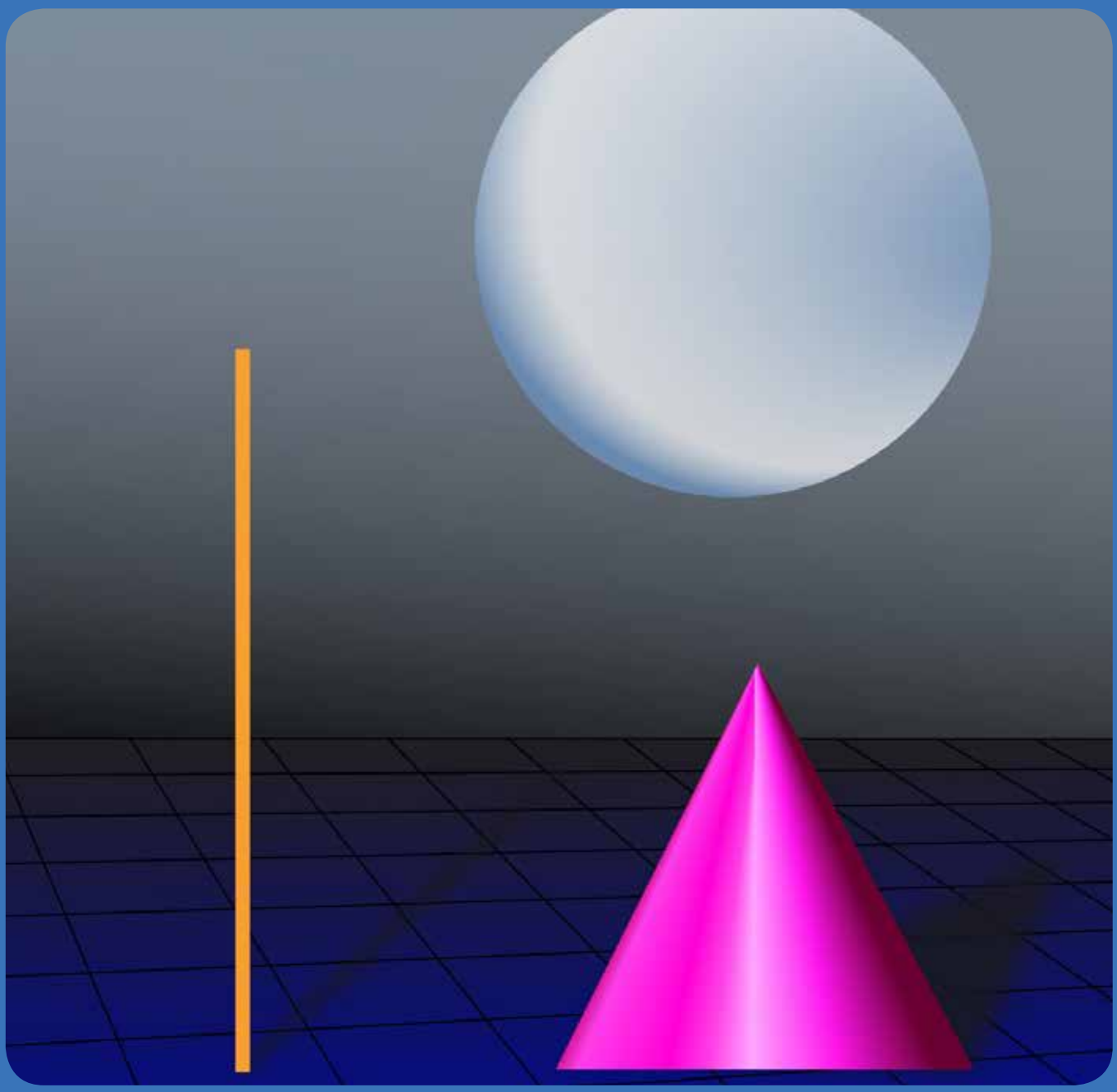
Dialogues in Clinical Neuroscience & Mental Health

Volume 1, 2018, Supplement 2

ISSN: 2585-2795



Dialogues in Clinical Neuroscience & Mental Health is an open-access, peer reviewed, international online Journal, published by the non-profit organization "obrela", www.obrela-journal.gr, www.obrela.gr, info@obrela.gr

