HOW THE TENNIS SCOREBOARD AFFECTS PLAYER PERFORMANCE

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Introduction

Pollard, Cross and Meyer [2], analysed men's grand slam set scores over a 10 year period and found that the scores depend to some extent on progress during a match. They fitted a model to account for this dependency in the data and concluded the following:

The better player lifts his probability of winning a set in certain situations. These situations are
(i) when he is behind in the set score, needs to lift his game, and lifts his probability of winning the next set by (on average) 0.035,
(ii) when he has just won a set, is "on-a-run", and lifts his probability of winning the next set by (on average) 0.035, and
(iii) when he has just lost two sets in a row, desperately needs to lift his game, and lifts his probability of winning each remaining set by (on average) 0.110, a substantial amount.

In this article, the above results are used to determine what proportion of a match win can be attributed to a player's ability (by assuming no memory of the scoreboard) and what proportion of a match win can be attributed to the psychological effects when a scoreboard is present. Further, historical data is used to show that the first set is more evenly contested than the other sets in a match. These results could be used in the training and coaching of players.

Match winning percentages

Suppose two players, player A and player B meet in a tennis match. Player A (the better player) is predicted to win 68% of points on serve in the first set and player B is predicted to win 60% of points on serve in the first set. By assuming independence of both players winning points on serve in the first set, player A has an 87.5% chance of winning a game on serve, and player B has a 73.6% chance of winning a game on serve [1]. These percentages equate to player A having a 74.7% chance of winning the first tiebreak set. This percentage of 74.7% is comparable with the predictive modelling obtained in Pollard et al. [2].

If the percentage of points won on serve for each player were independent for the entire match, then player A would have an 89.3% chance of winning a best-of-5 set tiebreak match. However, it has been noted from above that the better player lifts his probability of winning a set in certain situations, both

when ahead or behind in the set score. As a result of this dependency (in matches where the player takes notice of the scoreboard) player A now has a 93.2% chance of winning the match.

The current rankings may be used by players to recognise the better player prior to the start of a match. As a result of the scoreboard being present, player A has increased his chances of winning the match by 93.2% - 89.3% = 3.9%. If we were to interpret this increase in probability of winning the match as a result of psychological effects when the scoreboard is present, then 0.893 / 0.932 = 95.8% of the match is attributed to the players' ability, whilst 4.2% of the match is attributed to psychological effects.

Table 1 represents the set score distribution for 1141 3-set men's singles grand slam matches for the period 2000-2004. S1, S2 and S3 represent the first set, second set and third set respectively. It can be observed from the table that more tiebreak games are played in the first set when compared to the other sets in the match. This suggests that the first set is more evenly contested than the other sets, and shows further evidence of the psychological effects when the scoreboard is present. By identifying that the first set is more evenly contested than the remaining sets, players and coaches could use this information in their coaching routines. For example at the start of the second set, coaches could encourage players to concentrate on holding their own serve.

Score	Australian Open			French Open			Wimbledon			US Open		
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
6-0	12	14	12	13	14	23	6	4	9	9	5	14
6-1	39	26	32	29	34	28	33	18	28	37	27	33
6-2	47	52	64	47	50	51	46	49	55	35	59	63
6-3	65	61	57	61	64	60	74	68	57	74	63	60
6-4	48	72	67	49	55	56	54	91	79	64	74	69
7-5	21	25	21	28	23	22	27	21	25	27	20	24
7-6	50	32	29	37	24	24	58	47	45	51	49	34
Total	282	282	282	264	264	264	298	298	298	297	297	297

Table 1: Set score distribution for 1141 3-set matches 2000-2004

Discussion

Another way of interpreting the results presented above is that the weaker player does not have a strong belief that he can beat the better player. When the better player is ahead on the scoreboard, they gain momentum for the remaining sets. This momentum may contribute to the fact that the weaker player has lost confidence in being able to win the match and is simply going through the motions rather than fighting for every point. When the better player is behind on the scoreboard, the better player has the back-to-the wall effect. This effect may contribute to the fact that the weaker player does not believe that he can beat the better player, and is unable to close out the match.

Conclusion

As a result of dependency in the data, it has been shown that the better player gains an increase in the chances of winning the match, compared to a match where players winning points on serve are independent. The results are used to determine what proportion of a match win is contributed to a player's ability (by assuming no memory of the scoreboard) and what proportion of a match win is contributed to the psychological effects when a scoreboard is present. There is evidence in the data to show that the first set is more evenly contested than the other sets in a match. These findings could be used in the training and coaching of players.

References

[1] T. Barnett and S. Clarke, *Using Microsoft Excel to Model a Tennis Match.* Proceeding of the 6th Mathematics and Computers in Sport. Cohen G. (ed), 63-68.

[2] G. Pollard, R. Cross and D. Meyer, *An Analysis of Ten Years of the Four Grand Slam Men's Singles Data for Lack of Independence of Set Outcomes.* Proceeding of the 8th Mathematics and Computers in Sport. J. Hammond and N. de Mestre (eds), 239-246.