

Could the 50-40 Game Replace the Deuce Game in a Best-of-5 Sets Tennis Match?

By
Tristan Barnett

Introduction

There are currently 4 different scoring systems played on the ATP and WTA tour. At the Australian Open, men and women play a first-to-10 point tiebreak game at 6 games-all in the final set. At the French Open, men and women play an advantage final set. At Wimbledon, men and women play a first-to-7 point tiebreak game is played at 12 games-all in the final set. And lastly at the US Open, men and women play all a first-to-7 point tiebreak game in all sets. Men play a best-of-5 sets match whilst women play a best-of-3 sets match. Prior to the changes at the Australian Open and Wimbledon, men and women used to play an advantage final set alongside the French Open. The changes were brought about largely contributed with the 'long' match at the 2003 Australian Open between Roddick and El Aynaoui with Roddick winning 21-19 in the fifth set, taking 5 hours to complete. More significantly, there was the longest match in history at the 2010 Wimbledon Championships between Isner and Mahut lasting for 11 hours.

Long matches can still occur by playing a tiebreak fifth set. It is common for tiebreak sets to last 1 hour and even up to 1.5 hours (particularly on the slow surface of clay), hence taking 5 hours to complete. For example, table 1 gives statistics for the Clement vs Santoro match played at the 2004 French Open which lasted for 6.5 hours. The first four sets averaged 56 minutes before the fifth advantage set was played or a total of 3.7 hours.

	Serving Statistics (%)		Time (min)	Score
	Clement	Santoro		
Set 1	56	61	51	4-6
Set 2	50	64	46	3-6
Set 3	55	56	74	7-6
Set 4	57	43	52	6-3
Set 5	64	64	173	14-16
Match	58	60	396	

Table 1

As well as characteristics of the probability of the better player winning and time duration of a match, there are other factors to consider such as tradition and simplicity. This article will argue why the 50-40 game could possibly replace the deuce game in best-of-5 sets matches as typically applies to men's grand slam singles.

Results

Deuce – player has to win 4 points but if the score line reaches 3 points-all then a player must 2 points ahead to win the game

No-Ad – player has to win 4 points but if the score line reaches 3 points-all then the player to win the next point wins the game. At most 7 points are played in the game

50-40 – server has to win 4 points and receiver has to win 3 points. At most 6 points are played in the game

50-40* - server has to win 4 points and receiver has to win 3 points but if the score line reaches 3-2 (40-30) then the player to win two more points wins the game. At most 8 points are played in the game

pA and pB represent the probabilities of player A and player B winning a point on serve
 pA=0.55, pB=0.5 could typically apply to the slowest surface of clay
 pB=0.65, pB=0.6 could typically apply to a medium paced surface such as hard court
 pB=0.75, pB=0.7 could typically apply to the fastest surface of grass

It is assumed that the average time to play a point is 8 secs which can apply to hard court and clay.

	Chances of winning a best-of-5 sets all tiebreak set match			
	Deuce	No-Ad	50-40	50-40*
pA=0.55, pA=0.5	79.9%	77.0%	75.4%	77.0%
pA=0.65, pA=0.6	78.5%	76.7%	76.3%	77.8%
pA=0.75, pA=0.7	76.0%	75.9%	77.2%	78.1%

Table 2

	Mean number of points played in the match			
	Deuce	No-Ad	50-40	50-40*
pA=0.55, pA=0.5	255.49	223.95	191.15	208.28
pA=0.65, pA=0.6	256.08	227.42	194.54	212.80
pA=0.75, pA=0.7	264.40	239.83	202.82	220.98

Table 3

	Standard deviation of the number of points played in the match			
	Deuce	No-Ad	50-40	50-40*
pA=0.55, pA=0.5	62.80	52.95	44.99	49.71
pA=0.65, pA=0.6	61.73	53.38	46.27	51.32
pA=0.75, pA=0.7	61.38	55.44	48.28	53.00

Table 4

	Mean amount of time played in the match			
	Deuce	No-Ad	50-40	50-40*
pA=0.55, pA=0.5	3.05 hours	2.67 hours	2.28 hours	2.49 hours
pA=0.65, pA=0.6	3.06 hours	2.72 hours	2.32 hours	2.54 hours
pA=0.75, pA=0.7	3.16 hours	2.86 hours	2.42 hours	2.64 hours

Table 5

	Standard deviation of the mean amount of time played in the match			
	Deuce	No-Ad	50-40	50-40*
pA=0.55, pA=0.5	0.75 hours	0.63 hours	0.54 hours	0.59 hours
pA=0.65, pA=0.6	0.74 hours	0.64 hours	0.55 hours	0.61 hours
pA=0.75, pA=0.7	0.73 hours	0.66 hours	0.58 hours	0.63 hours

Table 6

	Chances of a match going beyond 3 hours			
	Deuce	No-Ad	50-40	50-40*
pA=0.55, pA=0.5	53.5%	34.2%	12.4%	22.3%
pA=0.65, pA=0.6	50.4%	37.6%	12.7%	29.4%
pA=0.75, pA=0.7	53.7%	45.0%	18.6%	31.1%

Table 6

	Chances of a match going beyond 4 hours			
	Deuce	No-Ad	50-40	50-40*
pA=0.55, pA=0.5	15.4%	1.9%	0.0%	0.6%
pA=0.65, pA=0.6	13.5%	2.5%	0.1%	1.0%
pA=0.75, pA=0.7	14.4%	4.9%	0.0%	1.7%

Table 7

It makes sense to have a deuce game to keep with tradition in best-of-3 set matches. The likelihood of playing a 'long' match with this kind of system is highly unlikely. The main issue is with best-of-5 set matches as typically applies to men singles grand slam and the authors would like to propose using a 50-40 or 50-40* game. The 50-40 game due to its simplicity is very attractive (server wins standard 4 points while receiver only has to win 3 points). There is on average a 45-minute reduction in the amount of time to play the match compared to a deuce game. There is a 4.5% reduction in probability for pA=0.55 and pB=0.50, however this would rarely be played in a men's match (mostly likely for women on clay where a deuce game is played with a best-of-3 set match). Note that for pA=0.75 and pB=0.7 there is a 1.2% increase in the chances of winning the match for the stronger player compared to a deuce game. Also, the chances of a match going beyond 4 hours is 0.0% and for 3 hours 12.4%-18.6% (a significant reduction compared to the deuce game, 14% for 4 hours and 53% for 3 hours and for the No-Ad game, 1.9% for 4 hours and 34.2% for 3 hours).

Further, to justify the difference in probabilities when pA=0.55, pB=0.50; if the decrease in probability with the 50-40 game in a best-of-5 set match is still greater than playing a best-of-3 set match with deuce games, then the 50-40 game is still warranted for a best-of-5 set match. For a best-of-5 set match with 50-40 games, the chances of the stronger player winning the match is 75.4%. For a best-of-3 set match with deuce games, the chances of the stronger player winning the match is 74.9%. Hence the 50-40 game holds up as 75.4%>74.9%. This is now sufficient evidence to play the 50-40 game in best-of-5 set matches as typically applies to men's grand slam singles and reduces the mean length on average by 45 mins. The deuce game should still be used in best-of-3 set matches to keep with tradition.