CLINICAL MANIFESTATIONS

POSTER PRESENTATION

Dementia vs Depression : new methods for differential diagnosis using automatic speech analysis

Céline Labbé[1] | Alexandra König[2,3] | Hali Lindsay[4] | **Nicklas Linz**[5] | Johannes Tröger[6] | Philippe Robert[7]

[1]Pasteur Psychiatric Hospital, University Cote d'azur, Nice, France

[2]CoBTeK (Cognition Behaviour Technology) Research Lab, University Côte d'azur, Nice, France

[3]National Institute for Research in Computer Science and Automation (INRIA), Sophia Antipolis, France

[4]German Research Center for Artificial Intelligence, Saarbrücken, Germany

[5]ki elements UG, Saarbrücken, Germany

[6]ki elements, Saarbrücken, Germany

[7]Université Côte d'Azur, Cognition Behaviour Technology Lab (CoBTeK), Nice, France

Correspondence
Nicklas Linz, ki elements UG, Saarbrücken, Germany.
Email: nicklas.linz@ki-elements.de

Abstract

Background: Depression is a very frequent pathology among elderly people. Depressive symptoms are common in neurocognitive disorders which can make it challenging to timely detect and diagnose them. Indeed, there is a high comorbidity of early-stage dementia and late- life depression. There are only a few diagnostic tools that help support differential diagnosis. Speech analysis and the extraction of vocal and linguistic markers could be a non-invasive new method to support this process.

Methods: In this pilot study, we included 12 female patients aged over 60 diagnosed with depression without a neurodegenerative disease or other psychiatric disorders. Clinical assessments include the MMSE, MADRS, EGF and ADC. They were asked to perform two short cognitive vocal tasks: a verbal semantic fluency (SVF) and a short narrative task (positive/negative storytelling) which were recorded. Then, in a second step, vocal and prosodic features were extracted from the audio files using machine learning methods. In a final step, we compared these features to those from a cohort of 9 matched patients with Mild Cognitive Impairment (MCI) diagnosis without any mood disorder and 21 matched controls.

Results: A non-parametric kruskal-wallis and BH-adjusted post-hoc wilcox test analysis revealed a statistically significant ($p<0.05$) lower word and semantic switch count for MCI compared to depression in the SVF. Linear mixed effects models were used to evaluate 18 prosodic features from the narrative speech task. Four features were significant between diagnoses; sound to noise ratio, delta deltas and deltas were significantly different for the depressed group in comparison to HC and MCI; total phonation time was longer for depressed patients than MCI patients in the negative story.

Conclusion: Automatic analysis of vocal tasks such as semantic verbal fluency and storytelling could be a fast solution for supporting early characterization of patients. Certain types of extracted speech features show different patterns and namely prosodic features should be further explored. To conclude, this new method could serve as an objective assessment tool for differentiating depression from mild cognitive impairment.