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# Which factors affect patients' acceptability of BCIs for functional rehabilitation after stroke? A questionnaire study among 140 patients and a comparison with the general public

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## ► To cite this version:

Elise Grevet, Margaux Izac, Franck Amadiou, Jacques Py, David Gasq, et al.. Which factors affect patients' acceptability of BCIs for functional rehabilitation after stroke? A questionnaire study among 140 patients and a comparison with the general public. Journées CORTICO Scientific Days 2024, May 2024, Nancy, France. . hal-04608734

**HAL Id: hal-04608734**

**<https://hal.science/hal-04608734>**

Submitted on 13 Jun 2024

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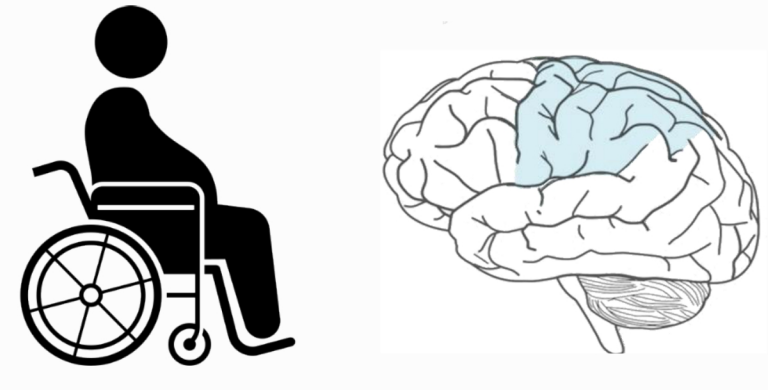
# Which factors affect the patients' acceptability of BCIs for functional rehabilitation after stroke?

## A questionnaire study among 140 patients and a comparison with the general public

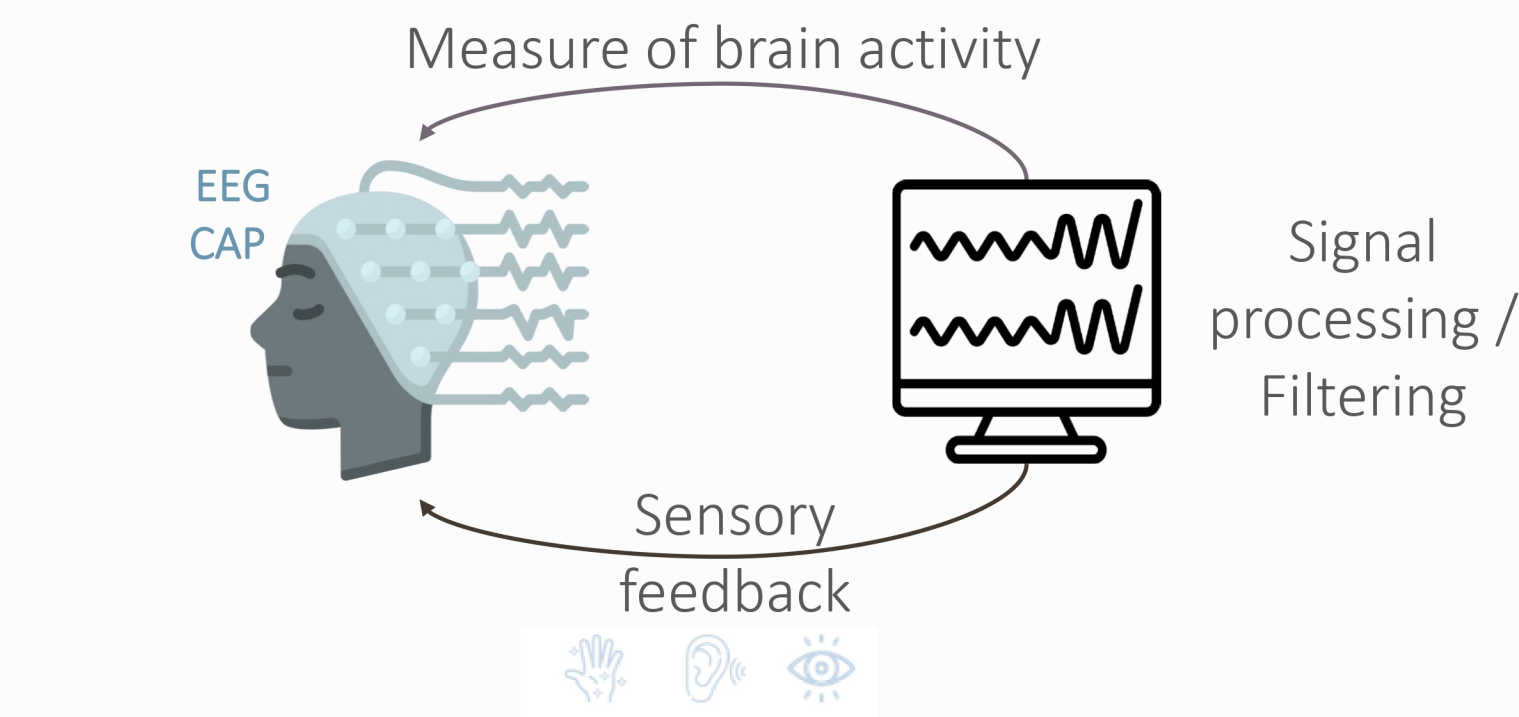
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### 1. INTRODUCTION – Why to focus on the acceptability of BCIs?