Dialogues in Clinical Neuroscience & Mental Health

DOI 10.26386/obrela.v1i0.33 ISSN 2585-2795

Athenian Symposia: Cerebral Instantiation of Memory, Under the auspices of the Hellenic Clinical Neurophysiology Society, Athens, March 30-31, 2018

Guest Editors: Andrew C. Papanicolaou, Ioannis Evdokimidis, Theodoros S Constantinidis

Lecture

Memory in philosophy

Chloe Balla, Vasso Kindi, Costas Pagondiotis, Ioannis Papachristou

Abstract

In antiquity memory was represented as a deity, Mnemosyne, who gave birth to the nine Muses. Mythical narratives show the importance that people attributed to memory for everyday life but also for the understanding of the world. Before the technology of writing allowed people to inscribe law codes, a man with special mnemonic powers, described as a Mnemon, was a trusted and distinguished member of the society who preserved, in his own memory, the rules that were set by the community as well as the community's lore.

Later, in the fifth century, interest in technical training in public speaking gave new value to the technique of mnemonics, which was practiced and presumably taught by experts in this field, who often relied on written records for the purpose of memorization. Criticizing the mechanistic function of mere recording of information and the abuse of writing and reading for the purposes of memorization, Plato undermined the value of mnemonics, and shifted philosophical discussion interest in the mechanism of anamnesis or recollection. His theory depended upon and at the same time introduced a new class of objects, namely the Forms, which were the ultimate objects of recollection. Plato›s metaphysical artillery set a new agenda in the history of philosophy, and marked the development of ideas on memory in the Neo- Platonism tradition. Plato represents an important side of the history of philosophy, without however exhausting it.

Aristotle, his contemporary student, followed a rather different vein, and attempted to demarcate memory and recollection as distinct functions. He connects memory to time and describes it as a passive storage of past events. By contrast, recollection, according to Aristotle, is not passive; recollection moves through discursive reason from fact to fact, until it recollects the object. Aristotle connects memory with sense-perception and, thus, attributes memory to all animals possessing sense-perception; whereas, only humans possess recollection because it involves reasoning.

Starting from an account of these distinct paths in the development of the concept of memory in antiquity we will focus on a variety of related issues, such as: memory as a faculty of the soul; memory, recollection and cognition; memory and emotions; recollection and self-knowledge.

In modern times, memory was invoked mostly in relation to epistemological issues, i.e., as a cognitive faculty that contributes to making sense of experience, consciousness, identity or time. In empiricist philosophy, in particular, where it played a major role, it was thought to be parasitic upon perception as it was supposed to recall or bring forward past sense impressions and, thus, contribute to the unity of perceptions, to fixing identity and, in particular, personal identity. It was also important for the experience of time. Rationalists such as Descartes also take memory to presuppose impressions, which leave traces on the brain making possible the recollection of ideas that resemble them. This is corporeal memory that Descartes distinguishes from intellectual memory. In general, in this period, memory has a mediating and synthesizing role bringing together and invoking impressions in storage and representational models of the mind.

Dialogues in Clinical Neuroscience & Mental Health

DOI 10.26386/obrela.v1i0.33 ISSN 2585-2795

Athenian Symposia: Cerebral Instantiation of Memory, Under the auspices of the Hellenic Clinical Neurophysiology Society, Athens, March 30-31, 2018

Guest Editors: Mary H. Kosmidis, Athanasia Liozidou, Lambros Messinis, Alexandra Thanellou, Ioannis Zalonis

The representational approach to memory is also dominant in contemporary analytic philosophy. Stored memory traces are postulated as necessary intermediates between the remembered object and the act of remembering so as to avoid causation at a temporal distance. There are various issues about these postulated entities that concern the relations they bare to the remembered object and the act of remembering. Most theorists favor the existence of a kind of causal relation among them. There is also debate about the way memory traces encode information about the remembered object. The main options here are pictorial, symbolic and distributed encoding. A related issue is how the encoded information is activated and whether this activation constitutes a passive reproduction or an active reconstruction. These questions are primarily for neuroscience to investigate, but there is certainly still room for philosophy. For example, a detailed description of the phenomenology of memory, of how one experiences from the first person perspective remembered objects, can set specific restrictions on the provided neuroscientific explanations.

