Suggestions to Improve Tennis Scorings Systems and the Challenge System

By
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Scoring Systems

The fundamental problem with current scoring systems is the deuce game is very “inefficient”. Some games can last for 25 minutes. The 50-40 game where the server has to win 4 points and the receiver has to win 3 points is very “efficient”. At most only 6 points are played in such a game. With the 50-40 game, a ‘long’ advantage final set is highly unlikely. The author has listed all the current scoring systems in table 1 and proposed scoring systems in the second table 2. The author thinks it makes sense to have just the one game structure and the 50-40 game due to its simplicity I feel is best to achieve this goal. All the early sets are tiebreak with a first-to-10 point tiebreak game at 6 games-all. The final set is either a first-to-10 point tiebreak game or advantage. Playing a final advantage set makes sense as it avoids the match being decided by one of two points in a tiebreak game. Matches are either 3 or 5 sets. This simplifies the scoring systems to 3. The author published a paper:

Barnett T (2012). Analyzing tennis scoring systems: from the origins to today. Journal of Medicine and Science in Tennis 17(2), 68-77.
http://strategicgames.com.au/article32.pdf

which demonstrates why the deuce game came about and why the 50-40 game could potentially replace it. The idea of "deuce" was introduced (at least as far as 1490) with a simple explanation - to ensure that the game could not be won by a one-point difference in players' scores. Hence deuce was derived from the French "a deux du jeu" - two points away from game.

System	Event	Games	Early Sets	Final Set	Match
1	US Open women's singles Aust./French/US Open women's doubles Aust./French/US Open men's doubles Olympics men's and women's singles Olympics men's and women's doubles Men's and women's singles	Deuce	Tiebreak First-to-7 points tiebreak game	Tiebreak First-to-7 points tiebreak game	3 sets
2	Australian Open women's singles	Deuce	Tiebreak First-to-7 points tiebreak game	Tiebreak First-to 10 points tiebreak game	3 sets
3	French women's singles	Deuce	Tiebreak First-to-7 points tiebreak game	Advantage	3 sets
4	Aust/French/US Open mixed doubles Olympics mixed doubles	Deuce	Tiebreak First-to-7 points tiebreak game	First-to-10 points tiebreak game	3 sets
5	Men's and women's doubles	No-ad	Tiebreak First-to-7 points tiebreak game	First-to-10 points tiebreak game	3 sets
6	US Open men's singles	Deuce	Tiebreak First-to-7 points tiebreak game	Tiebreak First-to-7 points tiebreak game	5 sets
7	Australian Open men's singles	Deuce	Tiebreak First-to-7 points tiebreak game	Tiebreak First-to 10 points tiebreak game	5 sets
8	French Olympics men's singles (Gold medal)	Deuce	Tiebreak First-to-7 points tiebreak game	Advantage	5 sets
9	Wimbledon women's singles Wimbledon women's doubles Wimbledon mixed doubles	Deuce	Tiebreak First-to-7 points tiebreak game	Tiebreak First-to-7 points tiebreak game at 12 games-all	3 sets
10	Wimbledon men's singles Wimbledon men's doubles	Deuce	Tiebreak First-to-7 points tiebreak game	Tiebreak First-to-7 points tiebreak game at 12 games-all	5 sets

Table 1: Current scoring systems used in men's and women's singles, doubles and mixed doubles

System	Event	Games	Early Sets	Final Set	Match
1	Grand Slam mixed doubles Olympic mixed doubles Men's doubles Women's doubles	50-40	Tiebreak First-to-10 points tiebreak game	First-to-10 points tiebreak game	3 sets
2	Grand Slam women's singles Grand Slam women's doubles Grand Slam men's doubles Olympics men's singles Olympics women's singles Olympics men's doubles Olympics women's doubles Men's singles Women's singles	50-40	Tiebreak First-to-10 points tiebreak game	Advantage	3 sets
3	Grand Slam men's singles Olympics men's singles (Gold medal)	50-40	Tiebreak First-to-10 points tiebreak game	Advantage	5 sets

Table 2: Proposed scoring systems used in men's and women's singles, doubles and mixed doubles

	Deuce game	No-Ad game	50-40 game
10-10	79.5%	69.0%	29.7%
20-20	63.0%	47.3%	8.0%
30-30	49.9%	32.4%	2.2%
40-40	39.6%	22.2%	0.6%
50-50	31.4%	15.2%	0.2%
60-60	24.9%	10.4%	0.0%
70-70	19.7%	7.1%	0.0%

Table 3: Chances of reaching x-games all in an advantage set across three different game structures and the probabilities of both players winning a point on serve is 83%.