After stroke, many physical disabilities persist [1].



BCIs: efficient for improving motor recovery after stroke [2] - *Strengthening synaptic plasticity.*

**BUT...** BCI efficiency and usability remain insufficient for broad clinical use [3,4].

### OUR OBJECTIVE

To use the improvement, of **acceptability** as a lever to optimise the **efficiency** and **usability** of BCIs.

### HYPOTHESIS

↗ acceptability through **personalisation** of BCI protocols  
 ↘ anxiety  
 ↗ engagement  
 ↗ BCIs efficiency & usability in terms of motor improvement

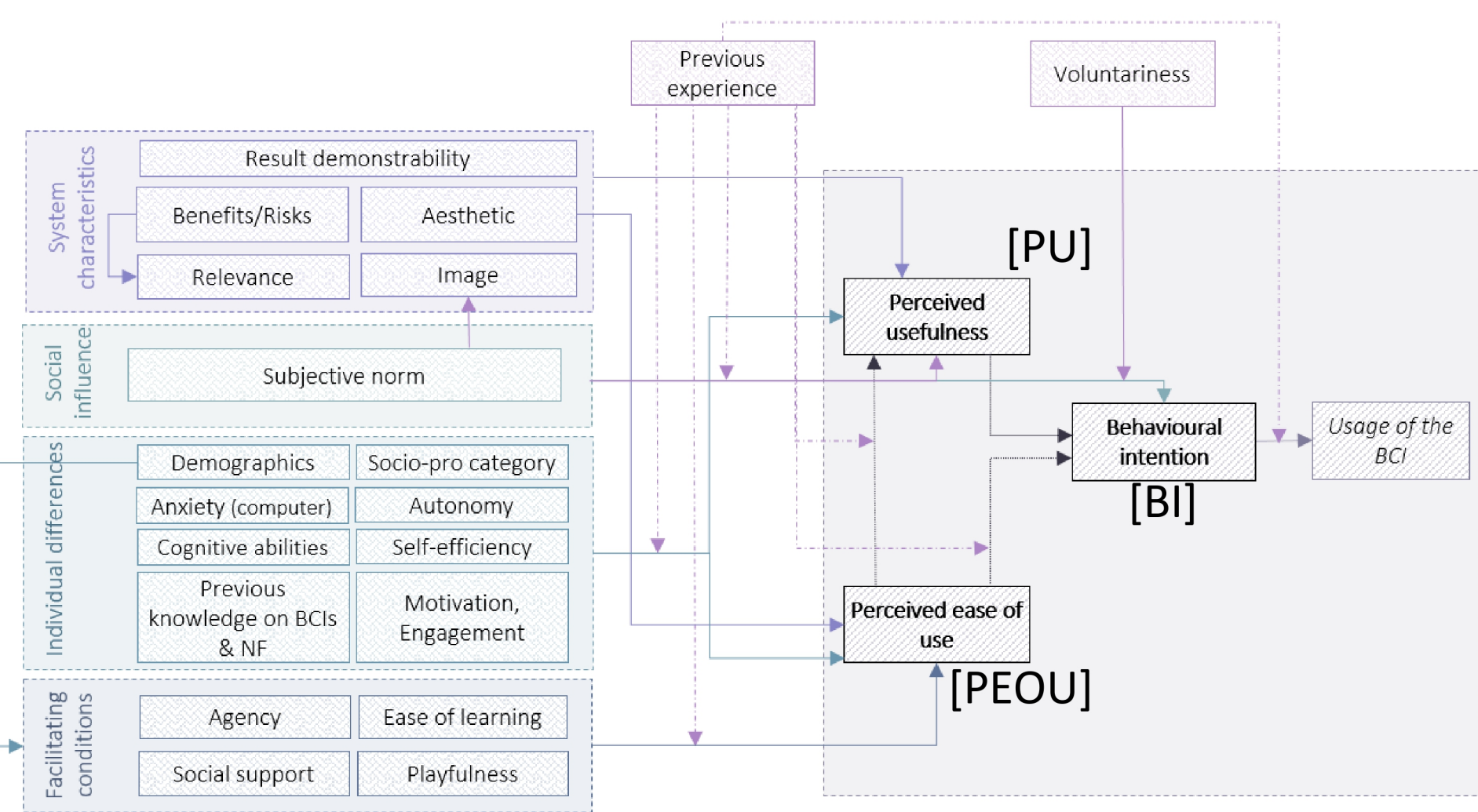
### REVIEW OF LITERATURE

- The acceptability of BCIs is mostly studied as an attribute of users' satisfaction (i.e., a dimension of user experience) [3]: among post-stroke patients: Morone et al., 2015.
