Lifting in an Alternate Reality: The Application of Action Observation Within Virtual Reality and Weightlifting

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ABSTRACT

Action observation (AO), where a learner watches a model perform a skill, has long been shown to facilitate motor learning of a variety of skills. There is great interest in learning ways to optimize the AO experience in order to maximize motor learning. In recent years, virtual reality (VR) technology has advanced considerably, where high-fidelity environments can facilitate a fully immersive experience. As such, the three-dimensional (3D) VR experience could allow for improved learning through AO over more traditional forms (e.g., watching a computer screen). **PURPOSE**: The purpose of this study is to determine how well people learn a novel exercise via AO through use of VR headsets, compared to computer-screen-based AO. **METHODS**: 15 participants (18-65 years old) who were novices to Olympic lifting were recruited for this study. Participants were randomly assigned into 1 of 3 groups: a control (looking at a poster describing the activity), 2D video, and 3D/VR group. Initially, participants observed a sequencing poster depicting the clean-and-jerk (C&J) and then completed the C&J using a 10-lb bar without further instruction. Participants were then asked to engage in AO using their assigned format, where they watched an expert perform the C&J. Afterwards, each individual repeated the exercise for 5 reps. This process was repeated 4 more times. 2 retro-reflective markers are placed on the ends of the bar. During baseline, training, and post-training, 3D coordinate data were collected at 150 Hz from an 8-camera motion capture system. **RESULTS**: Bar kinematics were analyzed for pre and post lifts, including horizontal displacement (HD), time to completion (TTC), and peak bar velocity (PBV). Preliminary trendsindicate that the control group (HD: +.02m, TTC: -2.15s, PBV: +.34m/s), 2D group (HD: +.06m, TTC: +.95s, PBV: +.37m/s), and 3D group (HD: +.09m, TTC: -2.49s, PBV: +.54m/s) all exhibited altered bar kinematics following AO relative to baseline. **CONCLUSION**: Results revealed the 3D group has the greatest improvement when comparing pre and post lifts. While, the 2D group had the absolute best improvement overall. Additionally, all three groups increased their horizontal displacement when comparing the pre and post lifts. Overall, preliminary results suggest VR improves learning, although 2D producing the best results.