Chloe Balla is Assistant Professor of ancient philosophy at the Department of Philosophy and Social Studies, University of Crete, Greece. Her publications include a translation with Introduction and notes of Aristotle›s Constitution of Athens in Modern Greek (in collaboration with Robert W. Wallace: Athens 2015); a monograph on Platonic Persuasion: From the art of the orator to the art of the statesman (in Greek: Athens 1997), and two co-edited volumes: on The Interface between Philosophy and Rhetoric in Classical Athens (special issue of Rhetorica, 2007), and on the Deaths of Philosophers in Antiquity (Greek: Athens 2011). Her interests lie in the works of the Sophists, Plato, Aristotle and the medical writers.

Vasso Kindi is Professor of Philosophy of Science at the Department of History and Philosophy of Science of the National and Kapodistrian University of Athens. She has published on philosophy of science, T. S. Kuhn's work, Wittgenstein's philosophy, philosophy of language, philosophy of history and ethics.

Costas Pagondiotis is Assistant Professor in Philosophy of Mind at the University of Patras, Greece. His research focuses on topics in the philosophy of mind, perception, and cognitive science. Special interests include the role of conceptual capacities in perception, the dependence of perception on action, self-consciousness, and pictorial experience.

Ioannis Papachristou received his PhD from Humboldt- Universität zu Berlin (2013) while being a doctoral fellow at Topoi Excellence Cluster in the framework of which he was appointed as Visiting Student Research Collaborator at Princeton University, USA. He has been awarded the Fellowship Fernand Braudel (2014-2015) at the Labex RESMED/ Centre Léon Robin, Paris IV- Sorbonne and later had a postdoctoral position at the Department of Philosophy, University of Geneva (2015-2016). Currently, I. Papachristou holds a postdoctoral position at the Research Centre for the Philosophy, University of Geneva.

Dialogues in Clinical Neuroscience & Mental Health

DOI 10.26386/obrela.v1i0.34 ISSN 2585-2795

Athenian Symposia: Cerebral Instantiation of Memory, Under the auspices of the Hellenic Clinical Neurophysiology Society, Athens, March 30-31, 2018

Guest Editors: Andrew C. Papanicolaou, Ioannis Evdokimidis, Theodoros S Constantinidis

Lecture

Storage-independent memory of concepts

Andrew C. Papanicolaou

Abstract

That memories in general and concepts in particular are represented in the brain by mnemonic traces, such as Hebbian neuronal circuits, is a nearly universal notion. Consequently, past and current models of memory, especially recognition memory, are based on the principle of "matching" external sensory inputs to stored representations of concepts. Yet a careful review of the literature on the effects of focal brain lesions on memory as well as the functional neuroimaging literature do not reveal any credible evidence in support of the notion of storage of concepts in the brain. On the contrary, the empirical data appear to favor the hypothesis, made popular some decades ago by Bartlett (1932) that at least episodic memories are not stored and retrieved but are created each time they emerge in consciousness. In this essay, having made the case for the lack of evidence for concept storage and having commented on some theoretical difficulties this notion entails, I discuss the possibility of a storage-free model of concept memory and draw the outline of its essential features.

