

The 6th International Conference on Cognitive Neurodynamics (ICCN2017)

PROGRAM & ABSTRACT BOOK



Edited by
José M. Delgado-García | Raudel Sánchez-Campusano

AUGUST 1-5, 2017 Hotel Alcázar de la Reina | Carmona (Seville), Spain

SPONSORED AND ORGANIZED BY

Division of Neurosciences, Pablo de Olavide University

CeslatiC Foundation (Centro de Estudios Latinoamericanos para la Ciencia y la Cultura)

CO-SPONSORED BY

Carmona City Hall

Cibertec S.A.

Olavide en Carmona

Pablo de Olavide University

Univerlab S.L.



COMMITTEES

INTERNATIONAL COMMITTEE

José María Delgado García (*Pablo de Olavide University, Spain*)

Rubin Wang (*Hangzhou Dianzi University and East China University of Science and Technology, China*)

Jan Lauwereyns (*Kyushu University, Japan*)

Minoru Tsukada (*Tamagawa University, Japan*)

Ichiro Tsuda (*Hokkaido University, Japan*)

Hans Liljenström, Hans (*SLU and Agora for Biosystems, Sweden*)

LOCAL ORGANIZING COMMITTEE

José María Delgado García (*Chairman*)

Agnès Gruart

Miguel Merchán

Juan Carlos López-Ramos

Rocío Leal-Campanario

Raudel Sánchez-Campusano

YOUNG LOCAL ORGANIZING COMMITTEE

Ana Rocío Conde Moro

Florabela Da Rocha Almeida

Mar Reus García

José Antonio García Moreno

Paper Acceptance and Book Edition

Raudel Sánchez Campusano (E-mail: rsancam@upo.es)

Xiaochuan Pan (E-mail: pxc@ecust.edu.cn)

Secretariat

Antonio Quetglas (E-mail: aquesab@upo.es)

Travel Agency

Antonio Vázquez (*Viajes Pacífico*, E-mail: avazquez@pacifico-meetings.com)

José M. Ávila (*Viajes Pacífico*, E-mail: iccn2017@pacifico-meetings.com)



Title: *Comprehensive Neurophilosophy -- a Tribute to Walter J. Freeman*

Speakers:

1. *Ichiro Tsuda, Hokkaido University, Hokkaido, Japan.*

Self-organization with constraints: The significance of invariant manifolds

2. *Nobuo Kazashi, Kobe University, Kobe, Japan.*

On the “Discontinuous continuity” of the self: memory, attention, and mindful breathing (Freeman along with William James)

3. *Anton Luis Sevilla, Kyushu University, Nishi-ku, Fukuoka, Japan.*

Mindful education and the Kyoto School: contemplative pedagogy, enactivism, and the philosophy of nothingness

4. *Jan Lauwereyns, Kyushu University, Nishi-ku, Fukuoka, Japan.*

Beyond Prediction: Self-Organization of Meaning with the World as a Constraint

12:30-14:00

Poster session 1 (*Salón Puerta de Sevilla*)

14:00-15:30

Buffet Lunch (*Salón Cueva de la Batida*)

16:00-17:00

Plenary Lecture 2 (*Salón Puerta de Sevilla*)

Speaker: *Salvador Martínez (INA, CSIC and Miguel Hernández University, Alicante, Spain)*

Title: ***Mild cortical dysplasia as a model of mental disorder***

Chairperson: *Agnès Gruart (Pablo de Olavide University, Sevilla, Spain)*

17:00-17:30

Coffee Break (*Salón Puerta de Sevilla*)

17:30-19:30

Symposium 3 (*Salón Puerta de Sevilla*)

Organizer: *Laura Roa (Biomedical Engineering, Engineering School, Seville, Spain)*

Title: ***Neural Engineering***

Speakers:

1. *José Luis Pons Rovira, Biomedical Engineering Group, CSIC, Madrid, Spain.*

Technology-driven neuromodulation and neural plasticity: stroke and iSCI

2. *Roberto Hornero Sánchez, Grupo de Ingeniería Biomédica, Valladolid University, Valladolid, Spain.*

Neurocognitive training by means of a motor imagery-based Brain Computer Interface in the elderly

3. *Javier Reina Tosina, Biomedical Engineering, Engineering School, University of Seville, Seville, Spain.*

Intra-body Communications as an Emerging Approach to Neuromodulation

4. *Christopher James, University of Warwick, Warwick, UK.*

Independent Component Analysis in brain signals

17:30-19:30

Symposium 4 (*Salón de la Reina*)

Organizer: *Agnès Gruart (Division of Neurosciences, Pablo de Olavide University, Seville, Spain)*

Title: ***Learning about learning: different scientific edges***

Speakers:

NEUROCOGNITIVE TRAINING BY MEANS OF A MOTOR IMAGERY-BASED BRAIN COMPUTER INTERFACE IN THE ELDERLY

J. Gomez-Pilar, V. Martínez-Cagigal, and R. Hornero*

Grupo de Ingeniería Biomédica, Valladolid University, E.T.S.I. Telecomunicación,
Paseo Belén, 15, 47011 - Valladolid, Spain

Abstract: Brain-computer interfaces (BCIs) have become not only a tool to provide communication and control for people with disabilities, but also a way to restore brain plasticity by inducing brain activity by means of neurofeedback training (NFT). In this regard, NFT has shown to be a suitable technique to control one's own brain activity. We hypothesized that a well-designed NFT with a motor imagery-based BCI (MI-BCI) could enhance cognitive functions related to ageing effects. In this study, a MI-BCI application was developed, designed and assessed to study the potential benefits in elderly people to slow down the effect of ageing. To assess the effectiveness of our MI-BCI application, a total of 63 subjects were recruited by the 'Centro de Referencia Estatal (CRE) of San Andrés del Rabanedo (León, Spain). All subjects were older than 60 years, healthy, and with similar educational level. None of them had previous BCI experience (BCI-naives). Participants was randomly divided, taking into account age and gender, into a control group (32 subjects) and a NFT group (31 subjects). Our proposed application was only used by the NFT group (31 subjects). NFT effects were studied observing changes in the electroencephalogram (EEG) spectrum during resting by means of relative power (RP) measures, and also by the study of changes in different cognitive functions using the Luria Adult Neuropsychological Diagnosis (Luria-AND) test. Three frequency bands centered on 12, 18, and 21 Hz (bandwidth of 3 Hz) were selected for the training and, then, to assess EEG changes. Significant increases ($p < 0.01$, Wilcoxon signed-rank test) in the RP of these frequency bands were found. Moreover, after performing five NFT session, results from Luria-AND test showed significant improvements ($p < 0.01$, Wilcoxon signed-rank test) in the NFT group in four cognitive functions: visuospatial, oral language, memory, and intellectual. These results further support the association between NFT and the enhancement of cognitive performance, as well as it opens the opportunity of designing new NFT based on motor imagery strategies. Therefore, this novel approach could lead to new means to help elderly people by slowing down the effect of ageing.

Support: Grants TEC2014-53196-R (Ministerio de Economía y Competitividad and FEDER), VA037U16 (Consejería de Educación de Castilla y León).