is well documented. However, current literature is inconclusive regarding their relationship with mathematical proficiency. ANS is commonly examined by comparison tasks, but recently some studies have focused on the performance of math operations (i.e., addition, subtraction and multiplication) within the ANS and approximately using symbolic representations.

Methods. Participants were presented with inverse ($X+Y-Y$) and non-inverse ($X+Y-Z$) mathematical operations. The tasks were presented in three formats: (1) ANS operations, (2) approximate symbolic operations and (3) exact symbolic operations.

Results and Conclusions. Relationships were found among the three types of operations and between them and mathematical proficiency. This was found when controlling working memory ability.

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Perception

Developing behavioral tools for diagnosing face perception difficulties in 6-14 years old children

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Congenital prosopagnosia (CP) is a neurodevelopment disorder characterized by life-long impairments in face processing in the absence of an overt lesion or a neurological disease. Surprisingly, most research in this domain is conducted on adults and little is known about its manifestation in children. Hence, the purpose of our study is to investigate the normal and abnormal developmental trajectory of face perception in a large cohort of children using a new battery we developed measuring perception, recognition, and memory of faces versus objects. Data collected so far from children in three age groups (6-8, 9-11, 12-14) in the normal population, reveals a trend of behavioral performance which is qualitatively similar to that found in adults. Having established our behavioral measures in the normal population we will also apply these tools to children who are suspected of having difficulties in face processing to estimate their deviation from the normal range.

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Are composite faces processed holistically? Evidence from workload capacity measures

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Composite faces fuse the top half of one face with the bottom half of another face and are often considered to be processed holistically. The present study subjected composite faces to strong tests of holism using workload measures (Miller, 1982; Townsend & Nozawa, 1995). In two experiments, observers looked for one of two predefined top or bottom target halves. Redundancy gains (Raab, 1962) were found with both aligned and misaligned faces. Analysis of the data showed that redundancy gains for aligned faces were generated by a super-capacity system, whereas redundancy gains for misaligned composite faces were generated by a parallel system with limited-to-unlimited capacity. The present study demonstrates how disruption of holistic processing of composite faces can result in alteration of cross-channel dependency and processing efficiency. It also highlights the presence of considerable individual differences in the mechanisms that govern the perception of faces.

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Non-visual obstacle detection and avoidance using the 'EyeCane' sensory substitution

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Humans avoid obstacles mainly using vision, posing a major challenge for visually impaired individuals, especially when they wish to do so unobtrusively. Can one learn to accurately avoid obstacles using other senses? How long does this process take? To explore these questions we developed the EyeCane, a Minimalistic Sensory Substitution Device. Six sighted-blindfolded, participants naïve to the EyeCane, used it to detect and avoid knee-to-waist-high (side) and sidewalk-height (floor) obstacles, following brief training. We show that by the fifth trial, participants' performance is significantly better than control in both detection and avoidance of side and floor obstacles ($p < 4E-10$, $p < 1.1E-05$ and $p < 0.002$, $p < 0.06$, respectively), detection significantly improving compared to the first trial (side: $68 \pm 21.3\%$ to $87 \pm 13.6\%$; $p < 1.2E-2$, floor: $29 \pm 36.7\%$ to $79 \pm 18.8\%$; $p < 0.007$). We will then discuss a further adaptation of the device for waist-up obstacles (stand-alone or mounted on a White-Cane) which was successfully tested on 16 visually impaired individuals.

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Trans-saccadic processing of high-level feature information

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How are we able to keep track of objects in space despite shifts of retinal image due to frequent saccadic eye-movements? A possible explanation is the transfer of spatial and low-level feature information of a future gaze position around the time of an intended saccade. We tested whether high-level feature information, such as object category, can be transferred across saccades and whether this information is represented in retinotopic or spatiotopic coordinates. We used a gaze-contingent procedure with simultaneous recording of gaze position and EEG. Two peripheral adaptors (face and clock) were followed by one peripheral (right/left) probe (same vs. different face) to which subjects were required to saccade. The test could appear in a: 1)spatially-matched, 2)retinotopically-matched, 3)spatially and retinotopically unmatched or 4)spatially and retinotopically matched location with respect to the adaptors. Object processing level was assessed by measuring the N170 face adaptation effect (FAE) with respect to probe onset.

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The effects of precueing the target location on temporal crowding

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Spatial crowding refers to impaired target identification when it is surrounded by flankers in space. Temporal crowding refers to impaired target identification when it is surrounded by flankers in time. Previous studies suggest that transient attention affects spatial crowding. This study examined whether transient attention affects temporal crowding. We presented a sequence of 3 displays. Each display included 1 letter. In one of these displays an oriented T appeared. Observers indicated the T's orientation. The ISI between the displays varied systematically. In the cued condition an auditory precue indicated the target's onset and location. In the neutral condition, a neutral auditory precue indicated the target's onset. Precueing improved performance only when the target appeared in the first display. There was no cueing x ISI interaction. Because a visual cue may be a stronger attractor of visual attention we are currently testing the effects of a visual cue on temporal crowding.

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Temporal and spatial integration at different regions of the visual field

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The Ternus-Pikler display can result in different motion percepts, depending on whether temporal or spatial integration prevails. Feature-Fusion usually measures temporal integration. Previous studies mostly employed foveal presentation. This study examined whether similar findings emerge with peripheral presentation. Experiment 1 used a typical feature-fusion display. A vernier and anti-vernier stimuli were presented in rapid succession at eccentricities of 0-5°. Although considerable feature-fusion was found at the fovea, none was found beyond 2°. Experiment 2 included peripheral presentation of a Ternus-Pikler display, consisting of two frames, each including three disks. We found that it is extremely difficult to obtain element-motion (associated with temporal integration) at the periphery. Moreover, the transition point from element-motion to group-motion as a function of Inter-Frame-Interval (IFI) was set on a shorter IFI compared with foveal presentation. This is consistent with the different patterns of spatial and temporal integration observed at various regions of the visual field.

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Subcortical involvement in global and local processing

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The present study examined the involvement of subcortical structures in the processing of global and local information. We took advantage of the fact that visual input, once received by the retina, is propagated in an eye-specific fashion through the early stages of the visual system. Using a stereoscope we manipulated the visual information presented to different eyes separately and presented a hierarchical stimuli (containing both local and global dimensions) in a binocular or a monocular fashion. The global and local dimensions were either both presented to the same eye, or were segregated into different eyes. Our results indicate that global information does not influence local processing when presented to a different monocular channel. In contrast, local information does influence global processing in both presentation conditions. This suggest that subcortical regions, indexed by monocular portions of the visual system, play a functional role in local but not global information processing.

