Elo等级分制度

Elo等级分制度是指由匈牙利裔美国物理学家埃洛(Elo)创建的一个衡量各类对弈活动水平的评价方法，是当今对弈水平评估的公认的权威方法。被广泛用于国际象棋、围棋、足球、篮球等运动。Elo等级分制度是基于统计学的一个评估棋手水平的方法。美国国际象棋协会在1960年首先使用这种计分方法。由于它比先前的方法更公平客观，这种方法很快流行开来。1970年国际棋联正式开始使用等级分制度。

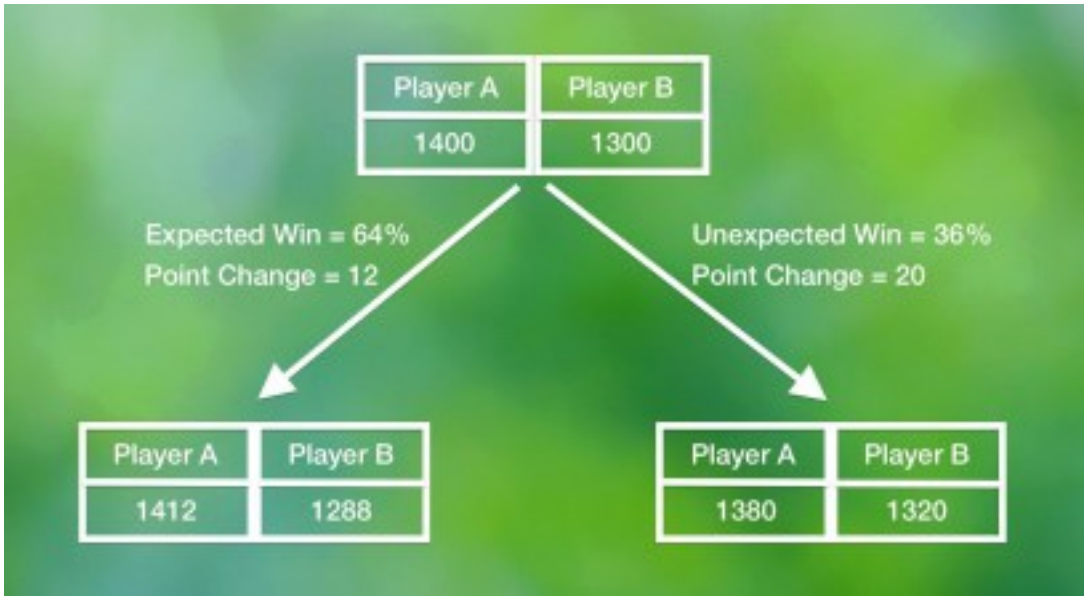
每个选手将会有一个数字评分。基于和其他评分选手的对战结果，分数更高表明选手技术更好。两场比赛的胜者在评分中获得一定数量的点数，而败者失去同等数量的点数。取胜或战败的分数取决于两个选手之间分数的差别，因此一名选手在击败更高等级的对手时将获得比较低等级的选手更多点数。在象棋中，如果一名选手的比其他人高出100点，那么根据他的评级他的胜败率大概是8局5胜(预期得分64%)，而评分改变也会折射出来。在举行一系列的比赛之后，如果玩家比预期更好，基于他的评分（对比他的其他对手）那么他的评级将晋级。

以上内容来自中文和英文维基百科。

举例一：一场比赛中的Elo点数变化

等级分的增长是可正可负的，通常比赛获胜等级分会增加，比赛落败会减少。当不同等级的选手比赛，如果排名较低的选手获胜，将获得较高的等级分，相反，如果输了，损失较小的等级分。

例如，1400等级分的选手A和1300等级分的选手B比赛，如果选手A获胜，这是一个预期的胜利，因为选手A有较高的等级分，将获得了12点数（小变化）。相反，如果选手A落败，选手A将失去20点数（较大的变化），应为他输给了一个较低等级的球员。这说明如下图。



比赛结束后，如果选手A获胜，那么选手A Elo等级分提高12点数到1412，选手B的Elo降12点数到1288。相反的，如果选手B赢（又称意外双赢或爆冷夺冠），那么玩家B的Elo等级分提高20点数到1320。

