Medical Xpress

The ace perceptual skills of tennis pros

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Tennis Grand Slam season is upon us once again with the French Open already over, and Wimbledon hot on its heels later in the month. Past studies have shown that tennis players outperform non-players at anticipating which shots will be played by their opponents and at quickly deciding what to do next under pressure but do Roger Federer and his fellow tennis players also benefit from better-developed visual information processing skills than non-players?

Reporting in a study in this week's *PLoS ONE*, Leila Overney and colleagues at the Ecole Polytechnique Federale de Lausanne (EPFL) in Federer's home country of Switzerland found that tennis players are often better than the rest of us at certain time-related, perceptual skills, such as speed discrimination.

In sports like tennis, having superior visual skills gives players a real advantage. In previous studies, tennis pros have been shown to perform consistently faster and more accurately than novices at skills like the anticipation of the ball's direction. In sports research, the cognitive tasks used are generally sport-specific. For example, tennis players' visual anticipation skills are tested with videotapes of expert tennis players performing serves or ground strokes.

In this new study, Overney and colleagues used perceptual rather than cognitive tasks, which were unrelated to tennis – or, indeed, to sport. The researchers set out to determine whether playing tennis improves only specific aspects of visual perception that are beneficial in a game of tennis (such as tennis ball speed estimation) or whether more basic

perceptual skills, such as speed detection – which can be improved with training but which aren't specific to one sport – are also improved.

The researchers compared the performance of skilled tennis players to that of non-athletes, as well as to a group of other athletes (triathletes) to ensure any potential differences could be linked to tennis (or at least to racket sports) rather than to sport in general or to being in better physical shape. They carried out seven visual tests, covering a wide range of perceptual functions including motion and temporal processing, object detection and attention, each requiring the participants to push buttons based on their responses to the computer-based tasks and each related to a particular aspect of visual perception.

Tennis players must react quickly in a fast-paced environment and so participants were tested on three temporal tasks. For example, to evaluate the participants' speed discrimination ability, they were asked to watch two displays of moving dots and select which display contained the faster-moving dots. Tennis players performed the best, primarily when the dots were expanding (simulating movement towards the participant) rather than contracting or rotating, which was expected given that tennis players often see balls coming towards them at high speeds. Speed discrimination could, then, be a fundamental skill that is influenced by tennis playing.

In another task, which investigated the participants' ability to detect coherent motion within a field of randomly moving dots, the tennis players also performed more accurately (although they weren't faster) than the non-players, which was expected given the need for tennis players to focus on ball trajectories. These tasks didn't involve a tennis-related context, suggesting that these are generalised, underlying skills rather than tennis-specific abilities.

One of the two object-based tasks that were conducted required the

participants to spot the presence or absence of a tennis ball in either a tennis-based scene (the 2005 Roland Garros tournament) or a non-tennis-based scene (landscapes or other sports scenes). Tennis players were much more accurate at spotting the ball in the tennis scenes, although not in the others. This supports previous studies of volleyball and basketball players whose improved ball-detection ability was found only within their own sport.

Overney and colleagues concluded that some perceptual skills are positively associated with tennis playing, including speed processing, at which tennis players are often faster and more accurate. It could either be the case that tennis improves temporal processing or that better temporal processing allows people to become better tennis players. However, the effects observed were quite small, which could simply be because we all use some of these skills on a daily basis (when driving a car, for example) – tennis players are only significantly better than the rest of us at spotting tennis balls in a tennis scene, and not at spotting a cat running across the road while they are driving.

The researchers believe the study opens the way for future research in the field. Can training in these more fundamentally specific perceptual tasks improve tennis performance? Since some basic visual skills, such as motion detection and speed discrimination, can be improved with practice, training these tasks might well lead to improved tennis performance. It may be too late for Britain's Tim Henman but perhaps such training could help wannabe tennis stars of the future.

Citation: Overney LS, Blanke O, Herzog MH (2008) Enhanced Temporal but Not Attentional Processing in Expert Tennis Players. PLoS ONE 3(6): e2380. doi:10.1371/journal.pone.0002380 -- www.plosone.org/doi/pone.0002380

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