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Reaction time predicts implicit processing load and visual crowding effect

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Reaction time (RT) and response accuracy are used to explore the processing load. Visual crowding is defined as the inability to recognize objects in clutter; and limit conscious visual perception and object recognition throughout most of the visual field. We explored the crowding effect by having subjects identify the letter E embedded in a matrix of other letters. The results show that foveal crowding is remarkable for short presentation times of 30, 60 msec but is insignificant for 240 msec. However, RT was largely reduced (~100 msec) even in cases where there was an indication of accuracy reduction (no-crowding). Furthermore, the RT for 240 msec (no-crowding) predicts a crowding effect for a 60 msec presentation: subjects that exhibit a slower RT for 240 msec exhibit larger crowding for demanding tasks of 60 msec. Therefore, RT serves as a marker for an implicit processing load without indications of explicit accuracy reduction.

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Orientation and disorientation: lessons from patients with epilepsy

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Orientation in time, space, and person is a fundamental cognitive faculty and the bedrock of neurological and psychiatric mental status examination. Nevertheless, research in orientation and disorientation is neglected in both cognitive science and neuropsychiatry. Specifically, it is still unclear whether disorientation in time, space and person represent a failure of the same system or merely share a common nomenclature, and whether these three forms of orientation depend on different psychological and neural systems. We have analyzed descriptions of patients with specific orientation failures associated with circumscribed cortical lesions, with a primary focus on epilepsy. The form of disorientation was analyzed according to its specific domain, the underlying neuropsychiatric disorder, and its anatomical correlate. Analysis of the cognitive and neural systems disturbed in these patients suggests that disorientation in one or several domains may be related to a failure in a specific brain mechanism localized mostly in the right hemisphere, partially overlapping with parts of the default-mode network.

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The idiosyncratic brain: Spatial distortion of spontaneous connectivity patterns in adults with autism spectrum disorder

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Autism Spectrum Disorder (ASD) has been associated with a reduction in resting-state functional-connectivity, though this assertion has recently been challenged by reports of increased connectivity in ASD. To address these contradictory findings, we examined both inter- and intra-hemispheric functional-connectivity in several resting-state datasets acquired from adults with high-functioning ASD and matched control participants. Our results reveal both areas of increased and decreased connectivity in ASD groups compared to control groups. Importantly, we show that this heterogeneity stems from a novel ASD characteristic: idiosyncratic distortions of the functional-connectivity pattern relative to the typical "canonical" template. The magnitude of the individual pattern-distortion in homotopic inter-hemispheric connectivity was significantly correlated with behavioral symptoms of ASD. We propose that individualized alterations of the functional-connectivity organization is a core characteristic of high-functioning ASD. This result not only accounts for existing discrepant findings but offers a potential signature of altered functional brain organization in ASD.

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Less is more: A new set of subtle and dynamic facial expressions.

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In everyday life, people encounter facial expression of emotion as a dynamic signal that can be quite subtle. Static and prototypical representations, which are typically used in emotion research, omit these characteristics and therefore may not capture the full essence of naturally occurring facial expressions. In the present study, we validated a new stimulus set of facial expressions – the JeFEE (Jerusalem Facial Expression of Emotion), which contains standardized dynamic emotion displays, in which facial expressions are subtle and not necessarily prototypical. When compared to other commonly used sets of prototypical facial expressions, the JeFEE stimulus set was found to be well recognized, but more challenging than the other stimuli. Moreover, JeFEE stimuli rated as more subtle and more ecologically valid than the other prototypical facial expressions. Taken together, in comparison with typically used prototypical and intense emotion displays, the JeFEE stimulus set seemed to better represent facial expressions that people encounter during social interactions.

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Perceived loudness of self-generated sounds is differentially modified by expected sound intensity.

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Performing actions with sensory consequences modifies physiological and behavioral responses relative to otherwise identical sensory input perceived in a passive manner. It is assumed that such modification occurs through an efference copy sent from motor cortex to sensory regions during performance of voluntary actions. In the auditory domain most behavioral studies report attenuated perceived loudness of self-generated auditory action-consequences. However, a few recent studies report enhanced perceived loudness of such consequences. Here we manipulated the intensity of self-generated and externally generated sounds and examined the type of perceptual modification (enhancement vs. attenuation). We found that when the intensity of self-generated sounds was low, perceived loudness is enhanced. Conversely, when the intensity of self-generated sounds was high, no such enhancement is observed. Our results suggest that an efference copy doesn't act in a global fashion, but rather adapts perception according to the sensory context of the voluntary action.

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More than meets the eye: Correspondence of retinotopic visual areas organization during resting state, beep detection and natural viewing.**Wilf, M.¹, Strappini, F.¹, Harel, M.¹, Golan, T.² & Malach, R.¹**

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Our sensory cortices maintain correlated activity even when we are at rest. However, it is not clear whether the activity patterns evident during resting state are due to mental processes such as imagery, and what is the origin of the specific cortical organization. We focused on retinotopic visual cortex and set out to search for similarities in intricate correlation patterns between three types of tasks: eyes-closed resting state, beep detection task, and natural viewing of a movie sequence (N=12). We found a striking similarity in correlation patterns of voxel seed-based connectivity maps within retinotopic visual regions (V1 to V3). Interestingly, long-distance correlation maps showed significant reproducibility in the three experiments, while a visual control did not. The pattern similarity between natural movie and rest implies that this kind of visual stimulation reliably captures essential features that are experienced in daily life, and by which the brain's synaptic structure is shape.

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Evidence of Piecemeal Conscious Perception through Distinct High-frequency Markers in the Visual Word Form Area.**Levy, J.¹, Vidal, J. R.², Fries, P.³, Démonet, J-F,² & Goldstein, A.¹, Bar-Ilan University.**

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It is commonly assumed that conscious visual perception operates in an all-or-none. However, recent theoretical and empirical findings suggest the existence of an intermediate level of conscious perception. Here, we studied the neural mechanisms of graded levels of conscious perception (of words) in a left portion of the occipitotemporal junction, a cerebral hub of word form recognition. Healthy human participants viewed masked words (Dutch and Hebrew) during two different experimental approaches yielding null, partial and full word percepts. Magnetoencephalography recordings of ongoing brain activity revealed three distinct temporal and rhythmic samples in the broad gamma band (40-100 Hz) altogether reflecting piecemeal conscious word perception. The findings altogether suggest that, regardless of bottom-up (orthography) or top-down (task) factors, the visual word form area operates an integrated process of three functionally coupled mechanisms at different time-frequency samples and thereby defines piecemeal word perception.

