The Creating Mind: Interdisciplinary Perspectives

The Gonda Multidisciplinary Brain Research Center

18 December 2013
Building 901
First Floor. Room 101

10:00-10:20: Coffee and Greetings

Morning Session 1: Theory of Mind and the Text
Chair: Chanita Goodblatt. Ben-Gurion University
10:20-11:15: Elena Semino. Lancaster University
Figurative Language and Theory of Mind in Fiction about Autism
11:15-12:10: Ellen Spolsky. Bar-Ilan University
Public Exposure: What Faces tell us from St Veronica's Handkerchief to Van Gogh's Portrait of the Postman

Coffee Break: 12:10-12:30

Morning Session 2: Perceptual Organization
Chair: Joel Walters. Bar-Ilan University
12:30-13:10: Avishai Henik. Ben-Gurion University
Numbers in Color and Time in Space: Neuro-cognitive Roots of Synesthesia
13:10-13:50: Yehoshua Shen. Tel Aviv University
What can Hybrids tell us about the Relationship between Language and Thought?
13:50-14:30: Chanita Goodblatt. Ben-Gurion University
Joseph Glicksohn. Bar-Ilan University
Bi-directionality in Metaphor and the Grotesque

Lunch: 14:30 -15:30

Afternoon Session: The Neural Perspective
Chair: Avi Goldstein. Bar-Ilan University
15:30-16:10: Simone Shamay-Tsoory. Haifa University
Unleashing Creativity: The Role of Left Temporal and Parietal Regions in Evaluating and Inhibiting Creativity
16:10-16:50: Miri Faust. Bar-Ilan University
Expertise and Creativity: Cognitive and Neural Aspects
16:50-17:30: Nira Mashal. Bar-Ilan University
Forming Novel Semantic Relations in Special Populations and the Normal Brain

Figurative Language and Theory of Mind in Fiction about Autism

Elena Semino. Lancaster University

In this talk I discuss the role of figurative language in suggesting Theory of Mind problems in three recent novels with 'autistic' protagonists: *Speed of Dark* by Elizabeth Moon (2002), *The Curious Incident of the Dog in the Night-Time* by Mark Haddon (2003) and *The Language of Others* by Clare Morrall (2008). I begin by showing how all three novels include salient episodes in which the protagonists struggle to understand some instances of figurative language use, and particularly metaphor. These episodes tend to involve either idiomatic expressions with relatively opaque figurative motivation or creative uses of figurative language. I argue that the protagonists' difficulties with figurative language contribute to the potential inference that they have a Theory of Mind problem, or, more generally, an autism-spectrum disorder. I then go on to illustrate how none of the three novels is actually consistent in this respect, as all three protagonists do in fact seem to be able to understand and use figurative language, at least some of the time. I relate this observation both to research on real-life people with autism and to the specific affordances and constraints of the fictional representation of autism. I finish by discussing the ways in which similes and metaphors are sometimes used in the three novels to convey the protagonists' perceptions of the workings of their own minds, and of the contrast with the workings of the minds of other characters.

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Elena Semino is a Professor of Linguistics and Verbal Art, and Head of the Department of Linguistics and English Language at Lancaster University. She holds a Visiting Professorship at Fuzhou University in China. She has published over fifty articles, and five books, among them: *Metaphor in Discourse* (Cambridge University Press, 2008) and *Figurative Language, Genre and Register* (Cambridge University Press, 2013). She is Principal Investigator on the ESRC-funded project "Metaphor in End of Life Care."

Public Exposure: What Faces tell us from St Veronica's Handkerchief to Van Gogh's Portrait of the Postman

Ellen Spolsky. Bar-Ilan University

Adding vocabulary and insights from theories of mind, of social intelligence, and of distributed cognition to traditional art-historical discourse, I will discuss a set of portrait paintings from the Italian Renaissance to the present. Beginning with distinct goals and pulling in different directions, none of these theories is by itself sufficient to describe how portraits work in the world. The biggest problem is that these hypotheses make claims about statistically normal behavior, while our best imaginative art is focally non-cooperative and intentionally disruptive of ordinary understanding. Cognitive theorists have labeled this cheating and describe cheaters as free-riders. Indeed, artists have designs on the minds of their audiences, and are clearly prepared to cheat to achieve them. Does this mean that cognitive theories are unsuited to the work of literary and cultural historians? Can the theories on offer be adapted to describe imaginative work as re-visionary? At its best, artists create something new in a way that biology obviously allows, but that social conventions generally constrain. The cognitive theories we seek have to describe the dynamic: how does the imagination produce something that can both be understood by audiences' already in place conventional systems but also encourage new growth and learning?

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Ellen Spolsky is Professor Emerita in the English Department, Bar-Ilan University. She is a literary theorist with a special interest in cognitive literary history and theory.