Andrew C. Papanicolaou is professor Emeritus of the University of Tennessee, College of Medicine, visiting professor of Neurology at the National University of Athens, Greece and chairman of Center for Applied Neurosciences of the University of Cyprus. Until 2017 he was chief of the Division of Clinical Neurosciences and professor in the Department of Anatomy and Neurobiology of the University of Tennessee, College of Medicine, Co-Director of the Neuroscience Institute of the Le Bonheur Hospital of Memphis and a member of the Board of Regents of the University of Ioannina, Greece. He began his academic career in the School of Philosophy of the National University of Athens, Greece. After receiving his doctorate in Psychology in 1978, he joined the faculty of the University of Texas Medical School, where he directed the Center for Clinical Neurosciences holding professorships in the Departments of Neurosurgery and Neurology and adjunct professorships in the Department of Linguistics of Rice University and the Department of Psychology of the University of Houston. Since 2012 he joined the faculty of the University of Tennessee. In 1993 he established the clinical service of intraoperative electrophysiological monitoring at Hermann Hospital, the teaching Hospital of the University of Texas Medical School. In 2002 he founded and until 2006 directed the Summer Institute of Advanced Studies of the International Neuropsychological Society, in Greece. In 2005 founded and in 2008 became the second president of the International Society for the Advancement of Clinical Magnetoencephalography. In 2008 he designed the curriculum and until 2014 he directed the graduate program in Clinical Neuropsychology at the Neurology Department of the National University of Athens (Aeginition Hospital). He is a Fulbright Scholar, an honorary member of the Hellenic Society of Clinical Neurophysiology and the Hellenic Society of Neuropsychology and the recipient of several distinctions and National Institutes of Health (NIH) grant awards for his research in epilepsy, developmental disorders and brain plasticity and in imaging the brain mechanisms of cognitive and affective functions. He is the author of over 250 peer-reviewed articles in Clinical and Experimental Neuroscience topics, 45 book chapters and several books ranging from technical manuals (e.g. Handbook of Functional Brain Imaging in Cognitive Neurosciences. Oxford University Press; Clinical Magnetoencephalography and Magnetic Source Imaging. Cambridge University Press); textbooks (e.g. The Amnesias: A Clinical Textbook of Memory Disorders, Oxford University Press); to philosophical works both in English and in Greek (Plato: Critique of Pragmatism,-- Ρεόντων Έλεγχος-- Αθήνα. Εξάντας; Bergson and Modern Thought: Towards a Unified Science. New York: Harwood Academic Publishers).

Corresponding Author: Andrew Papanicolaou, Professor Emeritus, Department of Pediatrics Division of Clinical Neurosciences, The University of Tennessee Health Science Center, e-mail: apapanic@uthsc.edu

Dialogues in Clinical Neuroscience & Mental Health

DOI 10.26386/obrela.v1i0.35 ISSN 2585-2795

Athenian Symposia: Cerebral Instantiation of Memory, Under the auspices of the Hellenic Clinical Neurophysiology Society, Athens, March 30-31, 2018

Guest Editors: Andrew C. Papanicolaou, Ioannis Evdokimidis, Theodoros S Constantinidis

Lecture

Concurrent Physiological Multisite-Recordings & Brain Imaging: Study of Dynamic Connectivity Related to System and Synaptic Memory Consolidation

Nikos K. Logothetis

Abstract

Experimental work in animals and humans suggests that various short-lasting patterns of neural activity, including single- or multiple-cycle oscillatory episodes, may reflect state changes of self-organizing large- scale networks. Such state-marking events, including K complexes, spindles, hippocampal sharp wave ripples (SPW-R), and ponto-geniculo-occipital (PGO) waves, are in fact thought to regulate cognitive capacities, such as learning, memory encoding and consolidation, as well as memory-guided decision making.

Although the neural events themselves have long been studied in great detail with neurophysiological methods, the actual brain-states related to them remain elusive, primarily due to a dearth of methodologies permitting concurrent recordings in various structures and mapping of whole-brain activity. The use of multishank-multichannel (MS-MC) electrical recordings of activity in different structures per se permits both the detection and the contextual identification of structure-specific neural events, for that matter also of their interrelationships. Combining in real-time the MS-MC recordings with spatiotemporally resolved functional magnetic resonance imaging (fMRI) evidently offers a unique opportunity to study the cooperative patterns of a large number of brain structures either leading or responding to recorded events. In an effort to map and study such patterns, we have recently developed so-called neural event triggered fMRI (NET-fMRI) and used it to understand the dynamics of the networks related to SPW-R and PGO events, both considered to be critical for the sequential states of system and synaptic memory consolidation during sleep.

The observed neurophysiological interactions of hippocampus, thalamus, cortex and pontine nuclei, together with the maps of robust up/down modulation of the brainwide metabolic activity revealed both synergistic and strong antagonistic interactions between memory systems, as well as between the activities of sensory thalamic and neuromodulatory nuclei and the hippocampal formation during epochs potentially related to memory consolidation. On-going work is currently examining the event-triggered neurophysiological responses in a number of structures, mapped with imaging, as well as the extent to which fMRI-measured multistructure activity patterns at any given time may themselves predict the occurrence of various neural events.

