

Tennis at the elite level – An ITF technical centre review

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ABSTRACT

In order to fulfil its mission, the Technical Centre strives to quantify the parameters that describe the current nature of tennis at the elite level, and thus constitute 'the state of the game'. The Technical Centre's annual review of the state of the game consists of player analysis, including match statistics, and monitoring the equipment used by players.

Key words: player analysis, equipment analysis, match statistics

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PLAYER ANALYSIS

Physiology

Figure 1 shows that the average height of the top 50 women has increased by 1 cm since 2002, compared to an increase of 4 cm for the top 50 men. This increase in the average height of the men was due to the number of players over 200 cm tall that are currently active – in 2002 there were none – and a general increase in height across all 50 players (figure 2).

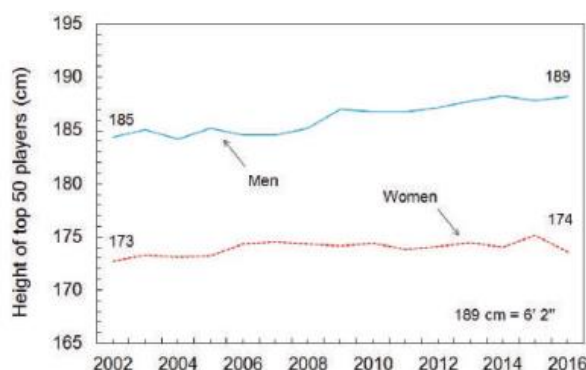


Figure 1. Average height of top 50 men (blue) and women (red).

Taller players typically have a greater arm span, which results in a higher racket head speed (for a constant swing speed), and hence faster serve. In addition, taller players are able to serve with a steeper trajectory and with a greater margin for error. In 2002, women in the top 50 were 12 cm shorter, on average,

than their male counterparts. This difference has now increased to 15 cm. The tallest woman in the current top 50 is 4 cm shorter than the average height of the top 50 men (189 cm).

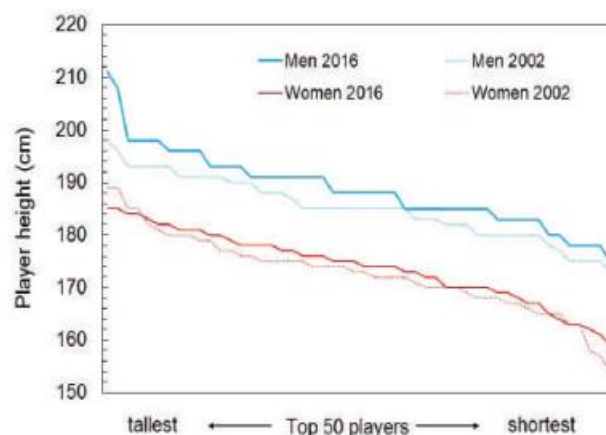


Figure 2. Individual heights of the top 50 men (blue) and women (red) in 2002 and 2016.

Figure 3 shows that since 2002 the average age of the top 50 women has increased by 2 years, while the average age of the top 50 men rose by 3 years. In 2002, few players in the men's or women's top 50 were over 30 years old. Currently, nearly half of the top 50 men are in their thirties (figure 4). This suggests that the careers of the top players are being extended and fewer younger players breaking into the top 50 than did previously.

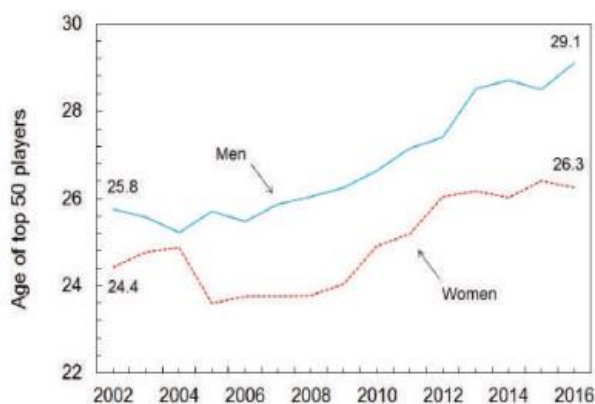


Figure 3. Average age of top 50 men (blue) and women (red).