Numbers in Color and Time in Space: Neuro-cognitive Roots of Synesthesia

Avishai Henik. Ben-Gurion University

What is the neuro-cognitive basis for cross-modal interactions? The answer to this question is of major importance to the understanding of function and dysfunction. As a result, the phenomenon of synesthesia—the merging of senses—has received a great deal of interest recently in the scientific literature. Many studies have stressed the uni-directional nature of this phenomenon. For example, color-grapheme synesthetes automatically perceive achromatic numbers as colored (e.g., 7 is turquoise). Conversely, colors do not automatically give rise to any sort of number experience (e.g., turquoise is not 7). Another line of research revolves around the question of whether synesthesia is a perceptual (low level) or a conceptual (high level) phenomena. Our studies suggest that colors can evoke numerical representations (i.e., bi-directionality) even in the absence of any digit presentation. Moreover, cross-modal interactions can involve different neuronal substrates at different time frames within the same individual. It seems that synesthesia can be both perceptual and conceptual, and may involve 'deficient' inhibitory mechanisms.

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Avishai Henik is a Professor in the Department of Psychology at Ben-Gurion University. His laboratory studies the neural and cognitive basis of numerical processing, attention, cognitive control, emotion, and synesthesia. Investigation of the brain-behavior relationship is carried out using behavioral methods, neuroimaging techniques and computation, with normal populations and those with learning disabilities (e.g., developmental dyscalculia) and brain injuries. Recently, with the funding of an ERC Advanced Researcher Grant, his lab has started conducting research on fish in an effort to study numerical cognition and attention in an evolutionarily older system. Prof. Henik has received the BGU President's Award for Excellence in Research and is an elected fellow of the American Psychological Society.

What can Hybrids tell us about the Relationship between Language and Thought?

Yehoshua Shen. Tel Aviv University

Do speakers "think differently" in linguistic than in non-linguistic media? The present study examines this possibility by analyzing people's perception of a specific type of visual stimuli—the visual hybrid, which is a novel composite image of two or more familiar objects from disparate categories. I examine the role of a basic form of knowledge organization—the Conceptual Hierarchy—in the perception of hybrids, focusing on four levels of hierarchy: Humans-Animals-Plants-Physical Objects. The question I address is: How do we conceptualize hybrids? In particular, is one of the two constituent parts of the hybrid more central to its conceptualization? And if so, which one? The main finding of a series of experiments suggests that the conceptualization of hybrids is highly dependent on the media (linguistic vs. non-linguistic) in which it is expressed: when people are asked to express their conceptualization of the hybrids *verbally***,** there is a robust CH effect: people would tend to conceptualize the hybrid as belonging to the higher category (e.g., Humans) rather than to a lower one (e.g., Animals). In contrast, when non-verbal tasks are used (e.g., a visual categorization task) no such effect is exhibited. Furthermore, it was found that the CH effect in non-verbal classification is increased when primed by a verbal task. It is proposed that this finding can be accounted for by assuming a "thinking for speaking" process, according to which when expressing their conceptualization while using language people tend to adhere to their linguistic conventions which favor grammatical structures that correspond to the hierarchy over those that do not.

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Yehoshua Shen is a Professor at Tel Aviv University, teaching in the Program of Cognitive Studies and in the Department of Literature. He has been awarded various grants from the Israel Science Foundation, to fund his research that has focused on story grammars, cognition and discourse structure, figurative language comprehension, conceptual structure, and cognitive poetics.

Bi-directionality in Metaphor and the Grotesque

Chanita Goodblatt. Ben-Gurion University
Joseph Glicksohn. Bar-Ilan University

It is not inconsequential that in developing his Interaction Theory of Metaphor, Max Black uses a metaphor (*Man is a Wolf*) that is incompatible and even *grotesque* in its juxtaposition of man and animal. Two points generated by central discussion of Black's theory are relevant to what we term a *potential for bi-directionality*: the tension between the primary subject and the secondary subject must be upheld (as Kittay has stressed), hence there is no *blending* of the two (as Forceville has suggested). Bi-directionality thus preserves the tension between the two subjects of the metaphor, while allowing each to alternatively become the focus of one's attention during reading. We further claim that bi-directionality in a metaphor is sustained in two primary ways: a clash of sharp visual images, and a use of the grotesque. We investigate this bi-directionality in an empirical study, utilizing a microgenetic procedure, coupled with the collection of an online verbal report about the process of metaphor comprehension, employing two poems by the American Modernist poet William Carlos Williams.

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Chanita Goodblatt is an Associate Professor of English and Comparative Literatures in the Department of Foreign Literatures & Linguistics, and in the Laboratory for Cognitive Poetics at Ben-Gurion University. She has published four books on the Early Modern Period, including a monograph study of *The Christian Hebraism of John Donne* (2010). She has also published essays on English, American and Israeli poetry, focusing on the use of Bakhtinian discourse, as well as the cognitive dimensions of metonymy and metaphor.

Joseph Glicksohn is a Professor in the Department of Criminology and in the Gonda Multidisciplinary Brain Research Center at Bar-Ilan University. He was trained in cognitive psychology, with a focus on the study of subjective experience. His work on metaphoric thinking, in particular, has developed into a broadly interdisciplinary approach, which bridges between cognitive psychology and literary criticism.