Nikos K. Logothetis is director of the department "Physiology of Cognitive Processes" at the Max Planck Institute for Biological Cybernetics (MPIBC), in Tübingen, Germany. He is also a faculty member at the Victoria University of Manchester (VUM) in England, and Honorary Professor in the Department of Biology at the University of Tübingen. He received a B.S. in mathematics from the University of Athens, a B.S. in biology from the University of Thessaloniki, and his Ph.D. in human neurobiology from the Ludwig-Maximilians University in Munich. In 1985 he moved to the Brain and Cognitive Sciences Department of M.I.T., where he initially worked as a post-

DOI 10.26386/obrela.v1i0.35 ISSN 2585-2795

Athenian Symposia: Cerebral Instantiation of Memory, Under the auspices of the Hellenic Clinical Neurophysiology Society, Athens, March 30-31, 2018

Guest Editors: Andrew C. Papanicolaou, Ioannis Evdokimidis, Theodoros S Constantinidis

doctoral fellow and later as Research Scientist. In 1990 he joined the faculty of the Division of Neuroscience at the Baylor College of Medicine. Seven years later he moved to the Max Planck Institute for Biological Cybernetics to continue his work on the physiological mechanisms underlying visual perception and object recognition. In addition to his primary affiliations in Germany and UK, Nikos K. Logothetis has long been Adjunct Professor of Neurobiology at the Salk Institute in San Diego, Adjunct Professor of Ophthalmology at the Baylor College of Medicine, Houston, Associate of the Neurosciences Institute, San Diego, Senior Visiting Fellow in University College, London, Adjunct Professor in the Department of Cognitive and Neural Systems and of Cognitive and Neural Systems and of Cognitive and Neural Systems in the College of Arts and Sciences, both at the Boston University, Massachusetts. Nikos K. Logothetis is member of the German Academy of Natural Scientists Leopoldina, and the Rodin Remediation Academy, a honorary member of the American Academy of Arts and Sciences, and a foreign associate of the National Academy of Sciences of the United States. He is recipient of the DeBakey Award for Excellence in Science, the Golden Brain Award of the Minerva Foundation, the 2003 Louis-Jeantet Prize of Medicine, the 2004 Zülch-Prize for Neuroscience, the 2007 IPSEN Prize for Neuronal Plasticity, the 2008 Alden Spencer Award of Columbia University, New York, and the Aristeion-Award of the Academy of Athens 2016.

Dialogues in Clinical Neuroscience & Mental Health

DOI 10.26386/obrela.v1i0.36 ISSN 2585-2795

Athenian Symposia: Cerebral Instantiation of Memory, Under the auspices of the Hellenic Clinical Neurophysiology Society, Athens, March 30-31, 2018

Guest Editors: Andrew C. Papanicolaou, Ioannis Evdokimidis, Theodoros S Constantinidis

Lecture

The mapping from language in the brain to the language of the brain

Peter Hagoort

Abstract

Human language consists of at least three levels of representation, namely sound patterns, syntactic patterns, and semantic information. These three different levels of representation are acquired and stored in neocortical brain structures during the first years of life. They form the representational primitives at Marr's computational level. During language processing, these representational primitives are retrieved and unified on-line (i.e. in real time and from left to right), to produce and comprehend the complex utterances that speakers and listeners are capable of exchanging. This requires a specification of Marr's algorithmic level of analysis, here referred to as Unification. A system with the capacity to show complex language generation and interpretation has to meet these representational and algorithmic requirements. However, when it comes to neural implementations, it requires a mapping of representational and algorithmic levels onto the informational language of the brain itself. This mapping remains one of the major, and largely unmet challenges for a neurobiological account of human language.