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Visual Working Memory

Compensation mechanisms for poor filtering ability in visual working memory

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Previous research has suggested that filtering efficiency (i.e., the ability to ignore task irrelevant items) might explain individual differences in visual working memory (VWM) capacity. Here, we investigated possible compensation mechanisms for the poor filtering ability. Specifically, we investigated whether cuing the same positions of the irrelevant items or cuing the upcoming trial when filtering was needed could compensate for the low filtering ability. Using a change-detection task while ERPs were recorded, participants viewed memory arrays with either two targets, four targets, or two targets and two distractors (the filtering condition). We used the CDA (a waveform that reflects the number of items held in VWM) to monitor changes in filtering efficiency. In both experiments we found no difference in filtering efficiency between the cued and non-cued conditions, suggesting that prior knowledge about where or when filtering occurs did not compensate for poor filtering efficiency in VWM.

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The online updating of separating items in visual working memory

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Visual working memory (VWM) is the mental mechanism that dynamically stores and manipulates visual stimuli, but relatively little is known about how its representations are updated. Specifically, most of previous research focused on conditions in which objects integrated to form groups, while the reverse process of objects separating to their elements is less understood. We examined the VWM representation of a shape that moved as a coherent unit, but then separated into two independently moving halves. To study the online dynamics of VWM, we monitored the contralateral delay activity, an electrophysiological marker whose amplitude reflects the number of items in VWM. We found that unlike the gradual integration previously found for joining items, the updating of separating items was abrupt: when an object broke into pieces, VWM cleared and then restarted. We investigated the nature of this updating process and the influence of familiarity, expectedness, and objecthood on it.

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Evidence for predictive coding in the human motor system: a MEG study

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Previous human neurophysiological and neuroimaging studies have shown that motor areas are active during action observation. Still little is known about action representation when the movement is partially occluded. We measured beta oscillations, which are largely associated with motor cortex activity, in MEG while participants passively observed full viewed and partially occluded transitive and intransitive actions. We found a different cortical activity before the movement begins: beta oscillations were suppressed to a lesser degree for intransitive actions and for partially occluded actions. The human motor cortex is active not only when the outcome of the action is viewed, but also when the goal of the action is occluded. Our results agree with a predictive coding account. It seems that we encode the goal of the action as well as the presence/absence of an occluder already during the static phase in which no occluder is seen, based only on prior knowledge.

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The n-reference task: Separating the contribution of WM updating, automatic updating, matching and gating to n-back performance

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Working memory (WM) has two major functions. Maintenance is the ability to shield information from being overwritten by irrelevant information, while updating is the ability to modify the maintained information when needed. These two conflicting demands are controlled by a gating mechanism which enables selective control over updating. However, some forms of memory updating are automatic and do not depend on cognitive control. The goal of our study was to separate the contribution of controlled updating to performance in the 1-back task. In our work we addressed several confounding components of the 1-back task, which all occur each time a mismatch is detected between the presented stimulus and the 1-back representation. To separate these components, we introduce the n-reference task, which enables separating the contribution of the matching decision, stimulus alternation, gate opening and WM updating to task performance. The implications for dissociating WM updating from automatic updating is discussed.

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Attention in Aging and Childhood, ADHD

Aging influences on the ventral and dorsal fronto-parietal attentional networks

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Reports regarding age-related influences on the orienting of attention are inconsistent. Considering the different functions of the ventral and dorsal fronto-parietal attentional networks in the orienting process suggests a possible account for these inconsistencies. The dorsal network is putatively responsible for focusing attention on a target location, whereas the ventral network is putatively responsible for signaling important events in unattended locations, disengaging and initiating shifts of attention. To examine possible differential changes in these two function sets resulting from aging, we employed a variation of the ANT-R paradigm, with a sample including oldest old participants (over 90). Initial results indicate that although older adults exhibit general slowing, they benefit from valid orienting cues and are adversely affected by invalid orienting cues to the same degree as younger adults. This result indicates that both ventral and dorsal attentional systems may be fully functional even in very old age.

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ERP correlates of sustained attention and response inhibition among adults with and without ADHD

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ERP correlates of sustained attention and response inhibition among adults with and without ADHD Deficiencies in sustained attention and response inhibition are of the most prominent deficiencies among adults with attention-deficit/hyperactivity disorder (ADHD). In the current study we aimed to elicit functioning of these two mechanisms while recording EEG data, in order to trace a neural correlate of the known neuropsychological differences between ADHD and controls. Participants performed a conjunctive continuous performance task (CCPT) with a manipulation of target frequency, measuring sustained attention and response inhibition in two task variants, thus allowing a direct comparison of these functions. ERPs corresponding to the two task variants are contrasted within and between groups (participants with or without ADHD). The relations between the neural level (ERP measures), the neuropsychological level (RT- and ACC-based measures), and the clinical level (behavioral symptoms reports) are investigated.

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Stimuli-intensive environments may, counter-intuitively, decrease distraction in ADHD

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One of the symptoms of ADHD is increased vulnerability to distraction. In a recent study (Forster et al., 2014), adults with ADHD performed a letter search task, in low and high set-size presentations, while ignoring a distractor. The results showed a reduction in distractor interference, under high-load conditions. Here we suggest that this reduction of distractor interference in ADHD adults need not be attributed to increases in task load, rather, it could be due to the dilution of the distractor by the neutral letters. To test our hypothesis, we added a 'dilution' condition which was characterized by a high set-size display, yet, the target 'popped-up' (forming a low task load). The results demonstrated a reduction of distractor interference in the dilution condition as in the high-load condition, in both ADHD and control groups. We suggest that ADHD adults, as controls, may benefit from stimuli-intensive environments when attempting to focus on a task-relevant target, irrespective of task load.

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The relation between visual perception, attention and behavioral symptoms in preschoolers

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Perception and attention have an important role in learning throughout the life span and especially in early childhood. This study investigated the relations between attention, visual perception and behavioral symptoms among preschoolers. Two computerized attention tasks and a manual visual perception task were administered to 41 preschoolers. In addition, subjective evaluations of everyday behaviors of inattention, impulsivity and hyperactivity were completed by the preschool's teachers. Significant differences were obtained between the younger and the older preschoolers in all three tasks. Correlations were obtained between performance in the visual perception task and measures of sustained-attention. Furthermore, visual perception was related to selective-spatial attention. Also, the performances in the visual perception task and in the sustained attention task were correlated to the subjective evaluation of inattention symptoms. No relations were obtained between measures of selective-spatial attention and behavioral symptoms. The theoretical and practical implications of the findings are discussed.