Unleashing Creativity: The Role of Left Temporal and Parietal Regions in Evaluating and Inhibiting Creativity

Simone Shamay-Tsoory. Haifa University

Human creativity is thought to entail two processes. One is idea generation, whereby ideas emerge in an associative manner, and the other is idea evaluation, whereby generated ideas are evaluated and screened. Thus far, neuroimaging studies have identified several brain regions as being involved in creativity, yet only a handful of studies have examined the neural basis underlying these processes. We found that an individual with left temporoparietal hemorrhage who had no previous experience as an artist developed remarkable artistic creativity, which diminished as the hemorrhage receded. We thus hypothesized that damage to the evaluation network of creativity during the initial hematoma had a releasing effect on creativity by "freeing" the idea generation system. In line with this hypothesis, we conducted a subsequent fMRI study showing that decreased left temporal and parietal activations among healthy individuals as they evaluated creative ideas selectively predicted higher creativity. Finally, using a cross-cultural framework, we show differences in the evaluation system between South Korean and Israelis indicating that social dimensions influence creativity. The current studies provide converging multi-method evidence suggesting that the left temporal and parietal areas are part of a neural network involved in evaluating creativity, and that as such may act as inhibitors of creativity. We propose an explanatory model of creativity centered upon the key role of the left temporal and parietal regions in evaluating and inhibiting creativity.

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Simone Shamay-Tsoory is a Professor in the Department of Psychology at Haifa University. She is interested in understanding the neural mechanisms underlying social cognition and emotional experiences. Her lab focuses on the cognitive and emotional consequences of brain pathologies whether psychiatric, acquired or developmental. In addition, recently she is involved in research projects that examine emotional and cognitive brain functions in healthy subjects using imaging and brain stimulation techniques.

Expertise and Creativity: Cognitive and Neural Aspect

Miriam Faust. Bar-Ilan University

Some previous research suggests that the right hemisphere (RH) is uniquely involved in processing creative language, including the comprehension of novel metaphors. The findings of a series of studies using a variety of experimental techniques, including behavioral, fMRI, MEG, ERP and TMS, provide convergent evidence linking the RH, particularly right posterior superior temporal areas, with the ability to integrate the meanings of two seemingly unrelated concepts into a meaningful novel metaphoric expression. These findings suggest that semantic processing in the intact brain is associated with distinct and flexible patterns of hemisphere interaction that is characterized by higher RH involvement for processing novel metaphoric expressions compared to literal, conventional metaphoric and meaningless expressions. Furthermore, research on individual differences in novel metaphor comprehension support RH unique contribution to the processing of novel conceptual combinations. The findings thus suggest that the expert, rule-based semantic mechanisms of the left hemisphere (LH) may not be sufficient for coping with the rule-violating, emergent and more creative aspects of language. These findings may have significant implications for understanding the neurocognitive processes involved in creativity.

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Miriam Faust is a Professor of Psychology, Director of the Brain and Language Laboratory at the Gonda Multidisciplinary Brain Research Center and Vice-Rector at Bar-Ilan University. She is a member of the editorial board of *Brain and Language*. She investigates the neurocognitive basis of language using a variety of experimental techniques, including imaging, behavioral and computational methods. Faust and colleagues currently focus on two research projects. One examines the neural and cognitive mechanisms underlying the comprehension of metaphoric language, emphasizing hemispheric involvement in processing novel metaphors. Another current research project focuses on phonological and semantic processing in native versus foreign language.

Forming Novel Semantic Relations in Special Populations and the Normal Brain

Nira Mashal. Bar-Ilan University

Individuals with schizophrenia or with high functioning autism (HFASD) demonstrate difficulties in communication that have been ascribed in part to figurative language. While comprehension of novel metaphors is a cognitive process that involves the right hemisphere, conventional metaphor comprehension is left lateralized. There are extensive findings, regarding the neural correlates of metaphor comprehension in healthy individuals, but much less is known about how special populations process metaphors. The aims of the present talk are twofold: to present findings concerning the neural correlates of novel and conventional metaphor understanding in individuals with schizophrenia versus healthy controls; and to compare the developmental trajectory of metaphor comprehension and production in individuals with autism. Individuals with schizophrenia were found to demonstrate reduced comprehension of novel and conventional metaphors. Furthermore, an over-activation of left inferior and middle frontal gyrii was found in this population relative to healthy individuals. Thus, inefficient processing of novel metaphors was associated with a reversal of left lateralization in schizophrenia. In contrast to the findings from schizophrenia, the HFASD group did not differ from controls in terms of novel and conventional metaphorical comprehension. Furthermore, the HFASD group outperformed the control group on metaphorical production. These results might be interpreted as representing heightened verbal creativity in autism.

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Nira Mashal is a Senior Lecturer in the School of Education, head of the Brain and language lab, the general special education program, and a member of the Gonda Multidisciplinary Brain Research Center at Bar-Ilan University. She studies the cognitive and the brain mechanisms of non-literal language processing using fMRI in healthy individuals and in special populations including schizophrenia, autism, and learning disability. In addition, she develops intervention programs to improve language comprehension and production in aphasic patients.