

## **Wimbledon Revisited**

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Minimax and its generalization to mixed strategy Nash equilibrium is the cornerstone of our understanding of strategic situations that require decision makers to be unpredictable. In sharp contrast to prior results based data obtained from laboratory experiments, Walker and Wooders (AER 2001) found that the serve and return behaviour of professional tennis players in championship matches is largely consistent with the predictions of mixed-strategy Nash equilibrium. This finding has received additional support from subsequent studies of both serves in tennis (Hsu, Huang, and Tang (AER 2007)) and penalty kicks in soccer (Palacios-Huerta (RES 2003), Chiappori, Levitt, and Groseclose (AER 2002)). We re-examine the findings of Walker and Wooders employing data set comprising over 300,000 serves from 3,172 tennis matches, which is approximately 100 times larger than in other studies. The large number of matches in our dataset necessitates the development of a novel statistical test to examine the joint null hypothesis that each player in our sample equates the winning probability of serves left and serves right. We show that this test is more powerful than the one introduced in Walker and Wooders. Nonetheless, our findings even more strongly support the original conclusion of Walker and Wooders that the serve and return behavior of professionals conforms remarkably closely to mixed-strategy equilibrium play, except that professionals switch their direction of serve too often to be consistent with randomness. We find that the play of women conforms less closely to equilibrium than that of men.