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The relations between visual working memory and visual attention in adults with and without ADHD

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Various studies have documented deficits in working memory (WM) and/or deficits in various aspects of attention among individuals with ADHD. In this study we tested the WM-attention relations in adults with ADHD vs. control participants, by investigating the connection between visual WM capacity and different functions of attention (sustained-, selective-spatial-, orienting-, and executive-attention). The change-detection task was used to assess the WM capacity and four visual-attention tasks were used to assess the various functions of attention. The results indicated that WM capacity correlated with executive attention among both the control and the ADHD groups. Selective (spatial) attention correlated with WM capacity only among the control group. The results suggest that executive attention (more specifically conflict resolution) and selective-spatial attention may contribute to WM capacity.

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Do people with ADHD symptoms seek more risks?

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People with ADHD are often engaged in risky behaviors (i.e. dangerous driving, substance abuse and gambling) which commonly interpreted as reflecting risk seeking tendency. However, evidence that people with ADHD show same patterns of risk choice when options are equal in their expected value and tend to erroneously choose the less favorable outcome when options are differ in their expected values shed skeptical light on the risk-seeking hypothesis. In this research, a new tone is established shifting attention from attitude to perception based on recent theory (Weber, Blais, and Betz, 2002) which suggests that level of risk taking can be accounted for by two underlying processes: 1) Risk/Return perception, and 2). Attitudes towards perceived risk. The present study suggests that, while people with ADHD symptoms appear to take more risks, their behavior is mediated by the perceived benefits of their risky actions and not by their tendency to seek risks.

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Is ADHD solely an executive attention problem? Interference effects of visual emotional distractors in adults with ADHD

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Attention-deficit/hyperactivity disorder (ADHD) is typically identified in childhood to early adolescence. ADHD diagnosis in adults has become more common in recent years. Most of the studies on ADHD focus on cognitive aspects in general and executive function deficits in particular. There is some evidence, however, for differences in emotional processing and regulation between adult patients with ADHD compared to controls (Rapport et al., 2002; Surman et al., 2010; Raz & Dan, 2014). The aim of the current study was to investigate possible abnormalities in emotion-attention interaction in adults with ADHD. Thirty one participants (15 ADHD patients; 16 matched controls) took part in 3 experiments manipulating task-relevance of emotional or neutral distracting stimuli. Results showed that only when the relevant target was negative, participants with ADHD display delayed reactions for negative flankers compared to controls. Similar findings were not revealed when the relevant target was either positive or neutral. Intriguingly, participants with ADHD did not show the expected higher interference for distracting information; in contrast, they did not show any interference effects for both relevant and irrelevant aspects of distracting information, as opposed to the controls. These results highlight the complex interference pattern in ADHD. This 'complex negativity bias', meaning interference toward negative stimuli, is in line with previous reports of a bias towards negative distractors (Kochel et al., 2013; Ludlow et al., 2014). As far as we know, this is the first evidence for interference of negative distracting information only when relevant information is congruently negative. Our findings manifest the importance of the nature of interaction between relevant and irrelevant information when studying emotional biases in ADHD. In a more general point of view, the results call for future investigation of emotional abnormalities as a core deficit in ADHD.

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Automated analysis of non-verbal behavior in schizophrenic patients.

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In psychiatry, mental disorders are diagnosed in a descriptive non-etiological manner using lists of signs and symptoms, largely based on non-verbal behavior *expressions*. To date, there are no objective, quantitative measures for these non-verbal observations, and no clear relation between them and the underlying brain disturbances. This causes multiple interpretations of phenomenology and leads to low reliability and validity of psychiatric diagnosis. Our study objective is to characterize non-verbal behavior in psychiatric patients and to develop automatic tools for quantitatively describing and analyzing relevant measures of this behavior. We videotaped 39 schizophrenia patients and 28 controls, during a short

structured interview, and while performing an emotionally evocative tasks (films and photos). Subjects were psychiatrically assessed using Positive and Negative Symptoms Scale (PANSS). Extraction of non-verbal measures out of videos, was done by a software called '*Faceshift*', which gives a score to the activity of individual facial muscles (action units -AUs), based on the Facial Action Coding System (FACS). Analysis of the AU activity was done taking a dynamic, continuous approach, using signal processing methods, and machine learning. Preliminary results suggest good separation between groups and different symptomology based on general properties of the AUs activity such as expression ratio, changeability and expression level. Our hope is that the quantitative, well-defined, non-verbal measures that will be introduced in the study will make it easier for psychiatrists to monitor patients, evaluate treatment influence, and compare between different symptomatology.

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THURSDAY, FEBRUARY 26TH 2015 – TALK SESSION 5

Symposium 4: Working Memory: Structure and Processes (Room A)

How complex information is represented in visual working memory?

Luria, R., Balaban, H. and Allon, A. Tel Aviv University, Israel.

It is widely accepted that visual working memory (VWM) can hold a limited amount of information, though the nature of this strict capacity limitation is under debate between discrete slots models and flexible resource models. We used the change-detection paradigm and measured both behavioral and electrophysiological indexes of VWM capacity allocation. The task required representing random polygons, previously used to support the resource models by showing that VWM is sensitive to complexity. Eliminating the need to encode the fine details of the polygons did not result in a parallel decrease in the resolution with which the polygon was maintained in VWM. Furthermore, capacity allocation in VWM was the same for a whole polygon relative to maintaining only half of a polygon, as revealed by both electrophysiology and in an object-benefit accuracy effect. The results support the claim that even complex stimuli are maintained in VWM as bound objects.

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Forgetting in working memory: mechanisms and implications

Pertzov, Y. The Hebrew University of Jerusalem, Israel.

It has been suggested that objects are maintained as integrated units in working memory and when forgotten they are lost as a whole, without leaving any trace. To study the validity of this claim we used a memory task with a continuous analogue scale of reporting with difficult-to-verbalize stimuli and variable delays. Analysis of the distribution of errors made by healthy participants showed that, contrary to the claim above, items are not only forgotten as a whole but the precision of report also deteriorates with time. While item "disappearance" seems to be a stationary process (not modulated by time) the decrease in precision saturates after a few seconds of delay. Thus, the temporal dynamics of forgetting is different when considering the quality and quantity of memory representations. We continued by investigating immediate forgetting in special neurological populations such as dyslectic individuals.

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Working memory and long-term memory: A two-way street

Makovski, T. The Open University, Israel.

What are the consequences of holding information in working memory (WM)? Over the last half-century, researchers have asked whether actively maintaining an item in WM leads to improved subsequent long-term memory (LTM). Despite this continued interest, the empirical situation remains unclear. I will present data from nearly 2000 subjects that clearly show that increased WM maintenance of a stimulus leads to superior recognition for that stimulus in a surprise memory test. I will further show that the relationship between LTM and WM is bi-directional, and LTM is also involved in WM tasks. There is still no consensus on the extent of this involvement. However, several researchers claim that LTM seriously contaminates visual WM capacity estimations as measured by standard change-detection tasks. This joins a growing number of criticisms raised in recent years against the common use of the change-detection task as a pure measurement of visual WM capacity.

