Tuesday, September 4th, 2018

5.45 – 6.45 p.m.

Invited lecture: Claude R. Cloninger

The Psychobiology and Genetics of Human Personality
C. R. Cloninger
Washington University School of Medicine, St. Louis, MO, United States of America

Nearly 1000 genes for human personality have now been identified using newly developed methods for genome-wide association studies that allow for gene-gene and gene-environment interaction. These genes explain nearly all the heritability of human personality expected from twin studies (50%). These genes are organized in specific molecular pathways that regulate 3 major systems of learning and memory in human beings: (i) behavioral conditioning of habits and skills, (ii) intentional learning of goals and social relationships, and (3) autobiographical learning of a personal life narrative as episodes in a spatiotemporal context. These 3 major systems can be identified as profiles of multiple dimensions of personality measured by the Temperament and Character Inventory. Initially the model was described on the basis of neurobiological studies in non-human animals supplemented by genetic and neuropharmacological studies in human beings. The early animal studies have now been confirmed by extensive human research using functional brain imaging, psychophysiological, and genetic studies. In addition, the evolution of human brain functions underlying personality structure and function has been studied through genome-wide association studies in human beings and their ancestors. Implications of the available data will be discussed in relation to psychobiological research and in relation to clinical treatment of personality and its disorders

Wednesday, September 5th, 2018

10.30 – 11.30 a.m.

Invited lecture: Raffaella Rumiati

We are what we eat: Food visual recognition in humans
R. I. Rumiati
SISSA, Trieste, Italy
Food is the fuel of life. Natural selection provided Homo sapiens with the adaptive attitude to virtually eat almost everything. Especially in well-to-do countries, being omnivores and the excessive availability of food generate anxiety when decisions about what to eat need to be made. Even though the different senses enrich our food experience, just looking at food allows us to extract a great deal of information about the characteristics of food. In my presentation I will review the evidence concerning how we process the information about the calorie content, the level of transformation, and the colour of food. I will also address how food concepts are represented in the brain of healthy individuals and brain-damaged patients. Results will be discussed within a model of semantics.

3.30 – 4.30 p.m.

Invited lecture: Mitsu Kawato

Computational neuroscience for psychiatry
M. Kawato
ATR Computational Neuroscience Labs, Kyoto, Japan

Psychiatric and developmental disorders are most probably dynamics diseases, where little structural abnormalities are observed, but abnormalities in system dynamics induce symptoms. Computational approach can help us quantify abnormality in brain network dynamics. Furthermore, computational techniques with real-time fMRI neurofeedback can change brain network dynamics.
We developed a biomarker of each psychiatric or developmental disorder utilizing resting-state functional connectivity MRI. Here, the challenge was 'learning from a small sample' or 'curse of dimensionality' with a few hundreds samples and about ten thousands explanatory variables. We succeeded to develop classifiers of autism, schizophrenia, melancholic depression and obsessive compulsive disorder. The classifiers generalized to independent validation cohorts with different sites, vendors, ethnicity even across the Pacific. Complicated and overlapping relationships between schizophrenia, autism, depression, and bipolar disorders were revealed by multiple biological dimensions derived from the classifiers
We have developed sophisticated real-time fMRI neurofeedback methods called decoded neurofeedback (DecNef) and functional connectivity neurofeedback (FCNef). Their characteristics are implicit neurofeedback without informing strategies

to participants, terminal monetary reward, and information extraction techniques either by multi-voxel decoding or functional connectivity estimation. DecNef and FCNef turned out versatile and efficient for modifying various cognitive functions, and have been explored as interventions for several disorders.

Watanabe T, Sasaki Y, Shibata K, Kawato M: Trends Cogn Sci, 21, 997 (2017)
Yamada T, et al.: Int J Neuropsychopharmacol, 20, 769 (2017)
Shibata K, Watanabe T, Sasaki Y, Kawato M: Science, 334, 1413 (2011)

6.30 – 07.00 p.m.

Didactic Lecture: Dezhong Yao

EEG-fMRI Fusion and its applications
Y. Dezhong
University of Electronic Science and Technology of China, Chengdu, China

This talk will show the main approaches of EEG-fMRI fusion,from EEG informed fMRI, EEG imaging with priors of fMRI networks to networks fusion of EEG and fMRI, and then fusion based imaging of epileptic spikes, and mining of individual difference in brain-computer interaction are presented. Finally, a fusion software (NIT: <http://www.neuro.uestc.edu.cn/NIT.html>) on a cloud platform (WeBrain: http://webrain.uestc.edu.cn/) will be introduced, and the challenges for the future are to be discussed.

Thursday, September 6th, 2018

10.30 – 11.30 a.m.