As a way into this mapping problem, I will outline a computational approach to modeling language processing in spiking recurrent. Sequential input is non-linearly mapped into a high-dimensional neural state-space and the internal dynamics is subsequently decoded onto a set of read-out neurons using machine learning techniques. Read-outs are viewed as a measurement device to characterize the encoded information and provide a theory bridging between neuronal processes and concepts at computational and algorithmic levels. The approach is well-suited for testing the computational role of various neurobiological features, adaptation mechanisms, and network architectures. This will help to elucidate the role of (a) brain connectivity, (b) memory at various time-scales and (c) unsupervised, local learning and adaptation mechanisms supporting the language system›s capacity to reconstruct hierarchically structured interpretations from sentence input. I will exemplify this approach within a neurobiologically motivated model which maps sentence input onto sequences of thematic roles and integrates these into sentence-level semantic representations.

Peter Hagoort is director of the Max Planck Institute for Psycholinguistics (since November 2006), and the founding director of the Donders Institute, Centre for Cognitive Neuroimaging (DCCN,1999), a cognitive neuroscience research centre at the Radboud University Nijmegen. In addition, he is professor in cognitive neuroscience at the Radboud University. His own research interests relate to the domain of the human language faculty and how it is instantiated in the brain. In his research he applies neuroimaging techniques such as ERP, MEG, PET and fMRI to investigate the language system and its impairments as in aphasia, dyslexia and autism. For his scientific contributions, the Royal Netherlands Academy of Arts Sciences (KNAW) awarded him with the Hendrik Mullerprijs in 2003. In 2004 he was awarded by the Dutch Queen with the «Knighthood of the Dutch Lion». In 2005 he received the NWO- Spinoza Prize (M€ 1.5). In 2007 the University of Glasgow awarded him with an honorary doctorate in science for his contributions to the cognitive neuroscience of language. In 2008 he was awarded with the Heymans Prize. In 2012 the KNAW awarded his career contribution to the cognitive neuroscience with the Academy Professorship Prize (M€ 1.0). Peter Hagoort is member of the Royal Netherlands Academy of Arts and Sciences (KNAW), and of the Academia Europaea.

Dialogues in Clinical Neuroscience & Mental Health

DOI 10.26386/obrela.v1i0.37 ISSN 2585-2795

Athenian Symposia: Cerebral Instantiation of Memory, Under the auspices of the Hellenic Clinical Neurophysiology Society, Athens, March 30-31, 2018

Guest Editors: Andrew C. Papanicolaou, Ioannis Evdokimidis, Theodoros S Constantinidis

Lecture

Diversity in pathway recruitment for memory processing

Helen Barbas

Abstract

Ideas about retrieval of memories are based largely on localization of function inferred after brain damage. On the other hand, communication in the cerebral cortex occurs through an intricate network of connections, suggesting highly distributed circuits. Loss of memory after lesions thus affects not only the damaged area, but also its rich inputs and outputs. The discussion here is based on a structural model of neural communication that can help explain the process of recruiting highly distributed relevant signals for conceptual and sensory recognition and memory. Discussion of cortical communication has traditionally been sensory-centric, based on the flow of information from the periphery to primary sensory areas and beyond, or in the reverse direction. However, visual signals often do not activate areas along a sequential route as predicted by a hierarchical model, exemplified by the fact that some visual signals activate prefrontal areas earlier than some visual association areas. On the other hand, the structural model for connections is based on the fundamental principle of systematic variation in laminar architecture of the cortex and applies to all cortical systems. The structural model is relational: it predicts that laminar-specific connections in the cortex depend on the structural (laminar) relationship between linked areas. Thus, connections that link an area with simpler laminar structure originate mainly – but not exclusively – in the deep layers and terminate mainly in the upper layers of an area with more elaborate laminar structure. In the opposite direction, connections originate in the upper layers and terminate in the middle-deep layers. Because the laminar architecture across cortical areas is graded, so is the distribution of connections within layers. The structural model holds for connections in all cortical systems and diverse species. Moreover, laminar-specific connections as predicted by the structural model terminate within inhibitory microenvironments that also differ by the distribution of functionally distinct classes of inhibitory neurons that can dynamically shift activity among layers and change cortical rhythms. The relational nature of the structural model and predictions of graded patterns of connections thus suggest that distributed areas and layers are recruited dynamically to meet task demands, including recollection of concepts and events.

