

## Boardgame Tournament Design

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This is an accumulated-strikes elimination tournament design for boardgames that are well playable by 5, 4, or 3 players. Examples of such a game are Acquire, Airlines Europe, Agricola, Alhambra, Amun Re, Carcassonne, Caylus, China, Chinatown, Hawaii, La Citta, Modern Art, Power Grid, Princes of Florence, Ra, Santa Fe Rails, Settlers of Catan, Small World, Steam, Steam Barons, Through the Desert, and Ticket to Ride. This tournament format works best for games that result in a numeric score for each player where the highest score wins.

Players accumulate strikes at the end of each game depending on what place they finished in. When a player accumulates 35 or more strikes, he/she is eliminated.

Strikes received by place:

5-player game

Place	Strikes
1	0
2	6
3	12
4	18
5	24

4-player game

Place	Strikes
1	0
2	8
3	16
4	24

3-player game

Place	Strikes
1	0
2	12
3	24

Ties combine strikes for the tied places, then those strikes divide evenly among the tied players. For example, if a 5-player game finishes with a tie for 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> places, add the strikes ( $6 + 12 + 18 = 36$ ) and divide by 3 players ( $36 \div 3 = 12$ ), and award 12 strikes to each of the three tied players. Use the same technique when there is a tie for first place. Ties for first place are perfectly valid in this tournament structure. If the particular boardgame's rules include a tiebreaker mechanism to determine the winner, do not use it.

Note: you can try setting the elimination level at 23 strikes for a shorter tournament of about 5 rounds, 35 strikes for a medium-length tournament of about 6 rounds, or 47 strikes for a longer tournament of about 7 rounds.

The first round has fully random seating assignment at the tables. The second round is a split-by-strikes round. Further rounds alternate between random type and split-by-strikes type. Note that if only 5, 4, or 3 players remain at the beginning of a round, then there is exactly one table playing a 5, 4, or 3 player game.

Assign actual table seating based on a least-times-met score which equals 'detrimental points' summed for each pair-of-players combination. To accomplish this, generate 30 seating plans randomly, then take the plan with the lowest score.

# of times met	detrimental points
0	0
1	1
2	2
3	4
4	7
5+	10

Generating 30 random seating plans, analyzing them, and declaring the assignments requires a computer program. The program should be designed with an easy way to input players' names and game results. The program should calculate strikes, keep track of strikes accumulated by each player, and declare eliminations. I've written a no-frills program that handles these tasks using text files as input and output. It's a Python program named Tabletwhist, and it's free software.

The table below specifies how many game tables to set up for 5-player, 4-player, and 3-player games depending on the number of players remaining and whether it's a fully random or split-by-strikes random round.

P's rem.	Random round			Split By Strikes round								
	5p	4p	3p	G1 5p	G1 4p	G1 3p	G2 5p	G2 4p	G2 3p	G3 5p	G3 4p	G3 3p
6	0	0	2	0	0	1	0	0	1			
7	0	1	1	0	1	0	0	0	1			
8	0	2	0	0	1	0	0	1	0			
9	1	1	0	1	0	0	0	1	0			
10	2	0	0	1	0	0	1	0	0			
11	0	2	1	0	1	1	0	1	0			
12	0	3	0	0	2	0	0	1	0			
13	1	2	0	0	2	0	1	0	0			
14	2	1	0	1	1	0	1	0	0			
15	3	0	0	2	0	0	1	0	0			
16	0	4	0	0	2	0	0	2	0			
17	1	3	0	1	1	0	0	2	0			
18	2	2	0	1	1	0	1	1	0			
19	3	1	0	2	0	0	1	1	0			
20	4	0	0	2	0	0	2	0	0			
21	1	4	0	0	3	0	1	1	0			
22	2	3	0	1	2	0	1	1	0			
23	3	2	0	1	2	0	2	0	0			
24	4	1	0	2	1	0	2	0	0			
25	5	0	0	3	0	0	2	0	0			
26	2	4	0	1	2	0	1	2	0			
27	3	3	0	2	1	0	1	2	0			
28	4	2	0	2	1	0	2	1	0			
29	5	1	0	3	0	0	2	1	0			
30	6	0	0	3	0	0	3	0	0			

31	3	4	0	1	2	0	1	1	0	1	1	0
32	4	3	0	0	3	0	2	0	0	2	0	0
33	5	2	0	1	2	0	2	0	0	2	0	0
34	6	1	0	2	1	0	2	0	0	2	0	0
35	7	0	0	3	0	0	2	0	0	2	0	0
36	4	4	0	1	2	0	1	2	0	2	0	0
37	5	3	0	2	1	0	2	1	0	1	1	0
38	6	2	0	2	1	0	2	1	0	2	0	0
39	7	1	0	3	0	0	2	1	0	2	0	0
40	8	0	0	3	0	0	3	0	0	2	0	0
41	5	4	0	2	1	0	2	1	0	1	2	0
42	6	3	0	2	1	0	2	1	0	2	1	0
43	7	2	0	3	0	0	2	1	0	2	1	0
44	8	1	0	3	0	0	3	0	0	2	1	0
45	9	0	0	3	0	0	3	0	0	3	0	0
46	6	4	0	2	2	0	2	1	0	2	1	0
47	7	3	0	1	3	0	3	0	0	3	0	0
48	8	2	0	2	2	0	3	0	0	3	0	0
49	9	1	0	3	1	0	3	0	0	3	0	0
50	10	0	0	4	0	0	3	0	0	3	0	0

The above table shows that, in split-by-strikes rounds, the players are split into two groups if there are 6 to 30 players remaining. Group G1 is composed of the players with fewer strikes accumulated so far, and G2 is composed of the players with more strikes. If there are 31 or more players remaining, the players are split into three groups G1, G2, and G3. Within a group, table seating is assigned randomly using the least-times-met method described earlier.

