Evaluating Practice Trials for Stable Performance in Manual Dexterity Assessments

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Summary

This study examines the practice effect in manual dexterity assessments using the Nine-Hole Peg Test (NHPT) and the Grooved Pegboard Test (GPT). Results indicate that the number of practice trials required to achieve stable performance varies depending on the test and hand dominance. The findings highlight the importance of providing sufficient practice trials to ensure accurate dexterity assessments.

Introduction

Manual dexterity is essential for daily tasks, enabling individuals to skillfully manipulate small objects and perform fine motor tasks. Various standardized tools have been developed [1] and widely adopted in the healthcare field to assess dexterity. However, the extent to which practice influences performance outcomes remains unclear. Initial poor performance may result from task unfamiliarity rather than actual dexterity limitations, leading to potential misinterpretations that could impact subsequent intervention decisions. To address this gap, this study examines how many practice trials are required before individuals achieve stable performance, ensuring that assessments more accurately reflect true motor capabilities.

Methods

This study investigated the practice effect in manual dexterity assessments using the Nine-Hole Peg Test (NHPT) and the Grooved Pegboard Test (GPT). Both tests evaluate dexterity by requiring individuals to manipulate small pegs within designated board holes. The NHPT measures the time required to transfer pegs between a container and the pegboard. Pegs are sequentially placed into nine holes and then removed in the same order. The GPT records the time spent placing pegs into 25 designated slots, requiring each peg to be retrieved from a container and rotated to match the groove orientation before insertion.

The participant completed ten trials for each test, with separate trials for the dominant and non-dominant hand. Performance trends were analyzed through graphical analysis, comparing variations between trials to determine the point at which stable performance was achieved.

Results and Discussion

For the NHPT, dominant-hand performance became steady after the third trial, requiring two practice attempts. However, a drop in performance was seen in the eighth trial, meaning the time taken to complete the task increased. This may suggest changes in control over the task, possibly due to factors such as mild fatigue or reduced focus. The non-dominant hand became steady from the second trial but showed a dip in the fifth trial. This suggests that the number of practice trials may have had a limited impact on improving non-dominant hand performance. The earlier decline in performance suggests greater variability in control, making consistent performance harder to sustain.

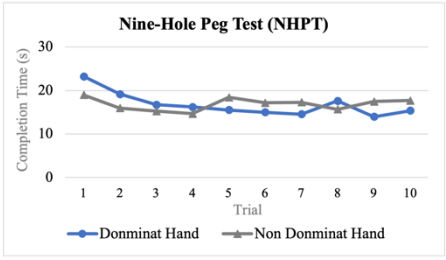

Figure 1: Performance of the Nine-Hole Peg Test across trials.

For the GPT, performance with the dominant-hand stabilized after the fifth trial, whereas the non-dominant hand required one additional practice trial, becoming steady after the sixth.

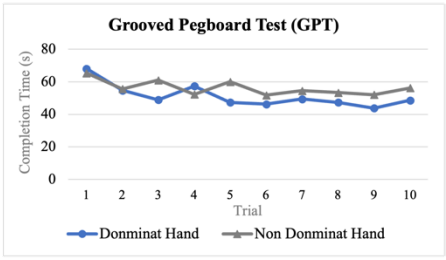

Figure 2: Performance of the Grooved Pegboard Test across trials.

These differences may relate to task difficulty. The NHPT, with larger pegs and simple placement, needed fewer practice trials. In contrast, the GPT, with 25 smaller pegs that had to be rotated before placement, required more practice to reach a steady level. The varying performance patterns observed across tests and between hands suggest that each condition may require a specific number of practice trials to achieve stable performance.

Conclusions

This study found that the number of practice trials needed for stable performance varies by test and hand dominance, highlighting the need for adequate practice trials to ensure accurate dexterity assessments. Further data collection is underway to enhance objective validation and insights.

Acknowledgments

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References

[1] Yancosek, K. E., & Howell, D. (2009). A narrative review of dexterity assessments. Journal of Hand Therapy, 22(3), 258-270