

Electric Neuronal Oscillations and Cognition - ENOC

COST Action B27

Start date: 23/05/2005

End date: 22/05/2009

Scientific context and objectives

- **Research area:**

- *Neuroscience*

- *Domain: Biomedicine and Molecular Bioscience (BMBS)*

- **Brief reminder of MoU objectives:**

- *To increase the knowledge of the electric neuronal oscillations correlated to memory and attention as the basis for neuronal regulation aimed at enhancing the human performance and health.*

Mind-matter correlation

Play-of-words

“What is mind?”

“No matter”

“What is matter?”

“Never mind”

(Jibu and Yashue, 1995)

Working groups

WG1 Theoretical considerations

- Chaos synchronization (9 teams/5 countries)
- EEG signal analysis (17/8)

WG 2 Diagnostics and treatment

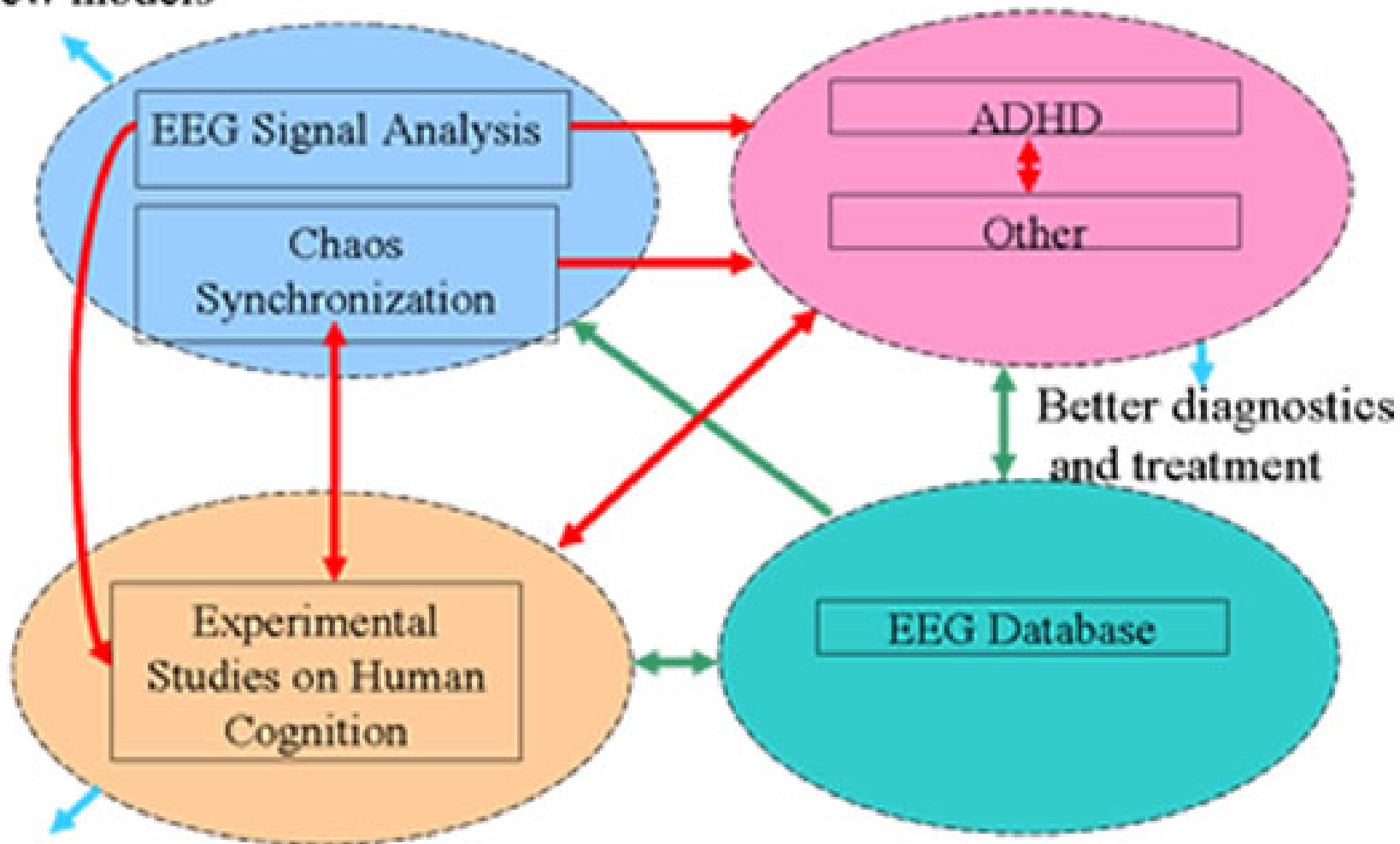
- ADHD (13/7)
- Other cognition-related disorders (12/10)

