The Effects of Learning on Cognitive Fatigue in MS

Hoffnung, G. [1]; Vissicchio, N.A.[1]; Portnoy, J. [1]; Pasternak, E. [1]; Glukhovsky, L.[1]; Picone, M.A. [2]; Foley, F.W.[1,2]

[1]Ferkauf Graduate School of Psychology, Yeshiva University, Bronx, NY; [2]Holy Name Medical Center, MS Center, Teaneck, NJ

Abstract

Purpose: Studies show that cognitive fatigue is very common in people with multiple sclerosis (MS). It is unclear whether the effect of cognitive fatigue can be counteracted by learning, so the present study examined the relationship between learning and cognitive fatigue in an MS population.
Method: 38 individuals with MS were recruited through the MS Center at Holy Name Medical Center in Teaneck, NJ. Participants were administered two trials of a cognitive task to measure learning and cognitive fatigue. Analysis of Variance (ANOVA) was conducted to determine the relationship between cognitive fatigue and learning.
Results: The task revealed a significant effect of cognitive fatigue, with a decrease in performance towards the end of the cognitive task in both trials. Performance on trial 2 improved, showing evidence of learning. However, cognitive fatigue was not affected by learning.
Conclusions: Cognitive fatigue may be resistant to the effect of learning.

Background

➢Multiple Sclerosis (MS) is a neurodegenerative and inflammatory chronic disease of the central nervous system, characterized by substantial impacts on physical, cognitive, and psychological functioning [1].

➢Approximately 40 – 65% of MS patients have cognitive impairments, especially in areas of memory, sustained attention, and information processing speed [2].

➢Fatigue and cognitive fatigue are typical symptoms in MS, characterized by limited endurance of sustained physical and mental activities [3].

➢Learning visually presented information has been shown to improve task performance [4].

➢Past research has shown that learning does not counteract the effect of fatigue in MS as it does in controls [5].

Methods

Procedures

➢ 38 participants diagnosed with MS were recruited to participate in the study from the MS Center at Holy Name Medical Center in Teaneck, NJ.

Measures

➢ The Symbol Digit Modalities Test (SDMT) is an orally administered task where the participant is given 90 seconds to match a series of numbers with their appropriate symbols. This has been a very sensitive measure for detecting cognitive impairment in MS.
➢Each participant was administered the SDMT twice with approximately 3 to 5 minutes between each administration.
➢Cognitive fatigue in this study is being operationalized as the difference in performance on the SDMT between the first 30 seconds (30") and the final 30 seconds (90") .
➢Learning is operationalized as performance on administration two as compared to administration one.

Statistical Analyses

➢ T-Test was conducted to determine if there was an effect of cognitive fatigue within test administrations and an effect of learning between administrations.
➢ Mixed-design between x within analysis of variance (ANOVA) was used to compare cognitive fatigue between the two administrations to determine if learning had an impact on cognitive fatigue.

Results

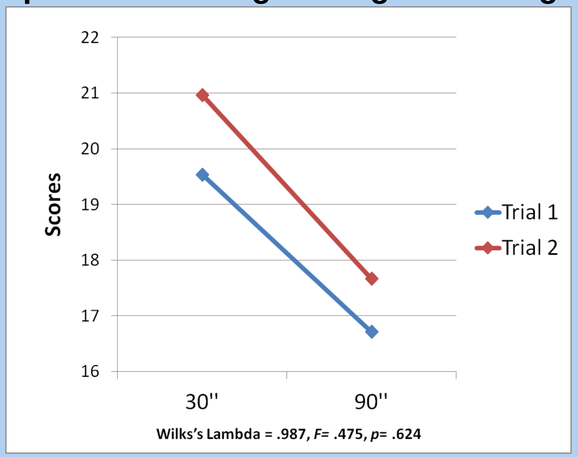
➢Effect of cognitive fatigue was observed comparing 30" and 90" for both trial 1 (t= 6.799, p< .001) and trial 2 (t= 8.783, p< .001).

➢Comparing total scores for the two trials revealed a significantly improved performance on the second trial than the first trial (t= -5.408, p< .001), which is likely due to the effect of learning.

➢Both 30" (t= -4.498, p< .001) and 90" (t= -2.697, p= .011) scores were significantly higher on the second administration when compared to the first administration, which is further evidence for learning.

➢Between x within ANOVA was not significant (Wilks's Lambda = .987, F= .475, p= .624), implying that cognitive fatigue had a similar effect on trials 1 and 2 and was not influenced by learning (see graph to the right).

Impact of Learning on Cognitive Fatigue



Conclusions

➢Results from the SDMT revealed a significant effect of cognitive fatigue on task performance.

➢Participants appeared to learn about the task as demonstrated by improved performance on trial 2.

➢Examining the slopes on the graph and the results of the ANOVA, it appears that cognitive fatigue affected performance similarly on both trials, which implies that learning did not have an effect on fatigue.

Implications

➢Cognitive fatigue appears to be operating independently of learning.

➢Individuals with MS that attempt to learn a task via repetition may still experience the effects of cognitive fatigue after learning has occurred, manifested by a reduction in performance towards the latter stages of the task.

References

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