TOWARDS A MULTIDIMENSIONAL ASSESSMENT OF APATHY IN NEUROCOGNITIVE DISORDERS

COBTEK - COGNITION BEHAVIOUR TECHNOLOGY RESEARCH UNIT, UNIVERSITE CÔTÉ D’AZUR, NICE, FRANCE,

NATIONAL INSTITUTE FOR RESEARCH IN COMPUTER SCIENCE AND AUTOMATION (INRIA), SOPHIA ANTIPOLIS, FRANCE

MONDAY, JULY 15, 2019

ALZHEIMER’S ASSOCIATION INTERNATIONAL CONFERENCE (AAIC)

APATHY:

- Definition: Quantitative reduction of goal-directed activities in 3 dimensions: Behavior/cognition, Emotions, Social Interactions (Robert et al., 2018)

WHY APATHY?

In MCIs, apathy may be associated with faster cognitive and functional decline (Starkstein et al., 2006, Robert et al., 2008).

In 2019, Ruthirakuhan and colleagues confirmed an increased risk of developing Alzheimer’s disease in MCI patients with apathy or Apathy + depression (n= 4932)

"The diminishing association between apathy and dementia with longer follow-up suggests apathy is predominantly prodromal to dementia rather than a causal risk factor; the risk regressing to the mean over time" (van Dalen et al., 2018).

In MCI, apathy may be associated with faster cognitive and functional decline (Starkstein et al., 2006, Robert et al., 2008).

In 2019, Ruthirakuhan and colleagues confirmed an increased risk of developing Alzheimer’s disease in MCI patients with apathy or Apathy + depression (n= 4932)

"The diminishing association between apathy and dementia with longer follow-up suggests apathy is predominantly prodromal to dementia rather than a causal risk factor; the risk regressing to the mean over time" (van Dalen et al., 2018).
CLASSICAL ASSESSMENT

Clinical scales
- Apathy Evaluation Scale (AES-S/I/C) - Marin et al. (1991)
- Apathy Scale (Starkstein et al. 1992)
- Neuropsychiatric Inventory (NPI) - Cummings et al. (1994)
- Philadelphia Apathy Computerized Task (PACT) - Fiits et al. (2016)
- Dimensional Apathy Scale (DAS) - Radakovic & Abrahams (2014)
- Apathy motivation index (AMI) - Ang et al. (2017)

Technologies
- Eyetracking - Chau (2016)
- Actigraphy - David et al. (2012)
- Philadelphia Apathy Computerized Task (PACT) - Fiits et al. (2016)
- Apathy inventory - Robert et al. (2002)
- Dementia Apathy Interview and Rating (DAIR) - Strauss & Sperry (2002)
- Lille Apathy Rating Scale (LARS) - Sockeel et al. (2006)
- Irritability-Apathy Scale (IAS) - Burns et al. (1997)

GLOBAL ACTIVITY ANALYSIS

CLASSICAL interview
If inclusion criteria are met
Start recording

Experimental protocol
Stop recording

Digital Phenotyping
Inscribed by Insel (2017)
**SENSOR-GLOBAL ACTIVITY ANALYSIS**

Population: 48
Diagnostic: Major vs Minor NCD
Apathy evaluation: ADC, 2018

No significant differences between apathetic and non-apathetic subjects were found.

**SENSOR-SPEECH ANALYSIS STUDY**

**Study 1**: N=60 (50% apathetic); Minor and Major NCD; Apathy assessment: Apathy inventory

Results: Emotional blunting is correlated with prosody features. Behavioral domain was more correlated to temporal features (pauses, slow rate etc.).

**Study 2**: N=52 (50% apathetic); Minor and Major NCD; Apathy assessment: Apathy inventory

Results: The apathy group uses less emotional language than the control group.
QUANTITATIVE ASSESSMENT OF INTERESTS

Interest

If the answer is YES, the subject has to choose the images that he is interested in.

Scores

Link to the application: [http://www.innovation-alzheimer.fr/motap-2/](http://www.innovation-alzheimer.fr/motap-2/)

SUMMARY

- The MNC project attempts to integrate sensors and novel behavioral tasks to assess apathy.
- The use of audio sensors in a spontaneous expression task makes it possible to differentiate apathetic and non-apathetic subjects.
- The use of a questionnaire presented in an interactive and playful form to find out about patients’ interests makes it possible to distinguish apathetic patients from non-apathetic.
- Future work: Fusion of Multimodal data