举例二: 三场比赛中的Elo点数变化

从上面的例子继续，假设选手A再次赢得了第二场比赛，但输了在第三场比赛，等级分变化如下表所示。

选手A等级分	选手B等级分	A-B	期望值	比赛结果	点数交换
1400	1300	100	65%	选手A赢	选手A 加12
1412	1288	124	67%	选手A赢	选手A 加11
1423	1277	146	70%	选手A输	选手A 减22
1401	1299				

选手A比选手B高约100的点数，赢的话将获得较少点数，输的话将失去较多的积分，应此三场比赛后，选手A虽然3局2胜，选手A与选手B各自保持差不多一样的等级分水平。

Elo等级分交换表

以下表显示的是选手A（我）和选手B（对手）比赛的交换分。例如第一行，如果你（选手A）赢得了对手（选手B，比你高400分），那么你将获得29分。相反，如果你输了比赛，你只输了3分。

	分差 （A-B）	选手A的期望值	选手A胜所获的交换分	选手A败所失的交换分
对手（选手B）具有较高的Elo等级分	-400	9%	29	3
	-350	12%	28	4
	-300	15%	27	5
	-250	19%	26	6
	-200	24%	24	8
	-150	30%	23	9
	-100	36%	20	12
	-50	43%	18	14
对手等级分相等	0	50%	16	16
对手（选手B）具有较低的Elo等级分	50	57%	14	18
	100	64%	12	20
	150	70%	9	23
	200	76%	8	24
	250	81%	6	26
	300	85%	5	27
	350	88%	4	28
	400	91%	3	29

History of Elo Rating System

The Elo Rating System is a method for calculating the relative skill levels of players in competitor-versus-competitor games such as chess. It is named after its creator Arpad Elo, a Hungarian-born American physics professor.

The Elo system was invented as an improved chess rating system and is also used in many other games. It is also used as a rating system for multiplayer competition in a number of video games and has been adapted to team sports including soccer (association football), American college football, basketball, Major League Baseball, competitive programming, and esports.

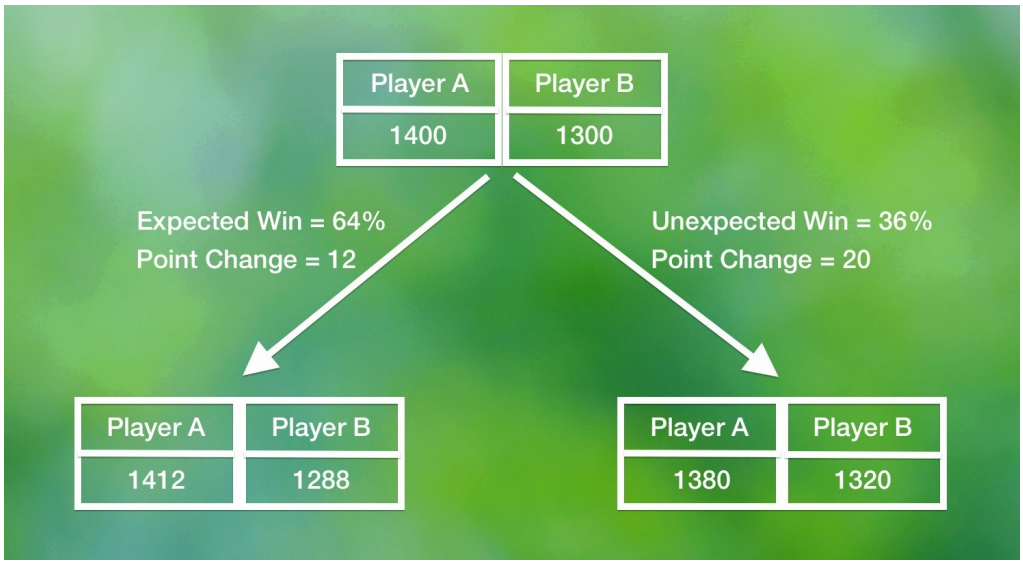
The difference in the ratings between two players serves as a predictor of the outcome of a match. Two players with equal ratings who play against each other are expected to score an equal number of wins. A player whose rating is 100 points greater than their opponent's is expected to score 64% (i.e win 5 out of 8 matches); if the difference is 200 points, then the expected score for the stronger player is 76%.

A player's Elo rating is represented by a number which increases or decreases based upon the outcome of games between rated players. After every game, the winning player takes points from the losing one. The difference between the ratings of the winner and loser determines the total number of points gained or lost after a game.