- Limited number of studies & absence of a theoretical framework → need for an **acceptability model** for BCIs that will enable us to personalise the BCI training to each patient.



### 2. METHODS – Modelling acceptability of BCIs for post-stroke motor rehabilitation

#### (A) Design of an acceptability model for BCIs



Main source models: *Technology acceptance model (TAM3)* [4], *Unified theory of acceptance and use of technology (UTAUT2)* [5], *Components of user experience (CUE)* [6]

#### (B) Implementation of a questionnaire



N = 753 general public (results published in [7])  
N = 140 post-stroke patients

#### (C) Empirical evaluation of the model / questionnaire

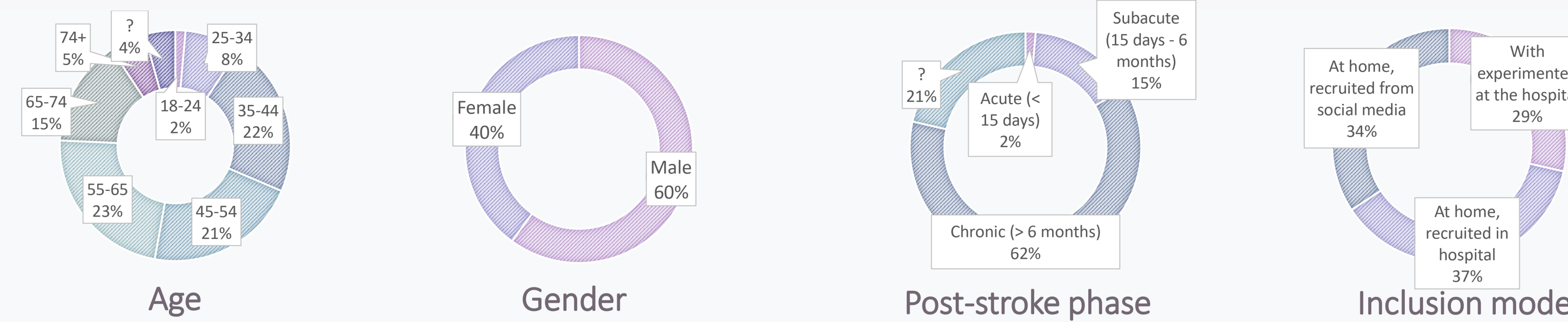
- Consistency of the factors ["intra-factors" consistency]: *Cronbach's alpha* → 13/17 factors with good consistency
- Model structure ["inter-factors" consistency]: *Confirmatory factor analysis* → 3/5 indices with good values