Invited Lecture: Birte U. Forstmann

The anatomo-functional role of the subthalamic nucleus in strategic decision-making
B. U. Forstmann
Integrative Model-based Cognitive Neuroscience, University of Amsterdam, Amsterdam, Netherlands

The basal ganglia are thought to implement a generic action-selection mechanism that releases from inhibition those actions that are desirable and maintains inhibitory control over all others. One key hypothesis that is shared by recent neurocomputational
models of decision making is that the subthalamic nucleus (STN), a small nucleus in the basal ganglia, plays a pivotal role in strategic adjustments of response thresholds.
In this talk I will first discuss the anatomo-functional role of the STN including ultra-high resolution 7Tesla magnetic resonance imaging (MRI) from post-mortem and in-vivo brains. I will provide a critical overview challenging the current academic consensus that the STN consists of three distinct parts, each selectively associated with cognitive, emotional, and motor functioning. I will then present structural and functional 3T and 7T MRI data highlighting the role of the STN in strategic decision-making. The results will be discussed in light of the STN′s functional role in both healthy and clinical populations.

3.30 – 4.30 p.m.

Erol Basar Lecture:Pedro Valdes-Sosa/Sirel Karakas

Erol Basar Lecture
S. Karakas
Dogus University, Istanbul, Turkey

Erol Basar was the student of Karl Werner Heisenberg, a Nobel awardee in atomic physics, and Carl Friedrich von Weizsaecker, a prominent scientist of physics. His knowledge of physics, quantum mechanics, and natural philosophy came from these two giants. As his mentor, von Weizsaecker advised the young Basar to continue his studies not with atomic physics but with physiology, starting with the physiology of circulation and moving from thereon to the physiology of the brain. He studied autoregulation in the kidney in his doctoral dissertation, and made, in the USA, the first evoked potential

recordings. He was always fascinated by weight-driven pendulum clocks; the oscillatory behavior of the pendulums represented a basic principle of the universe, and he wondered how the oscillatory behavior can be applied to the workings of the brain. Thus started the lifelong voyage of Prof. Basar on the brain oscillations. This ardent interest came to the attention of Prof. Dogramaci, and he was invited to the Hacettepe University to establish an institute on biophysics In those days, Prof. Basar was thinking that cognition cannot yet be studied experimentally, he thus studied the EEG of cats, and the evoked oscillatory potentials that sensory stimuli produce. Those days were not too far removed from the times when people believed that the oscillations the brain emitted were mere noise. Prof. Basar's early findings could thus be published in technical journals, which were liberal enough to include physiological applications of technology in their scope. Eventually, his book, where he argued for a biophysical and physiological systems analysis, became published. A small community did note the importance of the work, but the book did not arouse the interest of the larger community. However, Prof. Basar's character, and his devotion to science was such that nothing could hamper or interfere with his studies on the oscillations. Findings accumulated and principles of brain functioning were formulated, the basic one being, 'Oscillations are the real responses of the brain.' Then came his book 'EEG-Brain Dynamics', and shortly after, he was appointed the Richard Merton Professor at the University of Kiel. There were still some who believed in the old school saying about the worthlessness of the oscillations, but in those days, the larger scientific community dealing with brain sciences could no longer be unaware of Basar's studies. His academic atmosphere, which included such eminent scientists as T.H.Bullock, L.Deecke, R. Galambos, H.Haaken, H.Petsche and J.Polich; and the well-equipped laboratories that were staffed by numerous academicians and technicians, started a new era in Prof. Basar's life. All these accelerated his research on the oscillations, and the theoretical formulations that he developed explaining the oscillatory brain activity and its relationship to cognitive-affective phenomena.

Friday, September 7th, 2018

10.30 – 11.30 a.m.

Invited lecture: Benedetto Vitiello

Emotional dysregulation during development: implications for psychopathology
B. Vitiello
Regina Margherita Hospital, Turin, Italy

The current psychiatric nosology remains anchored to clinically descriptive categories, but the relevance of dimensional constructs that are based on psychophysiology rather is becoming more apparent. In particular, the neurobiological mechanisms underlying emotional regulation and abnormal emotional lability (emotional dysregulation) are relevant to understanding common psychopathological manifestations in childhood and adolescence, such as disruptive behavior disorders, mood disorders, aggression, and self-injurious behaviors. This presentation aims to review our understanding of how dysfunction in mood regulation can lead to a variety of clinical manifestations of emotional lability in youth. In particular, the role of abnormalities in the neural circuitries of the reward and threat mechanisms for the clinical presentations of irritability will be discussed. Clinically, a variety of psychotropic medications have been tried over the years for the management of child psychiatric disorders. These data will be reviewed in the light of identifying potentially specific pharmacological targets for modulating emotional dysregulation

3.30 – 4.30 p.m.

