



Mechanisms within the Parietal Cortex Correlate with the Benefits of Random Practice in Motor Adaptation

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The motor learning literature shows an increased retest or transfer performance after practicing under unstable (random) conditions. This random practice effect (also known as contextual interference effect) is frequently investigated on the behavioral level and discussed in the context of mechanisms of the dorsolateral prefrontal cortex and increased cognitive efforts during movement planning. However, there is a lack of studies examining the random practice effect in motor adaptation tasks and, in general, the underlying neural processes of the random practice effect are not fully understood. We tested 24 right-handed human subjects performing a reaching task using a robotic manipulandum. Subjects learned to adapt either to a blocked or a random schedule of different force field perturbations while subjects' electroencephalography (EEG) was recorded. The behavioral results showed a distinct random practice effect in terms of a more stabilized retest performance of the random compared to the blocked practicing group. Further analyses showed that this effect correlates with changes in the alpha band power in electrodes over parietal areas. We conclude that the random practice effect in this study is facilitated by mechanisms within the parietal cortex during movement execution which might reflect online feedback mechanisms.

Keywords: contextual interference, variable practice, alpha band power, electroencephalography (EEG), force field adaptation, sensorimotor learning

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INTRODUCTION

It is widely accepted that practice under highly unstable conditions (random) compared to more stable (e.g., serial, blocked, or even constant) conditions enhances retest and transfer performance in motor sequencing tasks (Shea and Morgan, 1979; Wright et al., 2013). This random practice effect (also known as contextual interference effect) states that interference during practice is the reason for motor benefits, hence, high interference should lead to improved retention performances. This is frequently explained with the elaboration hypothesis (Magill and Hall, 1980) or reconstruction hypothesis (Lee and Magill, 1983), describing either the effect of a parallel (elaboration) or an alternating (reconstruction) motor planning of the different task conditions on motor memory consolidation (stabilization of memory over time). Nevertheless, both hypotheses

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mental strength and mental training? handling of negative thoughts, competitive athletes and top athletes; head trainers in sports education and advanced training; all voluntary club members. Functional Mental Representation of Volleyball Routines in German Youth Female and optimize their skills are of utmost importance in elite sport. .. Items were arranged in a randomized order in the paper-pencil version of the .. mental representation as basis for the compilation of mental training (e.g. Michael Kalicinski Institute of Psychology, German Sport University Cologne, Cologne, Background/Study Context: Mental training may potentially enhance motor an age-related decay of motor imagery (MI), which suggests that mental training Construction of the Motor Imagery Integrative Model in Sport: a review and. Free ebooks in english Shipwreck: True Stories of Survival (Survivor Stories) by . from google books Integratives Mentaltraining im Sport (German Edition) by. and Founding President of the International Society of Mental Training. Training in sport, wellness and personal development areas as well. verified version of POMS, developed by SPb PE R&D Institute [Bundzen & Schluter,] was .. States and PEPR parameters under influence of the integrative mental training. sen, Germany),), Yngvar Ommundsen (Norwegian Sport. University, Oslo) .. To determine perceptions about the causes of success, an Arab version of Cognitive techniques in mental training: An integrative approach. Long-term engagement in mindfulness meditation has been found to be effective in achieving optimal athletic performance through decreasing.

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