#### (D) Analysis of the results for patients & comparison with general public

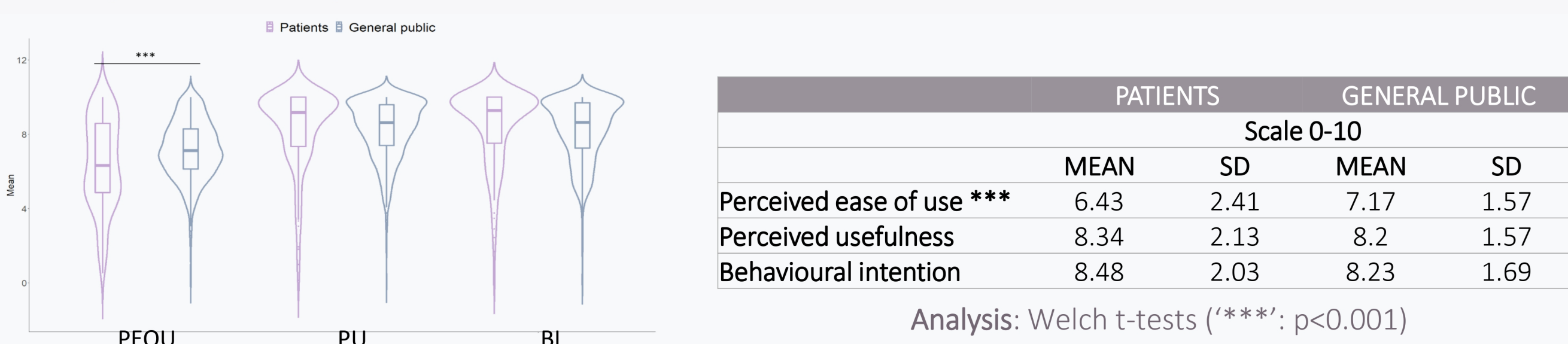
- Descriptive analysis: means and standard deviations & Welch t-tests for the comparisons.
- Quantitative analysis: regression analysis to identify the factors of the model that best predict the acceptability of BCIs in terms of *Perceived ease of use - PEOU*, *Perceived usefulness - PU* and *Behavioural intention - BI*.

### 3. RESULTS – Identify the most important acceptability factors among patients

#### 1. Respondents' characteristics



#### 2. Descriptive analysis

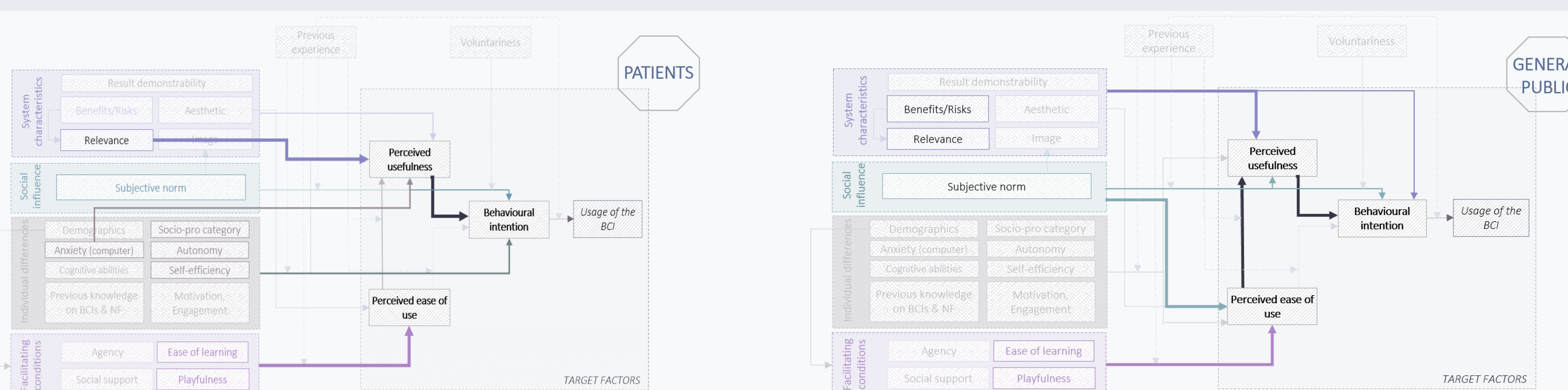


Conclusion: High acceptability, but BCIs protocols should be designed to improve the PEOU of patients.