Table 3 gives the chances of reaching x-games all in an advantage set across three different game structures and the probabilities of both players winning a point on serve is 83%. Note this is the most extreme case with the aim that an advantage final set can last for hundreds of years. Note the chances of reaching 70-all for the deuce game of 19.7% and the No-Ad game of 7.1%. Whereas for the 50-40 game players won't get anywhere near 70-all. In the 11 hour Isner Mahut match both players were winning 77.2% and 81.9% of points on serve in the final set. Note that in the final set of the Isner vs Mahut match, there was 2.9% chance of reaching 69 games-all in the advantage final set. Refer to section 8.4 in http://strategicgames.com.au/book.pdf for a full analysis of the Isner vs Mahut match. Also, it could be argued that playing a 11 hour match could have health affects on the players.

	Deuce game	No-Ad game	50-40 game
0.5	95.7%	93.1%	95.5%
1	26.3%	11.0%	9.2%
1.5	0.1%	0.0%	0.0%
2	0.0%	0.0%	0.0%

Table 4: Chances of reaching x-hours in a tiebreak set across three different game structures, the probabilities of both players winning a point on serve is 50% and the average time for a point played is 12 seconds.

Table 4 gives the chances of reaching x-hours in a tiebreak set across three different game structures, the probabilities of both players winning a point on serve is 50% and the average time for a point played is 12 seconds. On clay players can average only 50% of points won on serve. Also, players on clay average about 12 seconds to play a point. Note that using the deuce game there is a 26.3% chance of a tiebreak set reaching 1 hour and 0.1% chance of a tiebreak set reaching 1.5 hours. There are actual tiebreak sets under the deuce game that have gone for 1.5 hours. Using the 50-40 game the chances of reaching 1 hour are significantly reduced to only 9.2%.

	Deuce game	No-Ad game	50-40 game
55%, 50%	80.0%	77.2%	75.4%
65%, 60%	78.9%	76.9%	76.4%
75%, 70%	77.2%	76.7%	77.5%
85%, 80%	78.0%	78.4%	79.7%

Table 5: Chances of winning a best -of-5 set match with a first-to-7 point tiebreak game played at 6 games-all in early sets and an advantage set played in the final set played across three different game structures for different probabilities of players winning a point on serve.

Table 5 gives the chances of winning a best-of-5 set match with a first-to-7 point tiebreak game played at 6 games-all in early sets and an advantage set played in the final set played across three different game structures for different probabilities of players winning a point on serve. Note that this scoring structure typically applies to the French and Wimbledon men's singles where player's on serve are often around the 70-75% range. Note that under the deuce game there is 77.2% chance of the better player winning, under the No-Ad game this is reduced to 76.7% but for the 50-40 game this percentage is increased to 77.5%.

	First-to-7 point tiebreak game	**First-to-10 point tiebreak game**	**Advantage rule at 6 games-all using 50-40 games**
55%, 50%	57.9%	59.2%	60.1%
65%, 60%	58.2%	59.5%	60.6%
75%, 70%	59.0%	60.5%	62.7%
85%, 80%	61.1%	62.7%	68.8%

Table 6: Chances of the better player winning at 6 games-all across three different scoring structures.

Table 6 gives the chances of the better player winning at 6-games-all across three different scoring structures. Note that playing a first-to-10 point tiebreak game increases the chances of the better player winning from a first-to-7 point tiebreak game by about 1.5%. Also note that playing an advantage rule at 6-games all using 50-40 games increases the chances of the better player winning when compared to a first-to-10 point tiebreak game. In particular the increase for the better player with players winning 85% and 80% on serve is 6.1%.

Therefore, the statistics indicate that the three proposed scoring systems can be suitably applied to all men's and women's singles, doubles and mixed doubles matches.

Challenge System

Challenging a line call takes time and for this reason players have unlimited opportunity to challenge, but once three incorrect challenges are made in a set, they cannot challenge again until the next set. If the set goes to a tiebreak game, players are given additional opportunities to challenge (usually one extra). If the match is tied at six games all in an advantage set, the counter is reset with both players again having a limit of up to three incorrect challenges in the next 12 games, and this resetting process is repeated after every 12 games. Under the current system players could run out of challenges and unable to challenge on a point with a sufficiently large amount of 'importance' which could make a big difference to the outcome of the match. For this reason the following model is proposed.

Player's are given x challenges per set and have unlimited opportunity to challenge, but once three incorrect challenges are made in a set, they cannot challenge again until the next set. Further, players can always challenge when the point has a sufficient level of 'importance' = y without affecting their challenge point total, otherwise players cannot challenge if they have run out of their challenge point total.

Scenario 1)
When x=3 and the level of ‘importance’=1, is equivalent to the current system.

Scenario 2)
When x=0 and the level of ‘importance’=y, is “optimally” the best system in terms of minimizing time on player’s challenging on “unimportant” points.

Scenario 3)
When $1 \leq x \leq 3$ and the level of ‘importance’=y, is somewhere between Scenario 1) and Scenario 2)

Refer to http://strategicgames.com.au/article28.pdf for the analysis for Scenario 3)