# Development and Validation of an Embodied Conversational Agent (ECA) to detect Problematic Use of Tobacco and Alcohol

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## Background

→ Under-detection of tobacco and alcohol use disorders (UD): recommendations for systematic screening
→ Paper questionnaire for screening: takes time for scoring and data entering, lack of attractiveness, need for a mediator
→ Alternative: Embodied conversational agents (ECA)

### Embodied Conversational Agent « Jeanne »

- Interactive dialogue: different gestures, facial and verbal expression
- Affective computing
- Strong human-system interactions

#### ECA architecture and interactions:



Scan to see Jeanne interview →
(in French)
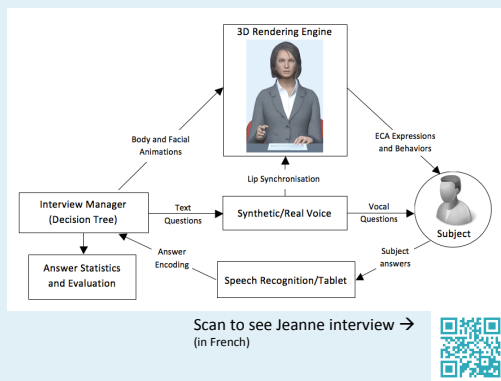
Jeanne interview:
- For tobacco problematic use: Cigarette Dependence Scale (CDS-5) questions
- For alcohol problematic use: Cut-down, Annoyed, Guilty, Eye-opener (CAGE) questionnaire

## Objectives

• **To compare the ECA interview with Human Interviewer using DSM-5 addiction diagnosis**
• **To describe ECA's acceptability by general population**

## Method

Population: recruited in Sleep Clinic in Bordeaux University Hospital

Procedure: A 3 parts Interview:
1) Human interviewer: Gold standard (MINI)
2) Interviews with the ECA « Jeanne »     } Randomization
3) Self-report questionnaires

Instruments:
• Mini International Neuropsychiatric Interview (MINI) (Sheehan and al. 1998)
• Cigarette Dependence scale (CDS-5) (Etter, Le Houezec and al. 2003)

•«Cut-dow, Annoyed, Guilty, Eye-opener » (CAGE) (Mayfield, 1974)
•«Questionnaire d'Acceptabilité de Bordeaux» (QAB)
•Acceptability E-Scale (AES) (Micoulaud-Franchi and al. 2016): final score from 0 (very bad acceptability) to 30 (very good acceptability)

## Analyses

- Internal consistence of ECA's item: Cronbach's alpha
- Validity of SUD screening by the ECA in comparison with MINI: Receiver Operating Characteristic analysis (ROC analysis)
- Specificity, sensitivity and predictive report: ROC curve
- ECA's acceptability: description of acceptability questionnaire

## Results

Participants: N=139, mean age = 43.0 years, 51.1% women
Current DSM-5 Use Disorder: Tobacco : 31.4%, Alcohol : 8.6%, Other : 4.3%
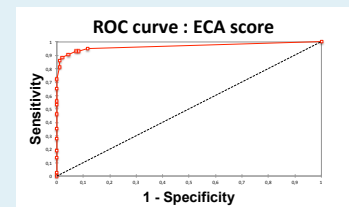Current addiction treatment: 1.4%

Performance of the ECA compared with MINI for DSM5 Tobacco Use Disorder:
 Cronbach's alpha = 0.94
 **Area under the curve=0.97 with $p<0.0001$**
 **Sensitivity: 91%**
 **Specificity: 96%**



ECA Acceptability:
AES mean : 24.8 (SD=4.2)
QAB:
•Acceptable: 88.9%      •Friendly: 91.6%
•Easy to use: 98.1%     •No boring: 87.9%
•Pleasant: 89.8%        •No tired: 98.1%

## Discussion

Good performance of ECA for screening of tobacco problematic use:
→ Very high internal consistency
→ Very informative screening value of the test
→ Very good ECA acceptability

## Perspectives

Test ECA for others substances and behavioral addictions
Apply this ECA for systematic screening in general medical care and also general population surveys

## Contacts

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