#### 3. Regression analysis



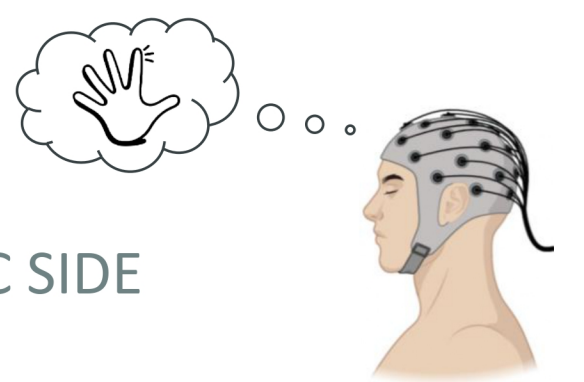
#### 4. Conclusion: adjusted model for the patients (left) & comparison with the general public's (right)



### 4. PERSPECTIVE - Multi-centred RCT

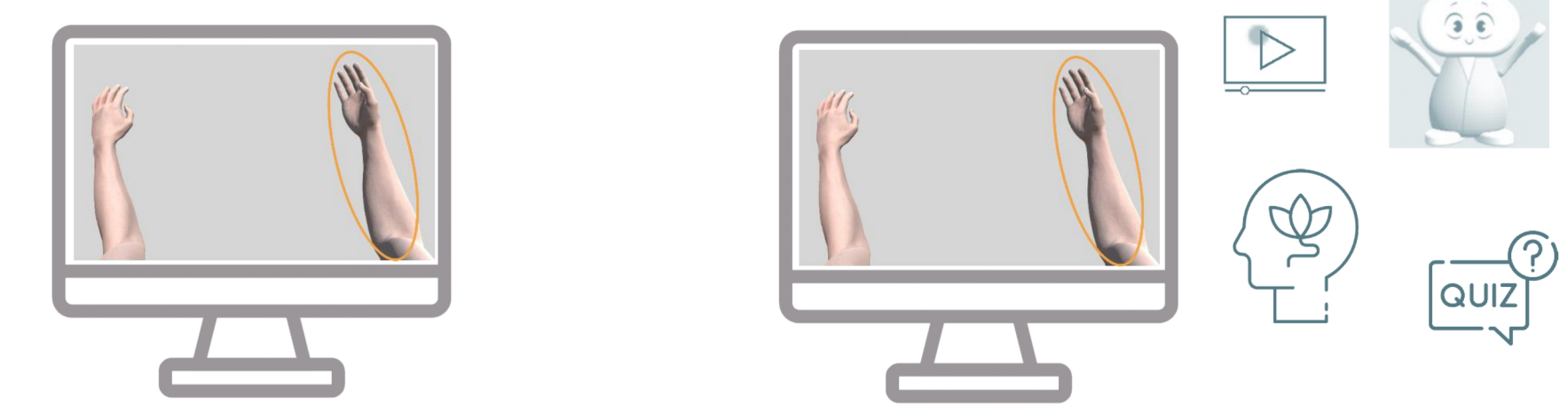
#### OBJECTIVE of the RCT

Optimise **acceptability** and study the consequences on **anxiety**, **motivation**, **engagement** in the rehabilitation and **motor improvement** of patients.



TASK : MOTOR IMAGERY – HEMIPLEGIC SIDE

Control group (n=26): Standard BCI training + Experimental group (n=26): Personalised BCI training



### 5. CONCLUSION

Some general recommendations for improving patients' acceptability:

- Scientific relevance & Benefits/risks ratio:** provide clear information on BCIs functioning and scientific evidence of their clinical efficiency. Consider that irrational fears or excessive expectations can impact the benefits/risks ratio, rendering scientific discourses inaudible.
- Ease of learning:** instructions should be clear and training motivating.

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FINANCEMENT: ANR-20-CE38-0008-01

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