Example of Elo rating changes after a match

When a match is played between players of different ratings, the lower ranked player will gain a higher rating change if he/she wins and smaller loss, when compared to the higher ranked player.

For example, there are the two possible outcome of a match between a player with 1400 and 1300 Elo rating. If Player A wins, it is an expected win since Player A has higher rating and gain 12 points (smaller change). Conversely, Player A will lose 20 points (bigger change) if he/she loses to a lower rating player. This is illustrated in the diagram below.



After the match, if Player A wins, then Player A Elo rating will become 1412 and Player B Elo rating will become 1288 since Player A won 12 points from Player B. Conversely, if Player B wins (also known as unexpected win or upset win), then Player B Elo rating will increase by 20 points to become 1320.

Example of Elo rating changes after a series of 3 matches

Continuing from the example above, suppose Player A wins again in the second match but loses in the third match, the Elo rating changes are tabulated below.

Player A Elo rating	Player B Elo rating	A-B	Expected Score for Player A	Actual Match Result	Elo Point Exchanged
1400	1300	100	64%	Player A Win	Player A gain 12
1412	1288	124	67%	Player A Win	Player A gain 11
1423	1277	146	70%	Player A Lose	Player A lose 22
1401	1299				

Player A with 100 Elo points higher, would gain less points for a winning a match and lose more points for a losing a match. The net result after 3 matches is that the Elo rating remain about the same level as their respective initial Elo rating.

Elo Points Exchange Table

This is the table showing the Elo points to be exchange for a match between Player A (me) and Player B (opponent). For example, the first line shows that if you (Player A) win a match against an opponent (Player B) with 400 Elo points higher than you, then you will gain 29 points. Conversely, if you lose the game, you lose only 3 points.

	Elo rating of A-B	Expected A Score	Point Exchange if A won	Point Exchange if A lose
Opponent (B) with higher Elo rating	-400	9%	29	3
	-350	12%	28	4
	-300	15%	27	5
	-250	19%	26	6
	-200	24%	24	8
	-150	30%	23	9
	-100	36%	20	12
	-50	43%	18	14
	0	50%	16	16
Opponent (B) with lower Elo rating	50	57%	14	18
	100	64%	12	20
	150	70%	9	23
	200	76%	8	24
	250	81%	6	26
	300	85%	5	27
	350	88%	4	28
	400	91%	3	29

Elo Points Exchange Table

Winner Elo - Loser Elo	Elo Gained by Winner
Above 720	0
524 to 719	1
428 to 523	2
365 to 428	3
315 to 364	4
274 to 314	5
238 to 273	6
238 to 273	7
177 to 205	8
150 to 176	9
125 to 149	10
101 to 124	11
78 to 100	12
55 to 77	13
33 to 54	14
11 to 32	15
0 to 10	16

Winner Elo - Loser Elo	Elo Gained by Winner
-10 to 0	16
-32 to -11	17
-54 to -33	18
-77 to -55	19
-100 to -78	20
-124 to -101	21
-149 to -125	22
-176 to -150	23
-205 to -177	24
-237 to -206	25
-273 to -238	26
-314 to -274	27
-364 to -315	28
-400 to -365	29
-523 to -428	30
-719 to -524	31
Below -720	32

Table Tennis New Zealand Rating Calculations

Ratings points are calculated based on points gained or lost for wins and losses, which in turn are graded against the quality of the opponent. Additional weighting for event types are also provided. Results for rated events are provided to TTNZ at the conclusion of tournaments, with the ratings system then updated with the results.

A players rating will change over time as various events are updated. A Player's rating will change according to the following calculation.

Ratings Calculation Table:

Rating Difference	Normal Outcome	Upset Outcome
<25	8	8
<50	7	10
<100	5	12
<150	3	15
<200	2	20
<250	1	26
	0	32

The winners rating is increased by the amount in this table (multiplied by the weighting and age group factor below) and the losers rating is decreased by the amount in this table (multiplied by the weighting and age group factor below)

Weightings:

Tournament Type

Nationals - Individuals	3
Norths/Souths Individuals, Veterans, Nationals (teams)	2
Association Open (1 per year)	1.5
Anything else	1

Age Groups

Open	1.00
Veteran	0.75
Junior	0.75