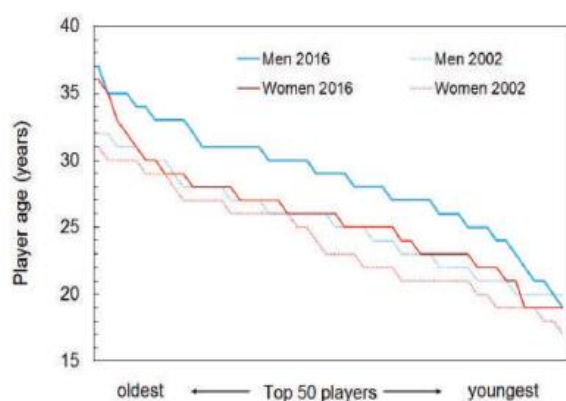


Figure 4. Individual ages of the top 50 men (blue) and women (red) in 2002 and 2016.

Serve speed and success

In both the men's and women's game, serve speed increased between 2002 and 2005, before reaching a plateau in most of the Grand Slams (figure 5). Since 2012, serve speed at the Australian Open has been increasing (for both men and women). Over the past decade, the top 20 fastest serving men served, on average, at 220 km.h⁻¹ and the women at 185 km.h⁻¹. The only major deviation from these values during this period was in the women's 2010 competition at Roland Garros, which appears to have been an anomaly (at 195 km.h⁻¹).

Figure 6 shows that the incidence of aces in the women's game has been reasonably stable since 2002. In the men's game the frequency of aces at Wimbledon has increased, and was roughly double that of Roland Garros for much of the period. Throughout the period, men served aces at twice the rate of women, which can be attributed to the 35 km.h⁻¹ average difference in serve speed between the genders. Figures 5 and 6 suggest that the increase in stature in the men's game has not greatly impacted the speed of serve, but may have influenced the numbers of aces (as the additional height could have been used to improve the placement of the serve).

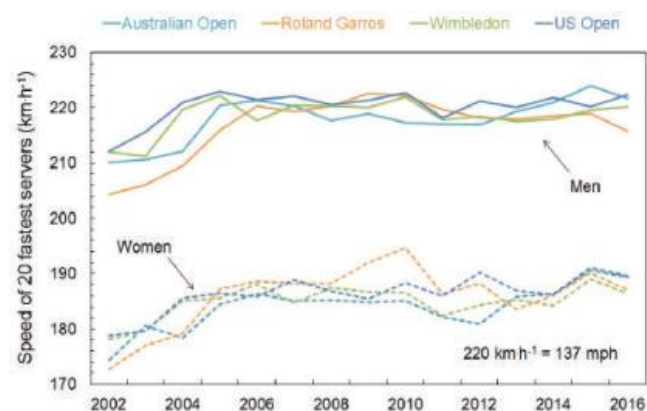


Figure 5. Average serve speed for the fastest 20 servers in Grand Slam singles.

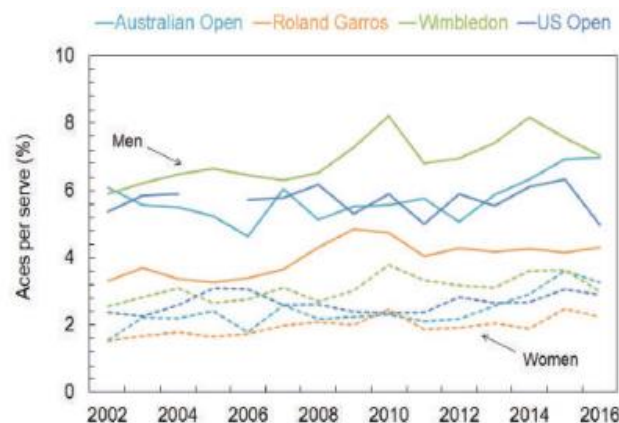


Figure 6. Percentage of aces per serve in Grand Slam singles.

The serve has been most potent at Wimbledon, which is testament to the influence of the speed of the court (figure 7).