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The role of controlled gating in working memory updating

Kessler, Y. Ben-Gurion University of the Negev, Israel.

Theories of working memory (WM) propose that updating is controlled by a gate that buffers between the perceptual input and the maintained information. Control over WM updating is achieved through of a cascade of sub-processes, including detection of a relevant change, gate-opening, information modification, and gate-closing. In contrast to WM updating, other memory phenomena, such as recency effects and sequential reaction time effects, are automatic. In contrast to WM updating, automatic updating occurs continuously, without control and without being part of the task requirement. Hence, automatic updating does not depend on gating. I propose that the nature of the updating process distinguishes between WM and STM/LTM. The implications of this suggestion will be discussed, as well as the mechanisms that trigger WM updating.

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Talk session 5: Attention in Aging and Childhood, ADHD (Room B)

Spatial attention affects letter position errors in short exposure

Salner, N.¹, Friedmann, N.¹ and Chajut, E.² [1] Tel-Aviv University, Israel. [2] The Open University, Israel.

This study tested the role of visual selective attention allocation in Letter Position Dyslexia (LPD, a reading deficit characterized by letter transpositions). Normal readers, LPDs, and surface dyslexics (who read via the sublexical route) read aloud migratable words (in which letter transposition creates another word, e.g., TRIAL) and potentiophones (words that can be read via letter-to-sound conversion as another word, e.g., NONE) in a Posner-like task. Results show that the invalid trials increased error rates for normal readers only for migratable words and not for potentiophones. This pattern was not observed for the LPDs and surface dyslexics. The increase in reading errors shown by normal readers in the migratable-unattended condition suggests that processes governed by attention allocation are involved in letter-position encoding. The performance of the LPD group implies that attention allocation to the whole word may not suffice and that proper letter-position encoding requires attention allocation to specific letter positions.

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Executive attention in adults with and without ADHD – an ERP study

Shalev-Mevorach, L.¹, Luria, R.¹, Saar, K.¹, Nesterovsky, I.¹, Stern, P.¹ and Styr, B.² [1] Tel Aviv University, Israel. [2] Maccabi Health Care, Israel.

The present study investigated executive attention in adults with ADHD. A typically developed adults group and an ADHD group performed a location-direction Strooplike task, while EEG was recorded. The task induced either a low conflict (location judgment blocks) or a high conflict (direction judgments blocks). The results indicated that the ADHD group showed an overall behavioral impairment. Moreover, we analyzed the slow potential (SP), an ERP component whose amplitude is sensitive to degree of conflict in such tasks. In the control group the SP amplitude, measured across parietal and occipital electrodes, was more positive in the high conflict- relative to the low conflict-condition. However, in the ADHD group no such sensitivity was found. Importantly, the degree of conflict resolution as indicated by the SP amplitude difference between the high and low conflict conditions, correlated with the severity of ADHD symptoms. We discuss several explanations for this novel finding.

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Stroop effects in Alzheimer's disease: Selective attention, speed of processing or color-naming?

Shakuf, V. and Ben-David, B. M. Interdisciplinary Center Herzliya, Israel.

Selective attention, an essential part of daily activity, is often impaired in people with Alzheimer's disease (AD). Usually, it is measured by the color-word Stroop test. However, there is no universal agreement whether performance on the Stroop task changes significantly in AD patients; or if so, whether an increase in Stroop effects reflects a decrease in selective attention, a slowing in generalized speed of processing (SOP), or is the result of degraded color-vision. The current study investigated the impact of AD on Stroop performance and its potential sources in a meta-analysis and mathematical modeling of 18 studies. We found a significant increase in Stroop effects for AD patients, across studies. SOP could only explain a moderate portion of the total variance. Moreover, we found strong evidence for an AD-related increase in the dimensional imbalance between color-naming and word-reading latencies. This increase was found to explain a significant portion of the AD-related increase in Stroop effects, hinting on a possible sensory source.

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Effects of aging and distractors on detection of redundant visual targets and capacity: Do older adults integrate visual targets differently than younger adults?

Ben-David, B. M.¹, Eidels, A.² and Donkin, C.³ [1] Interdisciplinary Center Herzliya, Israel. [2] University of Newcastle, Australia. [3] University of New South Wales, Australia.

In the redundant target effect, participants respond faster with two (redundant) targets. We compared the magnitude of this effect in younger and older adults, with and without distractors, in a simple visual-detection task. We employed additional measures that allow non-parametric assessment of performance (Townsend's capacity coefficient) and parametric estimates (Linear Ballistic Accumulator model). Older participants' latencies were slower, especially in the presence of distractors, and their calculated capacity indicators increased with distractors. Parametric estimates indicated that these increases were generated by the older adults' increased difficulty in inhibiting the distractors, and not the results of either improved detection of redundant-targets, or of a generalized slowing of processing.

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Attenuated hemispheric specialization in metaphor processing among adults with ADHD

Segal, D.¹, Shalev-Mevorach, L.² and Mashal, N.³ [1] The Hebrew University of Jerusalem, Israel. [2] Tel Aviv University, Israel. [3] Bar Ilan University, Israel.

There is a basic assumption that the central nervous system of individuals with ADHD is characterized by irregular cerebral organization and dysfunctional specialization needed for lateralized processing of language skills. In the current study, this assumption was tested by examining metaphor processing, which is known to be a lateralized process. We used a divided visual field paradigm in which different kinds of metaphors were presented either to the right visual field/left hemisphere (RVF/LH) or to the left visual field/right hemisphere (LVF/RH). Forty-eight participants were included in the study, half of whom were previously diagnosed with ADHD. We found that control participants processed conventional metaphors more efficiently when presented in the LVF/RH than when presented in the RVF/LH, while the ADHD group demonstrated more symmetrical hemispheric processing. Results suggest reduced hemispheric asymmetry in ADHD and are discussed in terms of potential compensation mechanisms.

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The relation between attentional functioning and spatial representation of Arabic numbers in children

Naveh, C., Azulai, O., Shoham, D., Baruch, S. and Shalev-Mevorach, L. Tel Aviv University, Israel.