Invited lecture: Arthur TOGA

The Informatics of Neuroimaging
A.W. Toga
USC Stevens Neuroimaging and Informatics Institute, Keck School of Medicine of USC
University of Southern California, Los Angeles, CA, Italy

Mapping the human brain, and the brains of other species, has long been hampered by the fact that there is substantial variance in both the structure and function of this organ among individuals within a species. Utilizing data from structural, functional, diffusion MRI, along with GWAS studies and clinical measures, we have built atlases with defined coordinate systems creating a framework for mapping and relating diverse data across studies. This talk describes the development and application of a theoretical framework, computational tools and visualization techniques for the construction of probabilistic atlases of large numbers of individuals in a population. It begins with some historical examples of approaches to map the structure and function of brain and ends with promises to come. Essential elements in performing this type of population based research are the informatics infrastructure to assemble, describe, disseminate and mine data collections along with computational resources necessary for large scale processing of big data such as whole genome sequence data and imaging data. This talk also describes the methods we have employed to address these challenges

6.30 – 7.00 p.m.

Didactic lecture: Michael J.Larson

Improving Rigor and Replicability in Psychophysiological Science: Evidential Value, Opportunities, and Registered Reports

M. J. Larson, PhD
Editor-in-Chief, International Journal of Psychophysiology
Professor, Department of Psychology and Neuroscience Center
Brigham Young University

Scientific results, including those from psychology, neuroscience, and psychophysiology, are under scrutiny due to a high number of false positive findings that are not consistently replicating. Many factors contribute to this so-called 'replication crisis'; yet, research practices are slow to change and incentives for change from scientific journals and academic institutions lag behind the need for improvement. Here, I present findings from a recent study assessing the power, evidential value, and degree of selective reporting in psychophysiological research. Findings indicate modest statistical power, generally good evidential value in the field, and minimal selective reporting that differs by journal impact factor. I provide examples of opportunities for improvement from the perspective of an editor, including decreasing researcher flexibility, increasing measurement precision, strengthening reporting standards, and shifting incentive structures. I end with a discussion of registered reports and pre-registration and how the implementation of registered reports in the International Journal of Psychophysiology strengthens the science of psychophysiology. Throughout the presentation, I will provide examples and emphasize guidelines for the implementation of clear, replicable, and rigorous psychophysiological science.

Saturday, September 8th, 2018

12.30 – 1.00 p.m.

Presidential Address: Giuseppe A. Chiarenza

Neurophysiological and neuropsychological differences between dysphonetic dyslexia and reading retardation

Giuseppe A. Chiarenza°, Valeria L. Peluso° and Jorge Bosch-Bayard*.
°Centro Internazionale dei Disturbi di Apprendimento, Attenzione e Iperattività, (CIDAAI) Milano, Italy
* Institute of Neurobiology, UNAM, Mexico.

Reading is essentially a two-channel function, requiring the integration of intact visual and auditory processes both peripheral and central. It is essential for normal reading that these component processes go forward automatically. Based on this model, Boder described three main subtypes of dyslexia, dysphonetic, dyseidetic, mixed, besides a fourth group defined reading retardation. The subtypes are identified by an algorithm that takes into account the reading quotient and the % of errors in the writing test. Chiarenza and Bindelli (2001) have developed the Direct Test of Reading and Writing (DTRW), a computerized, modified and validated version to the Italian language of the Boder test (Boder and Jarrico 1982). The objective of this research is to report the results of neurophysiological and neuropsychological differences of subjects with dysphonetic dyslexia with those with reading retardation. The sample consists of 179 subjects with dysphonetic dyslexia and 45 with reading retardation. The diagnosis of dyslexia was made according to the DSM-5 criteria. The Direct Test of Reading and Writing (DTRW), was used to identify the dyslexia subtypes and the reading retardation group. 2-5 minutes of artefact-free EEG, recorded at rest with eyes closed, according to 10-20 system were analyzed. Stability based Biomarkers identification methodology was applied to the DTRW and the qEEG separately and combined.
The reading quotients and the errors of the reading and writing test were significantly different in the two groups. In the qEEG, the dysphonetic group had significant higher activity in delta and theta band compared to reading retardation group in the frontal, central and parietal areas bilaterally.
The classification equation for the qEEG, both at the scalp and the sources levels, had a discrimination power lower than 0.8. However, the specificity and sensitivity of the classification equation for the DTRW itself was higher than 0.9 to discriminate dysphonetic children from children with reading retardation. The combination of the qEEG and the DTRW included only one variable from the qEEG (Pz at 2.53 Hz) in the classification equation, maintaining the very high classification power (> 0.95), sensitivity and specificity of the DTRW. These results confirm the existence of different neuropsychological and neurophysiological patterns in children with reading problems At the same time, they confirm the DTRW as a very valuable tool for the differential diagnosis of these two groups.