Helen Barbas is Professor at Boston University and School of Medicine. She established and directs the Neural Systems Laboratory at Boston University, funded by grants from the National Institutes of Health (NINDS and NIMH), the National Science Foundation, and Autism Speaks. Her research focuses on the prefrontal cortex and the pattern, organization and synaptology of prefrontal pathways associated with cognitive, mnemonic and emotional processes in primates. Publications from the laboratory are found at: http://www.bu.edu/neural/

Dialogues in Clinical Neuroscience & Mental Health

DOI 10.26386/obrela.v1i0.38 ISSN 2585-2795

Athenian Symposia: Cerebral Instantiation of Memory, Under the auspices of the Hellenic Clinical Neurophysiology Society, Athens, March 30-31, 2018

Guest Editors: Andrew C. Papanicolaou, Ioannis Evdokimidis, Theodoros S Constantinidis

Lecture

Perception of space—space memory—perception of space sixty years later

Ioannis Evdokimidis

Abstract

When we recall many years later the places where we lived as children, the family home, the elementary school, places where we played we remember them as spacious while when we visit them they appear small, as if they the volumes of objects the surfaces even discrete objects had shrank. This clash between the recollection and the present perception of the same space is the topic of my presentation.

The factors that influence the emergence of a percept and its subsequent encoding as a mnemonic engram are many, Steven's law expresses the relative reduction of the original percept on its way to become a memory. Therefore the general trend of perceived magnitudes (weight, surface, distances) all shrink in the process of becoming transformed into memories. This, however conflicts with our subjective impression that the memorized image of places, the space where we played, for instance, is larger than what it is in reality.

Besides these factors that are expressed in Steven's law, there are others that influence the process. The most basic among them are the following. The Age: the there is evidence that that up to the age of 9-10 years the distances are overestimated but subsequently the estimates become more precise. The feelings experienced, the efforts exerted in play and the goals of the various actions. Negative moods result in overestimation of distances. However, if the traveled distances lead to desired goals they are underestimated. Moreover, greater efforts lead are correlated with overestimates of distances.

Also important are kinesthetic sensations because they express the active involvement of the person within the space where the actions occur. The walking the running the sudden changes of direction while playing and the associated strong feelings create a pronounced affective experience which "dilates" the perceived dimentions of the objective space.

In conclusion, the dimensions and distances of the childhood playing spaces while remaining objectively constant, in the context of their later recollection they are far richer than their present perception through adult eyes. It appears that the richness of the childhood memories which are absent in the impoverished adult percepts seems to increase space beyond its objective size.

Ioannis Th. Evdokimidis was born the 1950 in Pireefs. He graduated (class of 1967) from the Ionidios High School and later, in 1974 from the Medical School of National and Kapodistrian University of Athens. He completed his training in Neurology and Psychiatry in 1980 and joined the staff of the Neurology Department of the University of of Athens Medical School housed in the Aeginition Hospital. In 1984 he received the degree of Doctorate in Neurology after completion of his Ph.D. thesis on the occilographic examination of congenital nystagmus. From 1984 on, he served as Assistant Professor of Neurology, then Associate Professor and since 2014 as Professor

Corresponding Author: Ioannis Evdokimidis, (MD, PhD), Professor of Neurology of A; Neurology Dpt, National & Kapodistrian University of Athens, e-mail: ievdokim@med.uoa.gr

DOI 10.26386/obrela.v1i0.38 ISSN 2585-2795

Athenian Symposia: Cerebral Instantiation of Memory, Under the auspices of the Hellenic Clinical Neurophysiology Society, Athens, March 30-31, 2018

Guest Editors: Andrew C. Papanicolaou, Ioannis Evdokimidis, Theodoros S Constantinidis

of Neurology During the period of 2014-2017 he directed the Neurology Clinic of the Aiginition Hospital as chairman of the Neurology Department.

