Consistent backswing crucial in helping sportspeople produce optimum results

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Golfers wanting to shoot below par or tennis players looking to smash their way past opponents should focus on their backswing in order to

perfect new techniques quickly, research suggests.

Academics at the University of Plymouth and the Technical University of Munich assessed the speed at which people learned the basic skills which allowed them to achieve consistent results.

They showed that those who were able to perform consistent lead-in motions were able to perfect their techniques twice as quickly as those who couldn't.

The study, published in *Scientific Reports*, was led by Dr Ian Howard, Associate Professor (Senior Lecturer) in Computational Neuroscience within Plymouth's Centre for Robotics and Neural Systems.

He has previously led research which showed the nature of the follow-through has significant influence on the extent to which new skills are acquired.

As well as having implications in sport, researchers believe the current results could have implications for both skill learning and movement rehabilitation following neurological conditions, since it demonstrates that any immediately preceding movement needs to be consistent to achieve fast learning.

Dr Howard, who worked on the research with Plymouth colleagues Christopher Ford and Professor Angelo Cangelosi, said: "Rapid learning can be critical to ensure elite performance in a changing world or to recover basic movement after neural injuries. And while learning a new skill such as golf or tennis takes considerable practice, the rate at which we can compensate for environmental changes and learn new skills plays an important role in our performance. This research shows the final (or main) movement is only one part of the learning process and that generating a consistent lead-in allows us to learn new skills faster."

For the research, participants were asked to make two successive movements (a lead-in movement followed immediately by the main movement) while grasping the handle of a robotic device.

A second experiment then examined if watching a computer-generated lead-in movement before actively performing the main movement would have the same effect.

In both experiments, researchers found that increasing the variability of the active lead-in movements produced a large decrement in learning rate, whereas a corresponding increase in variability in visual lead-in movements did not.

This, they believe, has demonstrated for the first time that increasing active lead-in variability reduced the rate of motor adaptation, whereas changes in visual lead-in variability had little effect.

David Franklin, Professor of Neuromuscular Diagnostics in the Department of Sport and Health Sciences at the Technical University of Munich, added: "These findings may also have implications for stroke rehabilitation, where fast relearning, or recovery of movement, is desired, but this also needs to be balanced with generalization to everyday tasks."

More information: Ian S. Howard et al, Active lead-in variability affects motor memory formation and slows motor learning, *Scientific Reports* (2017). DOI: 10.1038/s41598-017-05697-z

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