

BAR- ILAN UNIVERSITY

**Comparing Learning of Two Modalities of
a Grapho-Motor Task by Kindergarteners and Adults**

Duaa Abd ElHadi

Submitted in partial fulfillment of the requirements for the Master's Degree
in School of Education, Bar-Ilan University

Abstract

The ability to perform motor skills accurately as well as quickly is essential across all daily activities. Performance of a newly acquired motor skill is improved following training that involves repetitive practice as expressed in decreasing the time needed to complete a task while attaining a higher accuracy level (Newell & Rosenbloom, 1981). Identifying and understanding the different factors that drive this improvement is necessary for optimal performance. When learning a specific motor skill, the role of sleep and other hypothesized factors (such as time of training) as mediators for improvement had been investigated and clarified in a recent meta-analysis (Pan & Richard, 2015). The modality of performing the task was administered as a secondary variable, but no significant effect was attributed to it. To date, very few studies have examined differences in motor learning by comparing different modalities, reporting mixed findings (Raviv & Arnon, 2018; Vakil, Bloch, & Cohen, 2017). Moreover, processes of learning are being executed today using different techniques and operating through different modalities. Furthermore, transfer, which refers to the ability to extend what has been learned in one context to new contexts, is central for learning (Bransford, Brown, & Cocking, 1999), but gained less attention. Different learning experiences may result in either an effective or in a poor transfer. Hence, investigating the underlying processes that lead to the acquisition and transfer of skills, including from one modality to another, are important to understanding how people, specifically children, develop the ability to function competently in motor tasks, which may have educational implications.

The aim of the current study was to compare in kindergarten children and in adults, the learning, consolidation 24 h post-training, and retention two weeks post training, of a motor learning task- the Invented Letter Task- between two modalities of acquisition: pen versus finger using an iPad. At retention testing, the study assessed transfer to the different modality.

Seventy-four participants from two age groups: 36 kindergarteners and 38 adults aged 17-30, were recruited. Each practiced a motor learning task, in which they were asked to repetitively connect 3 dots to produce an "invented letter", by using finger or digital pen on iPad surface. The participants were tested at three phases: training, consolidation 24 h post-training and, retention two weeks post-training. At retention testing, they were required to perform the task by switching modality to test transfer ability. Speed as well as accuracy performance were measured.

The findings indicate that gains in performance speed were exhibited by the two age groups alike, while maintaining accuracy. However, as proposed, kindergarteners have improved at a superior rate than adults due to a poorer initial performance level. A modality-based difference was demonstrated as well, indicating that both kindergarteners and adults have performed faster, at training, when using their finger compared to a pen. As opposed to our assumption, no consolidation gain differences appeared between the two modalities in the two age groups. With regard to transfer, age-dependent differences have been shown, revealing no difference in transfer between the two modalities among adults, whereas among kindergarteners, transfer of the gains occurred only when pen learning was transferred to the finger modality. Transfer results were interpreted on the background of differences in familiarity with the modalities and in skill level.