WG 3 Experimental studies

- Improvements of knowledge on memory, attention, perception and executive functions (17/13)

Working groups - cooperation

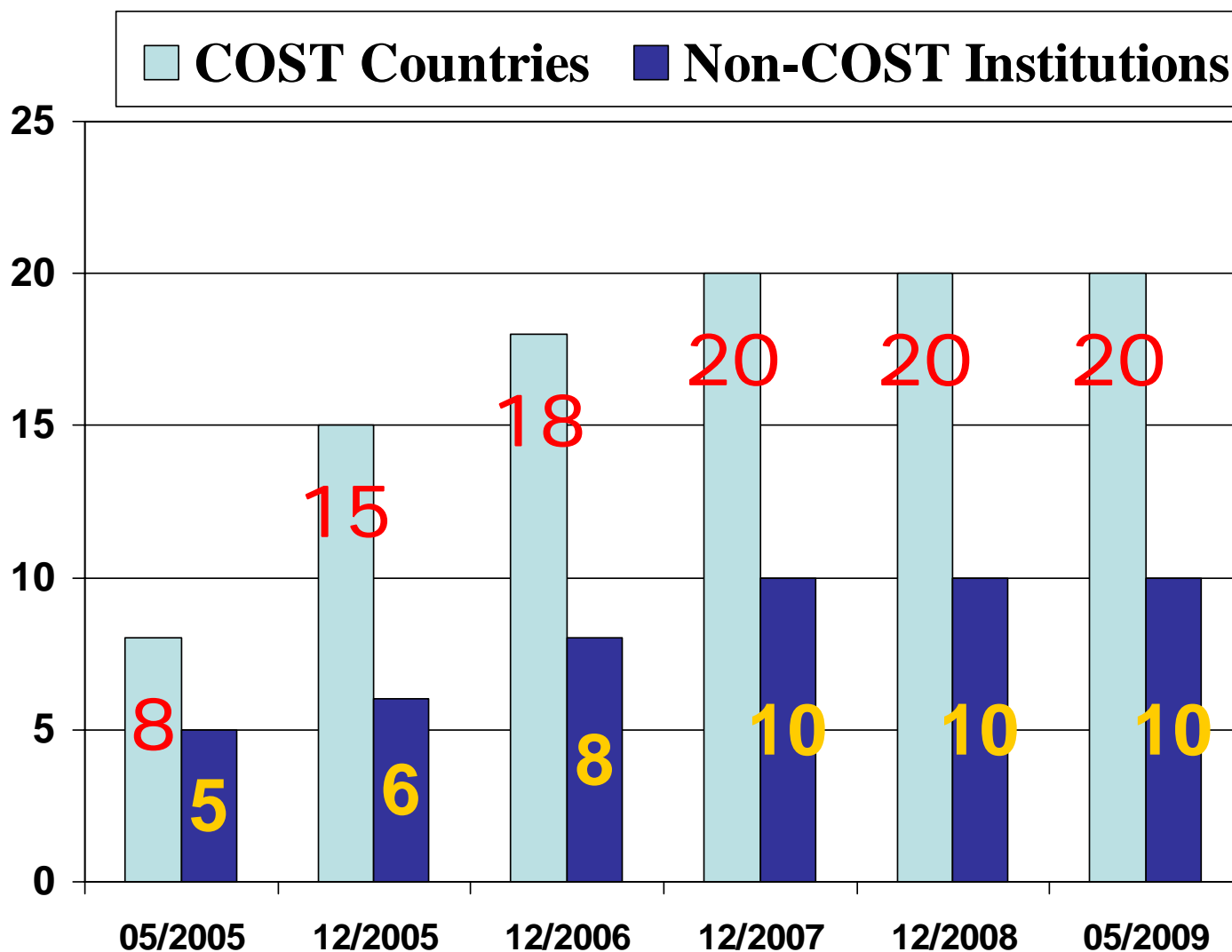
New models



Better diagnostics and treatment

New evidence

Action Members



Use of COST instruments

	2005	2006	2007	2008	2009	Total
No. of MC / WG meetings	2	2	2	1	1	8
No. of STSMs	1	6	3	4	4	18
No. of workshops / conferences	1	2	2	1	3	9
No. of proceedings	1	1	2	1	3	8
No. of training schools	0	0	0	0	2	2
GASG (activities)		Web site, Tech. sup.	Web site, Tech. sup	Web site, Tech. sup		3

Use of COST instruments - Analysis

- Joined MC/WG Meetings and STSMs have proved to be the best form of cooperation.
- Good proportion of Meetings participants were early-stage researchers, so more training schools were unnecessary.
- The number of STSMs (18 or 4.5 per year) is satisfactory. 15 of them were realized by early-stage researchers.

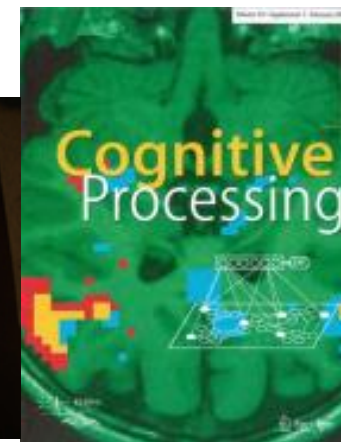
Use of COST instruments

COST Publications

- Books of Abstracts from the meetings in: Istanbul, Swansea, Florence, Seville, Crotone, Dubrovnik.

- Special Issue of Cognitive Processing: Neuroscience today - Neuronal Functional Diversity and Collective Behaviours, Pages: 125; Editors: F. T. Arecchi, R. Meucci, W. Sannita and A. Farini; Publisher: Springer

-In preparation: two issues of Journal of Psychophysiology (from Goetingen and Crotone Meetings) and a monograph on ADHD.