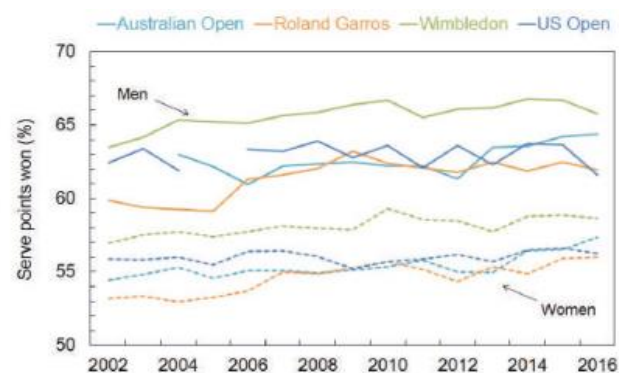


Figure 7. Percentage of points won on serve in Grand Slam singles.

The recent increase in serve speed at the Australian Open correlates with an increase in ace rate and serve points won. Surprisingly, the 10 km.h⁻¹, or so, increase in serve speed between 2002 and 2005 had little impact on serve points won

(or aces). It is also remarkable that although the aces served were less frequent at Roland Garros serve points won were comparable to those at both the Australian Open and US Open between 2006 and 2013.

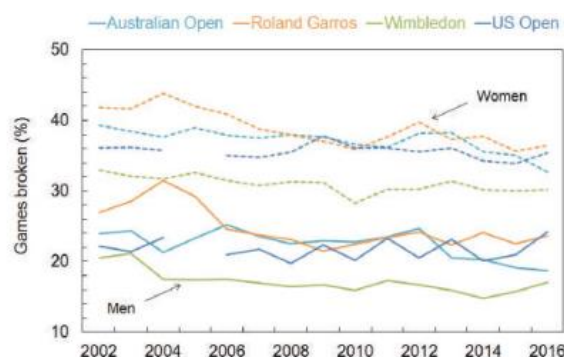


Figure 8. Percentage of games broken in Grand Slam singles.

Figure 8 shows the impact of serve points won on games broken. The serve has been less dominant in the women's game than it has been in the men's. In the past 10 years, the average percentage of games broken in men's matches has been less than 25% at all of the Grand Slams and below 20% at Wimbledon.

EQUIPMENT ANALYSIS

Rackets

Figure 9 shows the variation in strung mass of the rackets used by the top 50 men and women in 2016. The most common racket mass for both men and women was 322 g, although the men's average racket mass was 6 g heavier (325 g compared to 319 g).

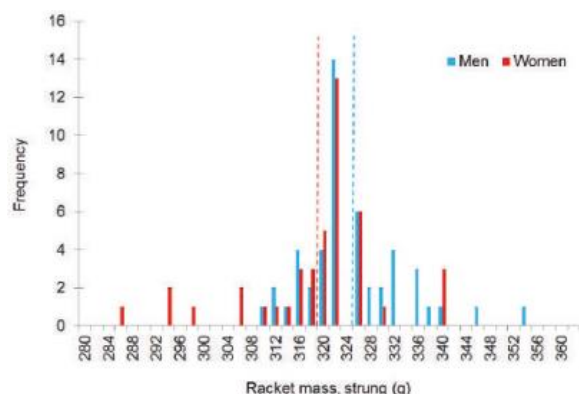


Figure 9. Distribution of strung mass for rackets used by the top 50 men (blue) and women (red) in 2016 (data from Tennis Warehouse University). Dashed vertical lines indicate the mean values for each gender.

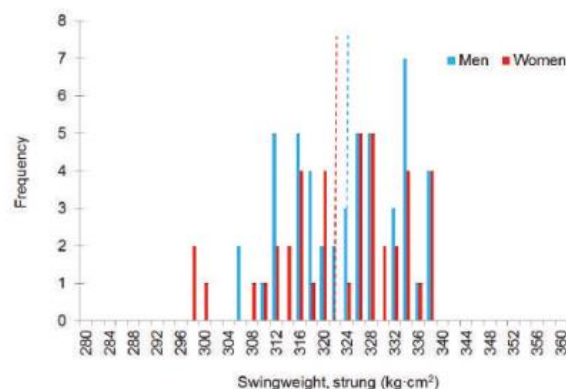


Figure 10. Distribution of strung swing weight for rackets used by the top 50 men (blue) and women (red) in 2016 (data from Tennis Warehouse University). Dashed vertical lines indicate the mean values for each gender.