Corresponding Author: Ioannis Evdokimidis, (MD, PhD), Professor of Neurology of A; Neurology Dpt, National & Kapodistrian University of Athens, e-mail: ievdokim@med.uoa.gr

Dialogues in Clinical Neuroscience & Mental Health

DOI 10.26386/obrela.v1i0.39 ISSN 2585-2795

Athenian Symposia: Cerebral Instantiation of Memory, Under the auspices of the Hellenic Clinical Neurophysiology Society, Athens, March 30-31, 2018

Guest Editors: Andrew C. Papanicolaou, Ioannis Evdokimidis, Theodoros S Constantinidis

Lecture

Pragmatic Conceptualization of Objects in the Brain

Luciano Fadiga

Abstract

Ancient Greek and Latin philosophers were already aware of the difficulty in discriminating between 'objects' intended as material entities belonging to the physical, external world, and 'objects' intended as internal representations of that world. Descartes was the first making a clear, rational distinction between the physical objects (res extensa) and their representations (res cogitans). However, from a theoretical point of view this remains an open question. Empirical evidence coming from neurophysiology may provide some insight to this vexata quaestio. Despite the classical view, segregating perceptual and executive functions in different sets of brain areas, a large percentage of sensory (visual) and motor neurons are indeed visuomotor. In other terms, the same cell specifically discharges during observation of manipulable objects and during the grasping action directed towards them. Accordingly, objects and objects-related concepts (representations) seem to be the two faces of the same medal. Objects, often created by us, are loci of interaction with our body and their brain representation automatically implies motor interaction. This concept is very close to the classical idea of motor affordance originally proposed by Gibson. Motor control of the grasping hand, visuomotor transformation of objects into hand poses and the relationship between pragmatic and semantic representations of objects/actions are interrelated functions resulting from a continuous interaction between parietal and frontal areas. In humans a similar picture emerges from neuroimaging and transcranial magnetic stimulation studies and prompts interesting links with language as well. In my presentation I will show and discuss the most recent ‹state of the art› of the topic integrating the perspective with some recent experimental results from our laboratory.

Luciano Fadiga, professor of Physiology at the University of Ferrara and director of the Center for Translational Neurophysiology at the Italian Institute of Technology, was among the discoverers of mirror neurons and provided the first neurophysiological evidence of their existence in humans. He has further shown a similar system for speech, functional to perception. He has accumulated a long experience in studying the visuomotor properties of primates premotor cortex, in particular concerning objects and space representation. He is actually studying the possible rooting of linguistic syntax in the motor system and the use of mirror neurons in neurorehabilitation. His work has received more than 30,000 citations.

Dialogues in Clinical Neuroscience & Mental Health

DOI 10.26386/obrela.v1i0.40 ISSN 2585-2795

Athenian Symposia: Cerebral Instantiation of Memory, Under the auspices of the Hellenic Clinical Neurophysiology Society, Athens, March 30-31, 2018

Guest Editors: Andrew C. Papanicolaou, Ioannis Evdokimidis, Theodoros S Constantinidis

Lecture

Memory, consciousness and temporality: Beyond the memory-trace paradox and the homunculus fallacy

Gianfranco Dalla Barba

Abstract

Most theories and models of memory are based on two assumptions that contain theoretical problems. These problems are reflected in the memory-trace paradox, which consists in believing that the past is contained in the memory trace, and in the homunculus fallacy, which consists in assuming the existence of an unconscious intentional subject. The very existence of memory units and representations is undermined by these problems. The Memory, Consciousness and Temporality Theory is free from these problems by considering Temporal Consciousness (TC) the key to personal temporality, including the personal past, episodic memory, the present and the future. It is proposed that the hippocampus is the neural correlate of TC, which is lost in amnesia and present, but malfunctioning, in confabulation. It is shown that patients who confabulate have at least partially preserved hippocampus and make confabulatory errors in remembering their past, in orienting themselves in time and space, and in predicting their personal future.

Conversely, complete bilateral hippocampal damage produces deep amnesia, temporo-spatial disorientation, and inability to predict personal future.

Gianfranco Dalla Barba had his Medical Doctorate in 1985 and his specialization in Neurology in 1990 from he University of Padua., and his PhD in Neurosciences in 1995 from the University of Verona. Since 1990 he has been working in Paris as INSERM researcher before at the Sainte Anne hospital and then at the Salpêtrière hospital, where he is currently working as the chief of a team involved in memory and Alzheimer's disease research. Since 2007 he is Professor of cognitive neurosciences at the University of Trieste. He is the author of one book and of more that one hundred scientific articles and book chapters.