Significant highlights (1/5)

Theoretical considerations

- Improvements in theoretical descriptions of synchronization by analysis of the dynamics of different neuron models – network of teams from IT(3), MK(1), PL(3), RS(1), USA(1).
- Extended and newly developed methods and codes, mainly aimed for practical EEG analysis - network of teams from AT(3), DE(2), EE(2), LT(2), MK(1), PL(4), TR(2), UK(1).

Significant highlights (2/5)

Diagnosics and treatment

- Development and application of biofeedback, neurofeedback and quantitative EEG for advanced treatment of Attention Deficit Hyperactivity Disorder (ADHD), as well as learning disorders, epilepsy, anxiety, addictions etc.
 - ADHD network: DE(4), IE(1), MK(1), PL(1), CH(3), TR(1), UK(2);
 - Other disorders: AT(2), HR(1), FR(1), IT(1), MK(1), RU(1), RS(1), SI(1), TR(1), UK(2).

Significant highlights (3/5)

Experimental studies

- Improvement of knowledge related to memory, attention, executive functions, sleep/circadian rhythms and brain-computer interactions (including neurofeedback) – network of teams from: AT(2), BG(1), HR(2), DE(1), DK(1), FR(1), IT(1), MK(1), NO(1), PL(2), RS(2), TR(1), UK(1).

Significant highlights (4/5)

Chapters in international monographs

- Cambridge University Press (BG)
- NOVA Biomedical Books (MK)
- Springer (LT)

Significant highlights (5/5)

Research projects

EC RTD Sixth Framework Programme – *two*:

CH, FR, **MK**, NL, SI;

AT, DE, IL, IT, LU, ES, SE, **UK**.

