

Memory in Bouldering

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Introduction

Domain-specific memory skills are crucial in bouldering [4] to recall the climbing holds and movements of previously climbed boulders, to develop suitable ascent strategies after failed climbing attempts, and to mentally visualise movement sequences. As in other sports [1], motor actions in bouldering necessitate the integration of task-relevant information processed in short-term memory with movement patterns stored in long-term memory [3].

Method

We examined the extent to which bouldering expertise is associated with the memorisation and subsequent recall of climbing holds and movements. 60 male athletes with intermediate ($n = 20$), advanced ($n = 20$), or elite ($n = 20$) bouldering skills were exposed to a climbing task set up on a specific bouldering wall (i.e., spray wall) with numerous climbing holds. A bouldering expert performed a practical demonstration of the task using a specific sequence of climbing holds, and participants were instructed to memorise the climbing holds and movements performed by the expert. Once participants felt familiar with the task or at the latest when a two-minute rehearsal period had elapsed, they were asked to name aloud the climbing holds belonging to the task and to simultaneously indicate them with a stick. Likewise, they had to verbally describe the climbing movements demonstrated by the expert.

Results

Elite athletes were characterised by shorter rehearsal times to process the task (43.5 s) and a better recall of the climbing movements (7.9 moves) than advanced (85.4 s, $p < .001$, $r = .70$; 6.1 moves, $p < .001$, $r = .83$) and intermediate (106.5 s, $p < .001$, $r = .90$; 3.5 moves, $p < .001$, $r = .94$) athletes. Similarly, linear regression revealed a positive effect between the participants' bouldering skills and the number of climbing holds ($R^2 = .48$, $p < .001$) and movements ($R^2 = .76$, $p < .001$) they recalled following the rehearsal period.

Discussion

Drawing on our observations, bouldering expertise relies on movement repertoire [3], allowing experts to better process sensory input, decode task-specific information, and interpret movement demands than less experienced athletes. Additionally, extensive movement patterns stored in long-term memory positively affect short-term memory [2] and thus recall capacity in expert climbers. We believe that experienced climbers are better at comparing perceived stimuli with patterns stored in long-term memory, recognising familiar patterns, and clustering perceptual stimuli into a kind of climbing choreography comprising a series of climbing holds associated with action. We provide practical implications for developing long-

term memory movement patterns through deliberate practice, and illustrate how deliberate coaching accounts for limited storage capacity of short-term memory.

References

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Short Biography

Jerry Medernach completed his PhD at the German Sports University in 2015, where he is currently pursuing his post-doctoral studies. His current research focuses on perceptual and cognitive processes in indoor bouldering. He is a qualified physical education teacher and climbing coach (EQF 6), and is responsible for conceptualising educational programmes at the National School of Physical Education and Sports in Luxembourg.