If, at the end of a one-table round (3 to 5 players remained), all but 2 players are eliminated, then the tournament winner is the one with fewer strikes if he/she also won the final game. If the one with fewer strikes came in 3<sup>rd</sup> place or worse in the final game, the tournament winner is the winner of the final game. If the one with fewer strikes came in 2<sup>nd</sup> place in the final game, then there are dual winners of the tournament. In case of a tie for strikes, then it's whoever won the final game.

If, at the end of a two-table round (6 to 10 players remained), all but 2 players are eliminated, then the tournament winner is the one with fewer strikes. In case of a tie for strikes, then it's whoever had the largest margin of victory (point spread between 1<sup>st</sup> and 2<sup>nd</sup> place) in his/her final game. If that's also a tie, then there are dual winners of the tournament.

Because there can be ties for first place in a game, it's possible (but very rare) for all players to be eliminated at the end of a round. If this occurs, then the winner is the player with the fewest strikes who played in the final round, even though his/her strikes total is above the elimination threshold. In case of a tie for fewest strikes, the tied players are cowinners.

If the particular boardgame played is good with just 2 players, and there are dual winners as described above, then one final tiebreaking 2-player game can be played. In this case, the winner of the game is the winner of the tournament regardless of accumulated strikes.

Some more explanation may be needed regarding generating 30 random seating plans and using the plan with the lowest 'detrimental points' score. Say it's the fifth round and there are 26 players still alive in the tournament. The fifth round is a Random type of round. Looking at the table of players remaining and number of game tables, for 26 players and Random round, there are 6 tables: 2 five-player tables and 4 four-player tables.

The computer program tries 30 'seating plans' and decides which one is the best. The best plan is where each player is seated at a table with players that he has not played against during the first four rounds, or played against perhaps only once or twice.

For each candidate seating plan, the program shuffles the 26 players and deals them out to the 6 tables. Then for each of the 6 tables, the program calculates a score by summing the 'detrimental points' for each pair of players, depending on how many times that pair has played together at the same table during the first four rounds. A five-player table has 10 different pairs of players, a four-player table has 6 pairs, and a three-player table has 3 pairs. The total score of the seating plan is the sum of the scores of the 6 tables.

The seating plan that will be used for the fifth round is the one with the lowest total score that was calculated from detrimental points.

If your boardgame is playable by only 4 or 3 players (or just does not play well with 5 players) you can still use this tournament format, but use the following table for each round's seating plan depending on the number of players remaining:

P's rem.	Random round		Split By Strikes round					
	4p	3p	G1 4p	G1 3p	G2 4p	G2 3p	G3 4p	G3 3p
6	0	2	0	1	0	1		
7	1	1	1	0	0	1		
8	2	0	1	0	1	0		
9	0	3	0	2	0	1		
10	1	2	0	2	1	0		
11	2	1	1	1	1	0		
12	3	0	2	0	1	0		
13	1	3	1	1	0	2		
14	2	2	1	1	1	1		
15	3	1	2	0	1	1		
16	4	0	2	0	2	0		
17	2	3	1	2	1	1		
18	3	2	1	2	2	0		

19	4	1	2	1	2	0		
20	5	0	3	0	2	0		
21	3	3	2	1	1	2		
22	4	2	2	1	2	1		
23	5	1	3	0	2	1		
24	6	0	3	0	3	0		
25	4	3	2	2	2	1		
26	5	2	2	2	3	0		
27	6	1	3	1	3	0		
28	7	0	4	0	3	0		
29	5	3	3	1	2	2		
30	6	2	3	1	3	1		
31	7	1	3	0	2	1	2	0
32	8	0	3	0	3	0	2	0
33	6	3	2	1	2	1	2	1
34	7	2	3	0	2	1	2	1
35	8	1	3	0	3	0	2	1
36	9	0	3	0	3	0	3	0
37	7	3	3	1	2	1	2	1
38	8	2	2	2	3	0	3	0
39	9	1	3	1	3	0	3	0
40	10	0	4	0	3	0	3	0
41	8	3	3	1	3	1	2	1
42	9	2	3	1	3	1	3	0
43	10	1	4	0	3	1	3	0
44	11	0	4	0	4	0	3	0
45	9	3	3	1	3	1	3	1
46	10	2	4	0	3	1	3	1
47	11	1	4	0	4	0	3	1
48	12	0	4	0	4	0	4	0
49	10	3	4	1	3	1	3	1
50	11	2	3	2	4	0	4	0

When, for a boardgame playable by only 4 or 3 players, there are 5 players remaining in the tournament, you have two options. If your boardgame is playable with 2 players, then you seat one 3-player table and one 2-player table. But if your boardgame is not good with 2 players, then seat one 4-player table and give one player a bye for the round (the player sits out and awaits the outcome of the one 4-player game). The player who receives the bye should be the player who has accumulated the fewest strikes.