Attention is a limited resource that is required in order to perform most of our everyday activities. Previous studies have shown a link between visuospatial attention and numerical cognition. The current research aimed at deepening our understanding of the relations between different aspects of attention and spatial representation of numbers. Our sample comprised of 44 children in the fifth and sixth grades from regular classes with normal vision and no other exclusion criteria. Each participant performed five computerized neuropsychological tasks and one paper and pencil task assessing numerical spatial representations (a number line task). High correlations were found between sustained attention and response inhibition and performance in the number line task. Lower yet significant correlations were obtained between certain aspects of executive attention and of orienting of attention and between performance in the number line task. Interpretation of the findings and their implications will be further discussed.

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Talk session 5: Metacognition, Reasoning, Judgment and Decision Making (Room C)

Looks like a bad sign: EEG and behavioral data reveal a biased perception of correlation between the outcomes of choice options

Marciano-Romm, D.¹, Bourgeois-Gironde, S.^{2,3}, Bentin, S.¹ and Deouell, L. Y.¹ [1] The Hebrew University of Jerusalem, Israel. [2] Panthéon-Assas University, France. [3] Institut Jean Nicod, France.

Behavioral research shows that following a choice, the outcome of the unchosen (alternative) option influences people's evaluation of their own outcome. Our EEG study tested whether the feedback-related negativity (FRN) is sensitive to outcomes comparison. Subjects chose one of two displayed boxes, each hiding a green/red (gain/loss) coin. In some trials the computer made the choice. Results: The alternative outcome, which was revealed first, modulated the FRN of the chosen outcome. This effect decreased when subjects didn't make the choice. Yet, the alternative's influence didn't parallel satisfaction reports from past studies. We hypothesized that subjects may have erroneously used the alternative outcome as a predictive cue regarding their outcome. Three behavioral experiments confirmed that subjects perceived an illusory negative correlation between the uncorrelated outcomes of the two boxes. Taken together, our electrophysiological and behavioral findings show that people see a good/bad alternative outcome as a bad/good sign regarding their fate.

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Going to extremes: Accentuation of option features as an integral part of the process of choice

Shoval, R. and Eitam, B. University of Haifa, Israel.

A new paradigm was designed for testing how preferences are affected by choice. Participants viewed and estimated the prices of daily products, with or without choosing between them prior to making the estimation. Two experiments confirmed that the new paradigm is equivalent to the classic 'free choice paradigm' (FCP) – the paradigm that produced the 'post choice preference change' effect. However, a closer inspection of the results reveals a pattern that cannot be explained by any available theory of choice – choice increased the difference in products' prices even when participants chose the products they perceived as cheaper. That is, choosing the perceived cheaper product decreased its value and increased the value of the rejected product. We outline a new theory by which choice requires discrimination that doesn't necessarily serve as a justification for the chosen option, but does highlight the differences between the options thus easing or even enabling choice.

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After the choice comes confidence: Post choice information integration as a causal determinant of confidence

Moran, R.¹, Teodorescu, A.² and Usher, M.¹ [1] Tel Aviv University, Israel. [2] Indiana University, USA.

Confidence judgments are pivotal in many domains of scientific research including the behavioral sciences, psychology and neuroscience. We study the mechanism underlying confidence judgments by investigating the source of the inputs for the confidence-calculation. We focus on an intriguing debate between two families of confidence theories. According to single (information collection) stage theories, confidence is based on the same information that underlies the decision or on some other aspect of the decision process, whereas according to dual stage theories, confidence is affected by novel information that is collected after the decision was made. Our experiments support the case for dual stage theories by showing that post-choice perceptual availability manipulations exert a causal effect on confidence in the decision followed by confidence paradigm. We show that even when a stimulus is not perceptually available after the decision, participants integrate post-choice information based on their memory or on a perceptual pipeline.

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The seller's sense: How well do selling and buying prices track an object's actual value?

Abofol, T.¹, Yechiam, E.¹ and Pachur, T.² [1] Technion – Israel Institute of Technology. [2] Max Planck Institute for Human Development, Germany.

Previous work comparing pricing decisions by buyers and sellers has primarily focused on discrepancies in valuation between the two perspectives. Here we examine whether this phenomenon, known as the endowment effect, is also accompanied by buyer-seller differences in the discrepancy of estimated prices from the objective value of the evaluated object. If, as has been proposed, sellers stand to accrue a more substantial loss than buyers, then their pricing decisions should be more sensitive to actual value differences between objects. We reanalyzed two published datasets in which participants priced monetary lotteries as sellers or buyers. It emerged that sellers indicated prices that were better-aligned with the ranking of the lotteries' expected value in 6 out of 7 studied conditions. The discrepancy in accuracy disappeared in a condition with an extended deliberation time of 15 seconds. The results are consistent with an attentional resource-based account of asymmetries between buyers and sellers.

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Gender moderates self-construal priming effects in visual context sensitivity, but not in reasoning**Guterman, Y.** Tel Hai College, Israel.

The current study examined whether the same mechanism underlies culture-related differences in perceptual context sensitivity and in reasoning. For this purpose, an attempt was made (1) to replicate reported findings suggesting that activation of independent (in contrast to interdependent) self-construal reduces sensitivity to context in visual perception; and (2) to test the prediction that the same manipulation will enhance analytical reasoning. In a visual memory task that requires sensitivity to visual context, an interaction emerged between self-construal priming and gender: females primed with interdependent self-construal showed better performance than females primed with an independent one, but the opposite was true for males. However, in the CRT (Cognitive Reflection Test) that requires restraining intuitive responding and engagement in deliberative reasoning, participants primed with independent self-construal, regardless of gender, performed better than participants primed with interdependent self-construal. I suggest that effects of self-construal priming on perceptual context sensitivity and on reasoning may be mediated by different psychological processes and discuss some possibilities as to their nature.

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THURSDAY, FEBRUARY 26TH 2015 – TALK SESSION 6

Symposium 5: From Numeric Cognition to Decision-Making: Common Processes and Interactions (Room A)

Introduction – Numerical representations and decision processes

Usher, M.¹ and Henik, A.² [1] Tel Aviv University, Israel. [2] Ben-Gurion University of the Negev, Israel.

Decisions usually involve some integration or averaging of values, such as monetary payments or numerical scores given to candidates in a contest. In addition, risky decisions involve the weighting of numerical values with corresponding probabilities. Research in decision-making indicates that while people are able to integrate values quite well they also show a number of biases. Research in numerical cognition examines the way numerical values and probabilities are represented and processed in the brain. While these two fields have mostly developed independently, an attractive possibility is that decision mechanisms and biases are intimately linked with properties of the numerical value-representation mechanisms. Here, as a preview to five talks that will address properties of the two systems and their interactions, we will present the motivation for shared processes in numeric cognition and decision-making, and review some central findings relevant to both fields.

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Not all ratio comparisons are created equal: an fMRI study

Kallai, A.¹, Stavy, R.² and Babai, R.² [1] Emek Yezreel Academic College, Israel. [2] Tel-Aviv University, Israel.

