Memory Performance in Special Forces: Speedier Responses Explain Improved Retrieval Performance after Physical Exertion

Maarten van der Velde
University of Groninngen, Groningen, Netherlands

Florian Sense
University of Groningen, Groningen, Netherlands

Jelmer Borst
University of Groningen, Groningen, Groningen, Netherlands

Ruud Den Hartigh
University of Groningen, Groningen, Netherlands

Maurits Baatenburg de Jong
Ministry of Defence, Roosendaal, Netherlands

Hedderik van Rijn
University of Groningen, Groningen, Netherlands

Abstract

Performance on cognitive tasks is typically affected by many factors simultaneously. For example, performance on a retrieval practice task is determined not only by memory encoding and retrieval processes, but also by motor processes, executive functions, affective state, etc. Often, these contributing processes also vary over time. This makes it challenging to attribute performance changes to a single mechanism, especially in real-world settings.

Here we analyse performance data from multiple retrieval practice sessions completed by special forces trainees before and after a high-intensity speed march. Learning outcomes improved from session to session, which suggests increased memory function. However, a linear ballistic accumulator fitted to the data showed that changes in non-memory processes—a decrease in non-retrieval time in particular—sufficed to explain the observed improvements.

This work demonstrates that even with a simple task, assuming that performance changes are attributable to a single cognitive process can lead to erroneous conclusions.