Glossolalic and metaphoric texts as tools for facial expression analysis in stroke patients

Stroke is a leading cause of disability in the population over 50 years of age. Aphasia reported in 30-40% of patients who have experienced a first-ever ischemic stroke underscores the profound impact that strokes can have on language function. Some post-stroke patients present rapid language recovery; others are faced with more taxing rehabilitation processes. There are no reliable methods to predict individual recovery profiles. With this understanding, we conducted a study on facial expressions during the acute phase of stroke.

All stroke patients underwent standard treatment, neurological examination, neuroimaging, logopedic assessment, and psychological examination with cognitive function evaluation in the Stroke Center. During the day 4th to 7th after stroke onset, the patients were exposed to:

a/ glossolalic text ("Namopanik Barwistamu" a poem by Alexander Wat). Wat was the precursor of the Polish futurism movement. "Namopanik" is the genre created by the poet. The one contains words related to "colors."

b/children's poem (Julian Tuwim's–"Lokomotywa"). Every Polish child has had contact with Tuwim's poem; thus, it usually evokes a positive emotional reaction.

c/ metaphoric text ("Barwy ziemi" by Halina Frąckowiak) – a popular song in which metaphors related to colors appear.

d/ plain text- a description of microbiological staining-that contains words related to colors and stains.

The audio file patients were exposed to contained recitations of texts, separated by 1-minute intervals of white noise to enable recovery after text exposition and monitor baseline reactions. During the total time of exposition, patients' reactions were video recorded. Facial expression analysis included facial action units (AU) evaluated using The Facial Action Coding System (FACS). We evaluated Main AU, Head Movement AU, Eye Movement AU. The combination of AU enables the detection of emotions: happiness/joy, sadness, surprise, fear, anger, disgust, and contempt.

We will present the facial expression analysis in stroke patients in response to different types of texts as clinically helpful tools. It allows non-intrusive and natural emotion measurement, capturing emotional expressions in real time without requiring patients to report their feelings verbally or in writing. Moreover, facial coding generates numerical data and enables statistical analyses and tracking of emotions over time.

In conclusion, we will present a tool that may help monitor stroke patients over time and understand the trajectory of language recovery and the efficacy of different therapeutic interventions. Such an approach may overcome the challenges posed by aphasia after a stroke by integrating treatment, personalized rehabilitation, and psychological support.

Key words: stroke, facial expression analysis, metaphoric text, glossolalic text