The ability to compute the ratio between two quantities is essential for everyday life (e.g., when estimating the probability of a desired outcome). However, not all ratios are processed similarly. In the current fMRI study we compared the neural processes underlining comparisons of different types of pairs of ratios. Four ratios categories were tested: pairs with both ratios being equal to 1 (e.g., 3:3 vs. 4:4); pairs with equal ratios different than 1 (e.g., 6:3 vs. 8:4); pairs with unequal ratios with a common component (e.g., 2:5 vs. 2:8, or 2:5 vs. 4:5), and pairs with unequal ratios with no common component (e.g., 2:5 vs. 3:7). Parietal regions were more active when the ratio comparison included unequal ratios and when no common components were included. Frontal regions were more active when the comparison was considered easier (equal ratios or common components). The strategies used by participants are discussed.

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Violations of standard statistical and mathematical theory in human cognition

Algom, D.¹, Rapp, J.¹ and Kareev, Y.² [1] Tel Aviv University, Israel. [2] The Hebrew University of Jerusalem.

This study on perception of the mean and the variance of number and of line stimuli revealed that the mean and the variance are integral statistical attributes. People are unable to perceive one without noticing the other. The mutual dependence of the two statistical moments in human cognition is inconsistent with standard statistical theory. These results join previous ones showing the perceptual dependence of Cartesian coordinate axes in human cognition. The results invite a fresh look on the recent wave of studies on representations of statistical properties, on the one hand, and on the classic psychophysical laws of Weber and Hick, on the other hand.

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Averaging numerical values: behavioral data and neural mechanism

Brezis, N., Bronfman, Z. and Usher, M. Tel Aviv University, Israel.

We investigated the mechanism(s) with which humans average fast numerical sequences. Participants were presented with 4, 8 or 16 (two-digit) numbers, serially and at a rapid pace (2-10 numerals per second), and were instructed to convey the sequence average as accurately as possible. We find that humans exhibit a remarkable ability in evaluating the average of rapidly presented numbers and that evaluations are faster and more accurate as set-size increases. We propose a novel computational model that postulates neural population-coding underlying intuitive numerical averaging. The model accounts for these findings and in addition provides several predictions, which were behaviorally corroborated.

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The precedence of global features directs value-based decisions

Levy, D. and Sela, T. Tel Aviv University, Israel.

Do perceptual and numerical features influence risk preferences? We developed a variation of Navon's figure task that included pairs of numbers instead of letters. Subjects decided which was larger: the local or the global number. A week later, subjects saw the same figures but now representing a 50-50 chance of winning or losing money and decided whether to accept or reject the gamble. Gains or losses were presented at the global or at the local level. We compared subjects' risk-preferences between these conditions. For positive expected value (EV) options, the propensity to accept the gamble was higher when the global feature was a

gain (congruent) vs. when it was a loss (incongruent). This was reversed for negative EVs. Reaction times of the 1st session correlated with choices of the 2nd session. We suggest that values are influenced not just by amount and probability but also by perceptual and numerical features.

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Processing of rare events: When numeric information leads to super-under-weighting of rare events

Yechiam, E.¹, Rakow, T.² and Newell, B.³ [1] Technion – Israel Institute of Technology. [2] University of Essex [3] University of New South Wales.

The description-experience gap is the finding that people tend to overweight rare events when these are presented in summary form in decisions from description; on the other hand, they tend to underweight these events when they are presented experientially. Additionally, super-underweighting of rare events is the phenomenon whereby underweighting events is exacerbated by feedback information showing the relative merit of the available alternatives regardless of a person's choice. We examine whether super-underweighting of rare events can also be obtained when being presented with an accurate numeric summary of information. In three experiments, repeated descriptive summaries of past outcomes from all alternatives accentuated the underweighting of rare events. The results shed light on the role of frequency-based judgments in decisions concerning rare events, and highlight that providing numeric information about the incidence of rare hazards can have the unintended effect of increasing people's propensity to take risks.

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Talk session 6: Consciousness and Attention (Room B)

We see more than we can report: "Cost free" color phenomenality outside focal attention

Bronfman, Z. and Usher, M. Tel Aviv University, Israel.

The distinction between access consciousness and phenomenal consciousness is a subject of intensive debate. According to one view, visual experience overflows the capacity of the attentional and working memory system: We see more than we can report. According to the opposed view, this perceived richness is an illusion—we are aware only of information that we can subsequently report. This debate remains unresolved because of the inevitable reliance on report, which is limited in capacity. To bypass this limitation, this study utilized color diversity—a unique summary statistic—which is sensitive to detailed visual information.

Participants were shown a Sperling-like array of colored letters, one row of which was precued. After reporting a letter from the cued row, participants estimated the color diversity of the noncued rows. Results showed that people could estimate the color diversity of the noncued array without a cost to letter report, which suggests that color diversity is registered automatically, outside focal attention, and without consuming additional working memory resources.

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Pulling the rug from under high-level unconscious processing: low-level awareness during continuous flash suppression

Gelbard-Sagiv, H.^{1,2*}, Faivre, N.^{2,3*}, Mudrik, L.^{1,2*} and Koch, C.^{2,4} [1] Tel Aviv University, Israel. [2] California Institute of Technology, USA. [3] École polytechnique fédérale de Lausanne, Switzerland. [4] Allen Institute for Brain Science, USA.

The scope and limits of unconscious processing is a matter of ongoing debate. Recently, Continuous Flash Suppression (CFS) has been widely used to demonstrate surprisingly high-level processing of invisible stimuli (e.g., reading, semantic processing or face identity processing). Yet the degree of stimulus suppression during CFS is far from being understood. We used CFS to suppress face images and found that on some trials subjects could accurately detect the color of the suppressed face, while reporting not seeing the face and failing to perform simple categorizations. Importantly, we found face identity priming effects only on those trials in which the color was visible, as opposed to trials in which subjects could not access color information. Our results thus question the existence of identity processing for completely invisible faces, and may reflect on other high-level effects held to be genuinely unconscious, as these may also be driven by low-level awareness.

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Right-field advantage in the attentional blink: Hemispheric differences in mechanisms behind attentional episodes

Bergerbest, D.¹, Shilkrot, O.¹, Joseph, M.¹ and Salti, M.² [1] Academic College of Tel Aviv-Yaffo, Israel. [2] Ben-Gurion University of the Negev, Israel.

