

Markers of Alzheimer's disease in handwriting as early indication of its severity

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The established methods of early diagnosis of Alzheimer's disease are very expensive and often inaccessible. The authors consider handwriting analysis as one of potential tools. Handwriting markers can be a warning signal for a serious medical investigation. They are as well a good indicator of the progression of the disease and effectiveness of a therapy. Handwriting is a natural activity that involves both fine motor skills and cognitive work.

Existing handwriting tests cover mostly linguistic problems, which manifest themselves at advanced disease stages, and only very few plain handwriting characteristics. Authors have developed two tests based on an extended handwriting sign protocol. Out of over 700 characteristics, the set of 36 ones was selected. The first test (AD-HS) allows the assessment of handwriting markers of cognitive impairment and/or Alzheimer's disease. The second (AD-HC) is designed to assess the dynamics of changes by comparing two handwritten documents written at different times.

The pilot study includes 16 patients by whom the medical examination diagnosed the disease at different stages. They all provided old handwriting samples dated 10-20 years ago and new handwriting samples written for the experiment. Evaluation of handwriting signs and its generalization by means of introduced Z-factor showed that both tests were effective in identifying not only Alzheimer's disease but as well its stage. AD-HS definitely differentiates (Z-factor is statistically higher) from the average values out the database of HSDetect system with several hundreds of handwriting samples. These data served as a control group. The correlation between the handwriting analysis and the medical test result was 0.62. AD-HC demonstrated statistically significant change of handwriting signs with the progress of the disease.

Further refinement of the proposed tests could enable handwriting exercises to be incorporated into supportive therapy, which could slow the progression of the disease.

Biography

Yury Chernov has completed his PhD in Applied Mathematics in 1987 from Moscow Technical University for Oil & Gas and postdoctoral studies from the same University. Parallel to his work as mathematician and software developer he gathered over 20 years' experience in research of handwriting analysis with such application areas as forensic, psychology and medicine. He is the research director of IHS Zurich Institute for Handwriting Sciences. His major interest in this area is the development of mathematical models and corresponding computer application to make handwriting analysis formalised, objective, and transparent. He has published more than 30 books and papers to the handwriting analysis in English, German & Russian.