- National Programmes – *twenty*: BG(2), EE(2), FR(1), DE(2), MK (2), PL(2), RU(3), RS(2), CH (1), TR(1), UK(2).
- International Programmes – *six*: BG & DE; IT, MK, NO, RU, CH & USA; CH & RU; MK & RU; BG & ES; MK & TR.

Global dimension (1/3)

Institutions from Non-COST Countries

- The Institute of Physical and Chemical Research, RIKEN, Japan
- The University of Auckland, Department of Engineering Science, New Zealand
- Institute of the Human Brain, Russian Federation
- State-Research Institute of Physiology, Psychophysiology Lab., Russian Federation
- Institute of Molecular Biology and Biophysics, Russian Federation
- Institute for Nonlinear Science, UCSD, United States
- New York University School of Medicine, United States
- Faculté des Sciences de Tunis, Tunisia
- University of Quebec, Psychology, Canada
- Institute of Neurology and Neurosurgery, Cuba

Global dimension (2/3)

Cooperation with external organizations

- Society of Applied Neuroscience (SAN): assistance with foundation of SAN and organization of four joint meetings;
- European Center for Nuclear Research (CERN): exchange of visits and experience on experimental tools.

Global dimension (3/3)

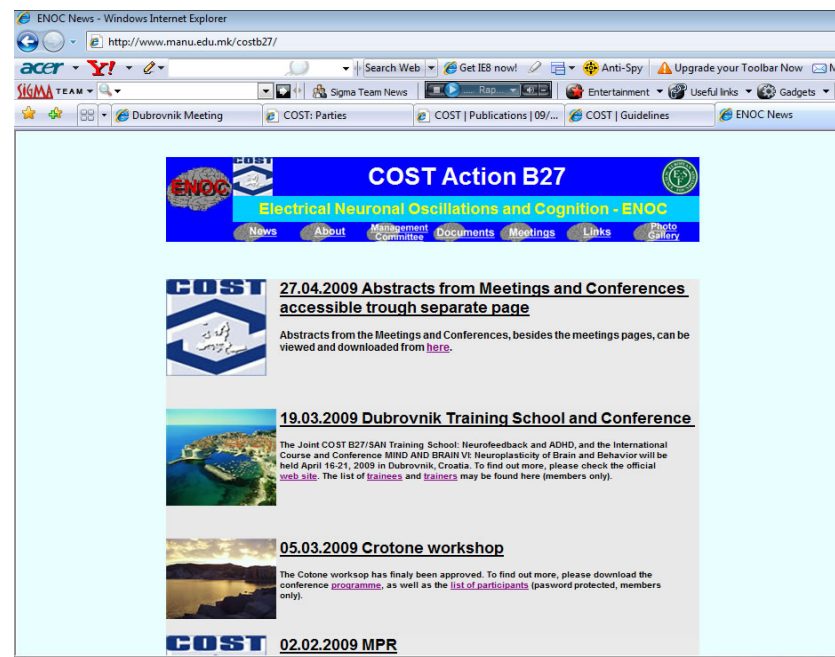
Dissemination Activities

Action web site:

- Complete information about ongoing activities;
- Transfer of methodology;
- Abstracts of the meetings available to general public;

Action related publications (336 in total):

- Multi-country: 34
- Multi-team: 99
- Other: 203



- MATLAB library:
AU, MK, TR
- Interviews in local printed and electronic media

Challenges (1/3)

Successes and shortcomings

- The joint research initiatives emerged from the Action are quite satisfactory, both in number and success.
- The research cooperation within the networks of the same WG is reasonably good. The cooperation between the teams from different WGs was less efficient and the number of joint publications could have been larger.
- The regular and continuous updating of the web site with useful information contributed to more effective management and communication within the Action and also for wider dissemination of the results.

Challenges (2/3)

Future challenges

- The established “ENOC Community” networking and experiences will have a fruitful follow-up through extensive participation in the three new complementary Neuro-COST Actions: NEUROMATH, Consciousness and Emerging EMF.
- Further applications to FP7 and other multilateral programmes.

Challenges (3/3)

General infer

COST is not only an acronym

- for cooperation in S & T

It appeared to be also a synonym

- for cost-effective cooperation