While monitoring two targets (T1 and T2) within a stream of rapidly presented visual stimuli (~100 ms per stimulus), we often miss T2 if it follows T1 within an interval of 200-500 ms. This so-called “Attentional Blink” is reduced, under certain circumstances, when T2 directly trails T1, demonstrating a “Lag-1 sparing” phenomenon. We studied the effects of location change

(T2 presented to the right or left of centered T1) on the attentional blink and specifically on Lag-1 sparing. Location change effects were asymmetrical: presenting T2 to the right of T1 resulted in a pronounced Lag-1 sparing, while presenting it to the left eliminated the effect. These results are discussed in relation to theories of attentional episodes (e.g., Wyble et al., 2009). Specifically, we suggest that the left hemisphere encode prolonged attentional episodes into working memory, resulting in pronounced Lag-1 sparing.

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Capture and engagement of attention during the attentional blink

Zivony, A. and Lamy, D. Tel Aviv University, Israel.

The attentional blink (AB) refers to impaired target identification when it follows a previous target within 500ms. Whether the AB reflects delayed engagement of attention or temporary loss of control over the attentional set has been debated. Here, we tested these models against each other. Two distractors (D1 and D2) and a color-defined target letter were embedded in a rapid serial visual presentation (RSVP) stream of letters. Each of the two distractors either shared or did not share the target color. The first distractor captured attention and produced an AB when it was in the target color. Regardless of D1 color, target-color D2 captured attention, but only the item immediately following it was selected, as revealed by the higher probability of erroneously reporting it as the target. This finding indicates that during the blink, there is a delay between attentional capture and attentional engagement, unambiguously supporting the delayed-engagement account.

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Multiple levels crowding: Between object parts and between object configural representations

Pirkner, Y. and Kimchi, R. University of Haifa, Israel.

Prevailing theories hold that crowding – the interference to target recognition by nearby flankers in peripheral vision – occurs because of integration or “pooling” of low-level features at a single, relatively early stage of visual processing. Recent studies with faces suggest that crowding can occur also between high-level representations of objects; however these results may be specific to faces. We examined whether crowding can occur at multiple levels, using simple, non-face objects. The target was 4 elements configured into a square or a diamond according to Gestalt principles. Target was surrounded by flankers similar to the target object whole or to the target object parts. Results showed crowding in both cases: target identification accuracy decreased with an increase in eccentricity and no flanker interference

was observed at the fovea. Crowding at the object-parts level was weaker and had smaller spatial extent than crowding at the object-whole level. We relate this finding to the interaction between crowding, perceptual organization, and attention. Our results provide strong evidence that crowding occurs at multiple levels – between object parts and between high-level object representations.

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Talk session 6: Neuropsychiatry (Room C)

Resting state functional MRI: Tools for studying brain systems organization in health and disease

Bergmann, E., and Kahn, I. Technion – Israel Institute of Technology.

A fundamental problem in brain research is how distributed brain systems work together to give rise to behavior. Magnetic resonance imaging (MRI) methods allow us to simultaneously measure the function of multiple brain systems. In humans we can characterize the functional organization and specialization, and compare the system between health and disease. In animal models we can further dissect using genetic and molecular tools the circuits underlying these dynamics. We aim to identify functional networks that span multiple cortical and subcortical regions, characterize their responses, and modulate the observed dynamics. To advance these goals, we are developing new tools that will allow us to study large-scale neural systems across species. In this talk, I will present our most recent work using spontaneous fluctuations of the blood oxygenation level-dependent (BOLD) signal measured with MRI in rodents, and discuss how this work can provide avenues to bridge between a basic understanding of human behavior, large-scale neural dynamics, and brain disorders where such dynamics are disrupted.

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Normalization of brain connectivity through compensatory behavior despite congenital hand absence

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We recently showed that adaptive patterns of intact hand usage after amputation drive plasticity in the deprived cortex, using task-evoked fMRI. Here we show that bilateral hand region connectivity reflects compensatory arm usage in individuals with congenital hand absence (one-handers), as reflected in spontaneous brain activity. As a group, one-handers showed reduction in both symmetry patterns of corticospinal white-matter integrity and resting-state bilateral hand connectivity, compared with two-handed controls. Nevertheless, individuals relying more on their residual arm for typically bimanual daily tasks showed greater hand region functional connectivity. We therefore suggest that compensatory arm usage maintains normal hand region connectivity levels in one-handers. Our findings show that adaptive behaviour is a powerful driver of long-range brain organization associated with sensorimotor deprivation. Since spontaneous connectivity in our study reflects ecological behaviour, we further propose that inter-hemispherical symmetry, typically observed in resting sensorimotor networks, depends on coordinated motor behaviour.

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Disorganization of somatosensory cortical gradients reflects pathological signal conduction

Saadon Grosman, N., Tal, Z., Itshayek, E., Amedi, A. and Arzy, S. The Hebrew University of Jerusalem, Israel.

Cortical gradients are defined as brain activations which change gradually in correspondence with a continuous stimulus. Primary sensory cortices, as well as higher-order cortices, are topographically organized as cortical gradients, suggesting gradients to be a fundamental character of brain organization. We applied somatosensory stimulation in five patients with a rare syndrome of unilateral hemihypoaesthesia due to cervical disc protrusion compressing half of the spinal cord as well as five healthy controls under fMRI. Cortical gradients for whole body representation were extracted at the primary somatosensory (S1) and the supplementary motor area (SMA) cortices, and quantified according to their continuity. Gradients contralateral to the disturbed body-side were found to be disorganized with respect to both non-disturbed body-side ones as well as healthy controls. Notably, no differences were found in the power of activation. Gradients continuity may therefore serve as a physiological principle of functional brain organization in response to natural continuous stimulation, which may be disrupted in pathological states.

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Procedural skill learning in young low-functioning autistic children and the effect of vestibular stimulation**Katz, G., Adini, Y., Hetzroni, O. and Bonne, Y.** University of Haifa, Israel.

People with low-functioning autism often fail to learn basic perceptual and motor skills despite intensive practice. The reason for this deficit is currently unknown. Here we investigated procedural skill learning, and the modulatory effect of vestibular stimulation, in children with low/mid-functioning ASD, ADHD and typically developing children (6-13y). The children (n=36) were trained on a touch version of the SRT paradigm for implicit sequence learning. Half of each group received vestibular stimulation prior to each training block. Preliminary results with few minutes training sessions across 10 meetings show RT improvement with similar speed gains in all groups; larger with vestibular stimulation in the ASD, but not ADHD sub-groups. These results suggest that low-functioning children with ASD can acquire and consolidate procedural skills with few short training sessions, with a slower speed but a similar time-course as non-autistic controls. They also suggest a positive effect of vestibular stimulation on learning. We suggest that the difficulty of severely autistic children to learn skills is not due to a primary deficit in procedural learning, but in the translation of explicit knowledge to procedures.

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