



## **Towards Measuring states of curiosity through Electroencephalography and body sensors responses**

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# Towards measuring states of curiosity through Electroencephalography and body sensors

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## Context

### ► Psychology, Neurosciences

- *Curiosity* is one of the key mental states involved in users' learning tasks : more a user is curious, better he learns [1]
- *Curiosity* is a mental state that comes up when users are *intrinsically motivated* to learn.

### ► Human-Computer Interactions

Adapting tasks to users' *curiosity* could increase their involvement and might allow them to enter a *flow* state.

## Goal

- Being able to estimate *curiosity* with objective measures would be an important step in understanding *curiosity* in deeper details.
- Today, this mental state is mainly subjectively measured using questionnaires, but two papers studied *curiosity* and learning with fMRI [1,2].
- Our goal is to estimate *curiosity* with objective measures using Electroencephalography (EEG) and body sensors

## Material: Measures

### Objective



Electroencephalography (EEG)



Skin Conductance



Electrocardiography (ECG)

### Subjective



Curiosity trials Rating

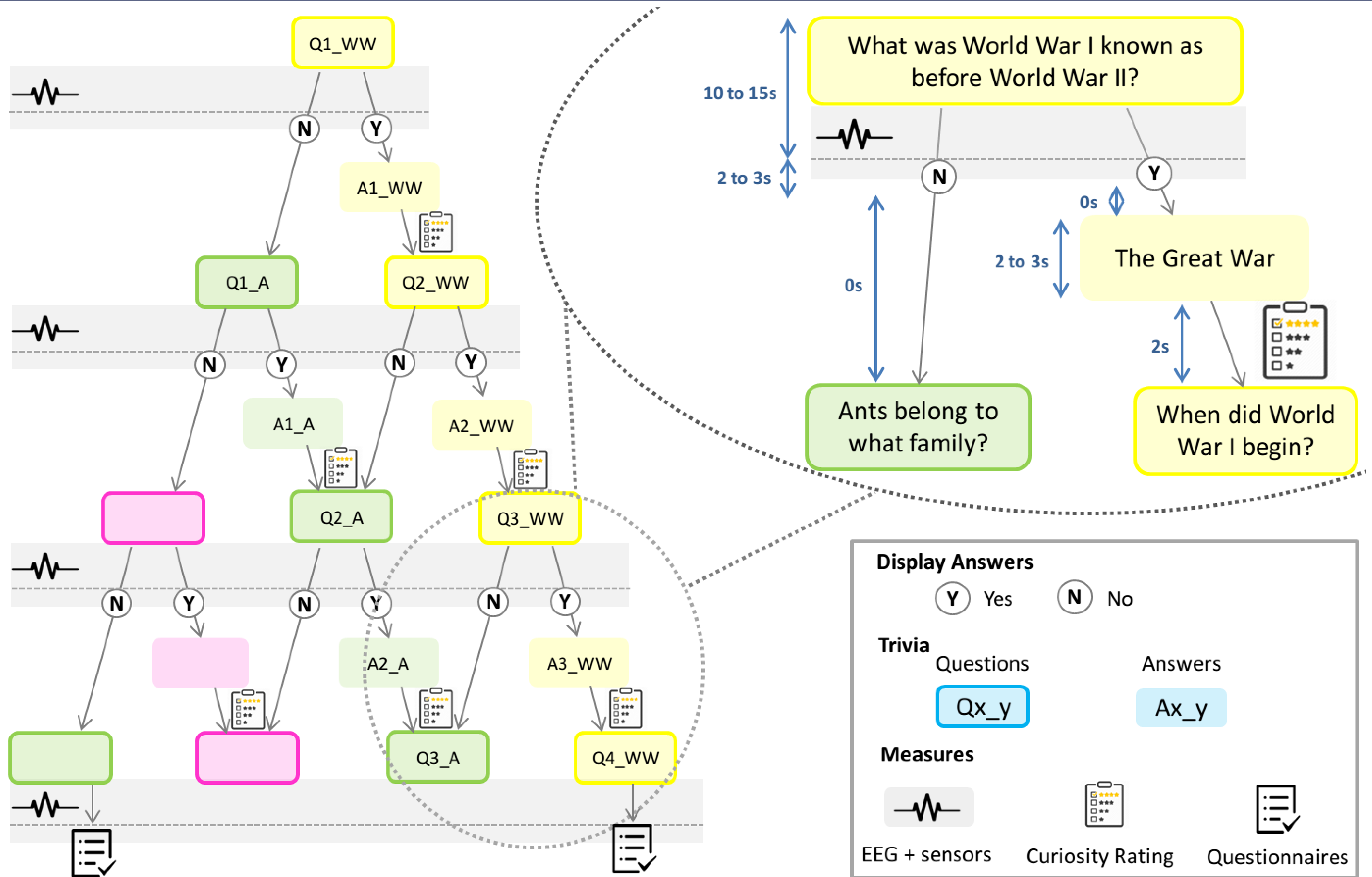


Questionnaires (curiosity [3], Intrinsic Motivation [4], Flow [5])

## Method

- A series of Trivia questions is displayed to each participant, in order to get 2 types of trials, i.e. curiosity trial (CT) & no-curiosity trial (NCT). After each question presentation, the participant can choose to:
  - display the answer and push forward on this category, the trial is tagged as CT
  - skip the answer and change category, the trial is tagged as NCT

## Trivia-questions presentation system



## References

- 1 M. Gruber B. Gelman C. Ranganath (2014). States of curiosity modulate hippocampus-dependant learning via the dopaminergic circuit
- 2 M. J. Kang al. The Wick in the Candle of Learning: Epistemic Curiosity Activates Reward Circuitry and Enhances Memory. Psy Sci
- 3 F. D. Naylor (1981). A State-Trait Curiosity inventory. Australian Psychologist Vol. 16 No. 2
- 4 F. Guay, R. J. Vallerand C. Blanchard (2000). On the Assessment of Situational Intrinsic Motivation Scale (SIMS). Motivation and Emotion
- 5 J. Heutte, Fenouillet, Boniwell, Martin-Krumm Csikszentmihalyi (2014). EduFlow: Proposal for a new measure of flow in education.