There was little difference in the variation in swingweight (distribution of mass within the frame) of rackets used by the top 50 men and women in 2016 (figure 12). The average swingweight for men was 324 kg·cm², compared to an average of 322 kg·cm² for women. Greater racket mass and swingweight generate faster serve speeds (for a given swing speed).

Balls

Figure 11 shows a general trend of increasing bounce height for balls obtained from tournaments up to 2013, which would increase serve speed (all other factors being equal). However, in each of the last three years the average bounce height of tournament balls has decreased. The average bounce height of tournament balls is now the same as that for balls submitted for approval (which has typically remained close the midpoint of the specifications since 2002).

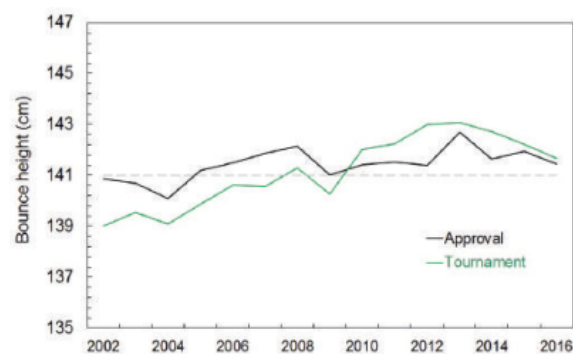


Figure 11. Average bounce height of pressurised balls for tournaments and approval. Dashed horizontal line indicates the midpoint of the specification.

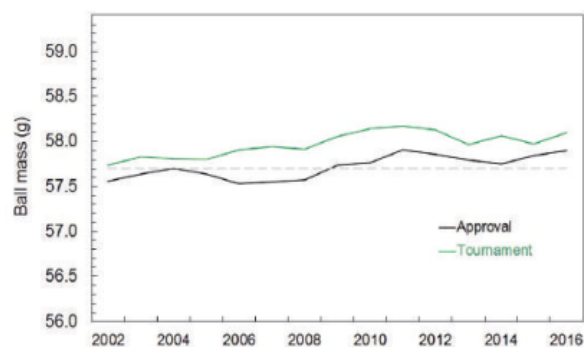


Figure 12. Average mass of pressurised balls for tournaments and approval. Dashed horizontal line indicates the midpoint of the specification.

Figure 12 indicates that the mass of tournament balls has increased slightly over time, which has negligible impact on the speed of the serve (at the point it reaches the receiver), and has been continually greater than that for balls submitted for approval by manufacturers. The average values for tournament and approval balls have remained within 0.5 g of the midpoint of the specifications (57.7 g).

CONCLUSION

The average height of the top 50 has increased since 2002: by 1 cm, to 174 cm, for women; and by 4 cm, to 189 cm, for men. These increases in stature have not had a noticeable impact on serve speeds of the top 20 fastest servers at the Grand Slams. The men served, on average, 35 km.h⁻¹ faster than the women, resulting in double the frequency of aces. The effectiveness of the serve has increased at Roland Garros, and more recently at the Australian Open, but continues to be most potent at Wimbledon. The serve is a key shot in the game and constituted over a quarter of all shots in the Davis Cup and Fed Cup.

The top 50 men tended to use only marginally heavier rackets than their female counterparts in 2016, and was little difference in the swing weight of the rackets between the genders.

Therefore, the choice of racket is unlikely to be responsible for the difference in men's and women's serve speed. The average bounce height of balls used in tournaments has decreased over the last three years, to the point where it is close to the midpoint of the specification (and the value for balls submitted for approval). The average mass of balls used in tournaments has increased slightly, but remains close to the midpoint of the specifications.

REFERENCES

Tennis Warehouse University (2016). Racquet Comparison Tool. Available from: <http://twu.tennis-warehouse.com/cgi-bin/racquetspecs2.cgi> (Accessed 5 December 2016).

RECOMMENDED ITF TENNIS ACADEMY CONTENT (CLICK BELOW)



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