

Win three-sets sports: Game patterns, gender comparisons, and comeback analysis—A commentary

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Abstract

Goldschmied et al. (2025) have conducted a longitudinal survey of three sports where the winner must win three sets to win a match. This note investigates their results in a simple statistical model.

Keywords

Comeback, probability, scoring, table tennis, tennis, volleyball

Goldschmied et al. (2025) have conducted a longitudinal survey of three sports where the winner must win three sets to win a match: American collegiate volleyball, international table tennis, and international men's tennis. The paper has been written with a descriptive emphasis, but their results are worth investigating in a simple statistical model.

The model

Assume that a contestant wins a set with a probability $p \geq 0.5$ and its opponent with a probability $1 - p$. Consequently, luck does not influence the results, and match outcomes are fully predicted by abilities.

Then the probability that

- one contestant wins the first two sets is $p^2 + (1 - p)^2 = 2p^2 - 2p + 1$;
- the result after the first two sets is 1-1 equals $2p(1 - p) = -2p^2 + 2p$;
- one contestant wins by 3-0 is $p^3 + (1 - p)^3$;
- one contestant wins the first two sets but loses the third is $p^2(1 - p) + (1 - p)^2p$;
- the result is 3-1 after the match starts with 2-0 equals $p^3(1 - p) + (1 - p)^3p$;
- one contestant wins the first two sets but loses the subsequent two is $2p^2(1 - p)^2$;
- a comeback is made equals $p^2(1 - p)^3 + (1 - p)^2p^3$;
- one contestant wins the first two sets, loses the next two and still wins the match is $p^3(1 - p)^2 + (1 - p)^3p^2$.

The value of parameter p can be estimated on the basis of observed frequencies for results 1-1 and 2-0 after two sets are played as the number of observations is the highest for these cases. The results are presented in Table 1.

Implications

Even though the suggested one-parametric mathematical model cannot fully reproduce field observations, its goodness of fit is surprisingly high. For example, the probability of 3-0 is over/underestimated by no more than 1.5%. The result of 2-1 after one contestant wins the first two sets is underestimated for all sports except men's volleyball. This shows that luck is partially responsible for winning the first two sets, which is reinforced by the overestimation of the result 3-1 after one contestant wins the first two sets. The extent of upward bias exceeds 9.5%

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Table 1. Frequencies of different results in sports that require winning three sets to win the match.

Sport Probability	Women's Volleyball		Men's Volleyball		Women's Table Tennis		Men's Table Tennis		Men's Tennis	
	Implied	Observed	Implied	Observed	Implied	Observed	Implied	Observed	Implied	Observed
1-1	33.909		32.045		31.471		33.337		33.169	
2-0	66.085		67.955		68.529		66.663		66.831	
Parameter p	78.360		79.963		80.438		78.865		79.010	
3-0	49.128	49.450	51.933	51.324	52.794	53.341	49.995	50.138	50.247	50.767
2-1*	16.957	16.635	16.022	16.631	15.735	15.188	16.668	16.525	16.584	16.064
3-1*	11.206	10.097	10.888	10.425	10.783	9.463	11.112	10.136	11.084	9.017
2-2*	5.751	6.538	5.134	6.206	4.952	5.725	5.557	6.389	5.501	7.047
Comeback* ¹	2.876	3.381	2.567	2.987	2.476	2.643	2.778	2.994	2.750	3.907
No comeback* ²	2.876	3.157	2.567	3.218	2.476	3.083	2.778	3.395	2.750	3.140

All numbers are relative frequencies in percentages.

The value of parameter p is estimated on the basis of probabilities for 1-1 and 2-0.

Observed probabilities come from Goldschmied et al. (2025, Table 1).

* Matches that started 2-0.

¹ The contestant that lost the initial 2 sets, won the match.

² The contestant that won the initial 2 sets, won the match.

other than men's volleyball and reaches 22.9% in men's tennis.

Analogously, the probability of 2-2 after one contestant wins the first two sets is underestimated by at least 12%, with the worst performance for men's tennis, where the downward bias is 22%. Finally, the model is independent of the outcomes of previous sets, therefore, the implied probabilities of a comeback and no comeback coincide. The relative frequency of both events is underestimated between 6.3% (comeback in women's table tennis) and 29.6% (comeback in men's tennis). The distortion is higher for a comeback in two sets of data—women's volleyball and men's tennis—and for no comeback in sets of data.

Overall, it seems that luck and psychological factors such as crowd support affect volleyball to the smallest and men's tennis to the highest degree. The conclusion

that skills and training have more impact on team sports than on individual sports makes sense.

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Reference

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