



The birth and scope of the BrainConquest ERC starting grant project

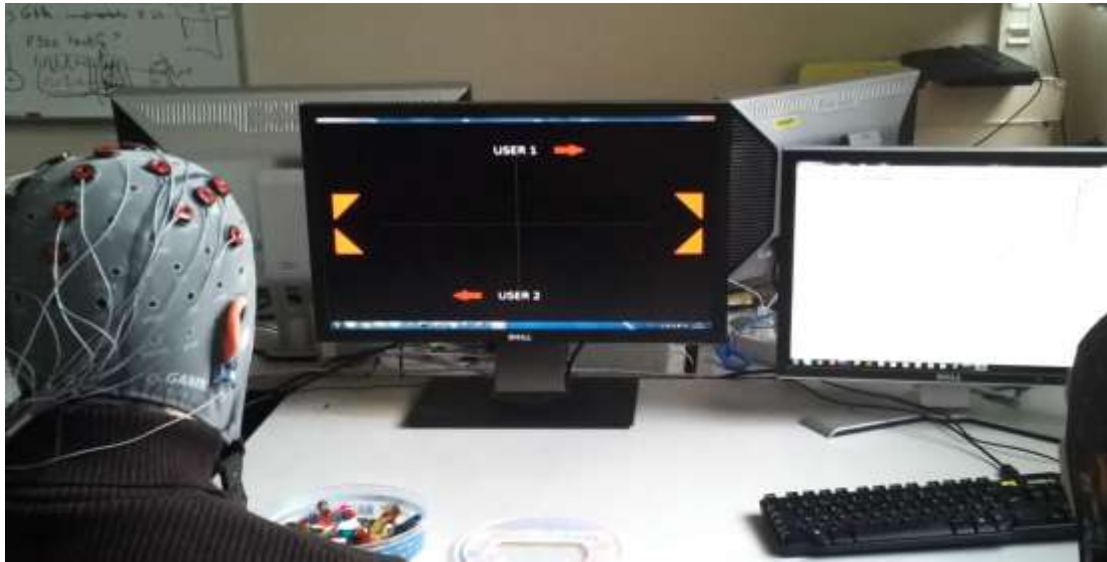
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Brain-Computer Interface (BCI)

System translating measures of brain activity into commands or messages for an interactive application



Ex: Motor Imagery BCI-based [Bonnet, Lotte, Lécuyer, 2013]

- Many promising applications: communication, wheelchair control, video games, stroke rehabilitation, etc.

F. Lotte, L. Bougrain, M. Clerc, "*Electroencephalography (EEG)-based Brain-Computer Interfaces*", Wiley Encyclopedia on Electrical and Electronics Engineering, 2015

EEG-based BCI are very promising, but...

- Scarce BCI use outside laboratories due to a **poor usability**

poor efficacy

High
error-rate
[Guger 1999,
Blankertz 2010]

~10-30% of
users cannot
control a BCI
[Allison 2010]

poor efficiency

Long
calibration
times
[Blankertz 2008]

Long user
training times
[Neuper 2010,
Wolpaw 2012]

⇒ We need more usable BCI!

USABLE BCI =
ROBUST SIGNAL PROCESSING + **WELL TRAINED USER**

Why current training is inappropriate



- Current BCI user training does not satisfy guidelines from educational science [Lotte, Larrue, Mühl, Frontiers in Neurosciences, 2013]
- Current feedback type prevent people to learn simple motor tasks [Jeunet, Jahanpour, Lotte, Journal of Neural Engineering, 2016]
- We currently lack the fundamental knowledge to make this training appropriate

BrainConquest: Boosting Brain-Computer Communication with high Quality User Training

PROJECT AMBITION

Developing models and tools for understanding and redefining
BCI user training in order to drastically boost BCI reliability



Starting Grant
BrainConquest
2017-2021
1,5 M€

SCIENTIFIC CHALLENGES

. CURRENTLY . **Target** . IN 5 YEARS .
75% accuracy for 2 commands  *>90% accuracy for 3 commands*

SC1 ▼ Modelling the user learning process

What is learned?

How is this learned?

