

Tele-Evaluation for the Handwriting performance

Sara Rosenblum and Tamar Weiss
Department of Occupational Therapy
Faculty of Social Welfare and Health Sciences
University of Haifa

rosens@research.haifa.ac.il; tamar@research.haifa.ac.il <http://research.haifa.ac.il/~rosens>

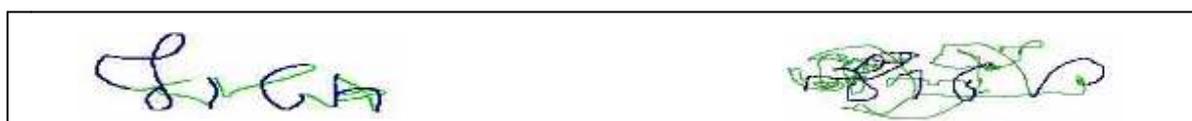
Handwriting is a complex human activity that appears to be an outward manifestation of the individual's perceptual-motor abilities¹. Collecting objective data regarding people's these abilities through handwriting performance is important for various purposes such as the classification of people into appropriate professions, refinement of certain medical diagnoses, identification of how drugs influence disease processes, educational assessment and intervention and even legal purposes. Recent developments in data collection technology now permit the examination of a much richer set of objective handwriting measures than were traditionally available. With the aid of a digitizing tablet and instrumented pen, handwriting can be monitored in real time and stored in a format amenable to sophisticated analyses of spatial, temporal and pressure measures.



ComPET (Computerized Penmanship Evaluation Tool – previously, 'POET') is a non-language dependant software developed by Rosenblum and Weiss. It constitutes one component of a computerized system for handwriting process analysis that also includes a laptop computer and a digitizer. The software is composed of two parts, one for data collection and the other for data analysis. The data analysis section is continuously being updated to achieve more detailed and wide-ranging measures of human perceptual-motor function. It is based on the integration of sophisticated analyses methods drawn from the fields of mathematics and signal processing.

Results of previous studies have revealed that the *ComPET* is sensitive to outcomes of the aging process², as well as to different phases of Alzheimer's disease.³ The system also enabled the distinction between poor and proficient handwriters⁴, children with ADHD when they are on and off medication⁵ and between children with Developmental Coordination Disorders and typically developed children⁶.

The sample shown on the left side of the figure below is from a child who is a proficient writer. The sample on the right side was written by a child with severe problems of legibility, speed, and flow. The thick lines show what actually appeared on the paper whereas the think lines show what each child "wrote" when his/her pen was in the air. It is astonishing to see how much time and effort the child with difficulties squanders in unproductive motion.



Our aim is to further develop this modular environment for the collection and analysis of handwriting samples to develop tools that will automatically extract features measuring the smoothness and quality of people's handwriting. Researchers, clinicians and human resource experts could use the digitizer to collect handwriting samples that they could then email directly to our laboratory. This data could then be automatically analyzed through these state of the art data analysis techniques and returned to the assessors for their needs.

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4. Rosenblum, S., Dvorkin, A., & Weiss, P. L. (2006). Automatic segmentation as a tool for examining the handwriting process of children with dysgraphic and proficient handwriting. *Human Movement Science*, 25, 608-621. (Special issue on Handwriting).
5. Rosenblum, S., Parush, S., Epsztein, L., & Weiss, P. L. (2003). Process versus product evaluation of poor handwriting among children with Developmental Dysgraphia and ADHD. In H. L. Teulings & A. W. A. Van Gemmert (Eds.). *Proceedings of the 11th Conference of the International Graphonomics Society*. (pp. 169-173). USA; Scottsdale Arizona.
6. Rosenblum, S., & Livneh-Zirinsky, M. Handwriting process and product characteristics of children diagnosed with Developmental Coordination Disorder (In press).