SC2 ▼ Designing new feedbacks & training tasks

Feedback

Training tasks

SC3 ▼ BCI platform and applications

Assistive Technologies

Human-Machine Interaction

ERC Funded Group

3 PhD students

2 Post-docs

1 Engineer

~10 Master students

International collaborators:

- RIKEN BSI, *Japan*
- National Center for Neurotechnologies, *USA*
- Univ. Sussex, *UK*
- EPFL, *Switzerland*
- TU Graz, *Austria*
- TU Berlin, *Germany*, etc.

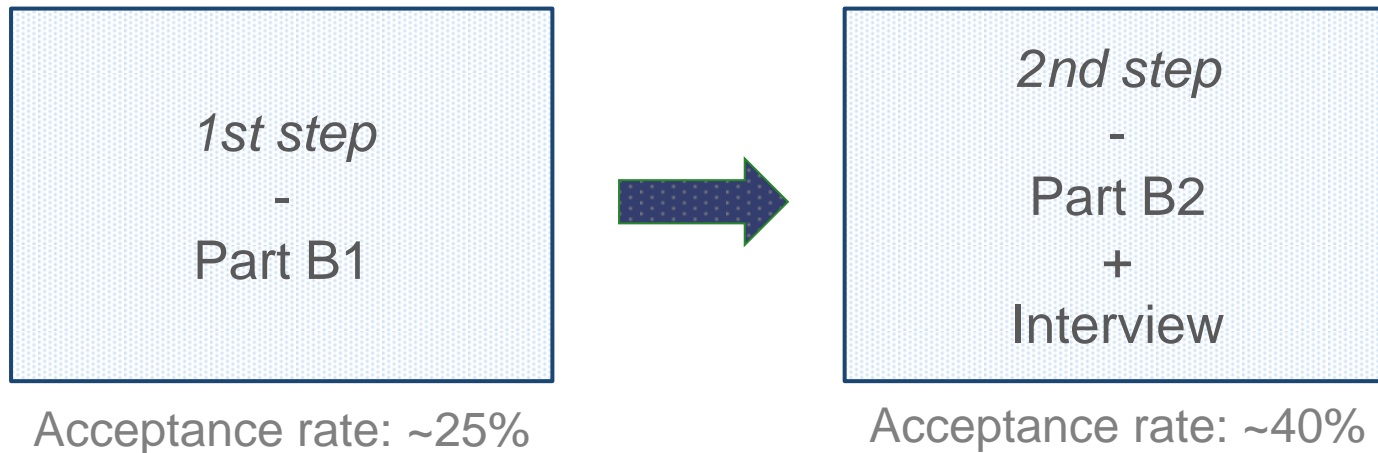
Collaboration with RIKEN BSI - Japan

- Visiting scientist at RIKEN Brain Science Institute – wakoshi
 - Pr. Cichocki Advanced Brain Signal Processing laboratory
 - Neurosciences research and brain signals analysis and modelling tools



ERC Starting Grant application process

- Written submission
 - Part B1: short proposal (5p) + CV (2p) + track record (2p)
 - Part B2: detailed proposal (15p) + team, planning, budget
- Evaluation: a 2-step process



Step 1: Short proposal + CV + Track record

- Short proposal (5p)
 - Showing the vision
 - Should be ambitious, very novel
 - Scientific challenges
- CV (2p)
 - Education / research employment
 - Supervision & teaching
 - impact
 - Community service
- Early achievements (2p)
 - 5 selected publications
 - Awards
 - Invited talks

Should show the project is “High risk – high gain”

Should show you are a recognized and promising scientist

Step2: detailed proposal + interview

- Part B2: detailed scientific proposal (+ budget, timing, team, ...)
 - Reviewed by 10 international experts!
- Interview in Brussels
 - 30 min interview
 - 7 min presentation, 4 slides! (in PE7)
 - ~20 panel members
 - Scientific, management, budget questions



The proposal preparation for me

- Applied first in 2014 – and failed at the first stage
- Re-applied in 2016
- Was “coached” by Jean-Pierre Bânatre
 - Former Inria European affair director (now sabia consulting)
 - Coached more than 55 successful ERC grant awardees
- Got help on all the process from my close colleagues
 - Discussing the ideas and the writing
 - Refining the interview talk and slides



Some other advices

- Get help from someone who knows how to write ERC grants!
- Be precise
- Be ambitious but realistic
- It takes a lot of work: be dedicated and focused
- Be enthusiastic and passionate

Thank you for your attention!



Any question?

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