Elo rating system

The Elo system was originally invented as an improved chess rating system over the previously used Harkness system, but is also used as a rating system for multiplayer competition in a number of video games,[1] association football, American football, basketball,[2] Major League Baseball, Scrabble, board games such as Diplomacy and other games.

A player's Elo rating is represented by a number which increases or decreases depending on 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. In a series of games between a high-rated player and a low-rated player, the high-rated player is expected to score more wins.

Arpad Elo was a master-level chess player and an active participant in the United States Chess Federation (USCF) from its founding in 1939.[3] The USCF used a numerical ratings system, devised by Kenneth Harkness, to allow members to track their individual progress in terms other than tournament wins and losses.

Mathematical details

Performance isn't measured absolutely; it is inferred from wins, losses, and draws against other players. Players' ratings depend on the ratings of their opponents, and the results scored against them. The difference in rating between two players determines an estimate for the expected score between them. Both the average and the spread of ratings can be arbitrarily chosen. Elo suggested scaling ratings so that a difference of 200 rating points in chess would mean that the stronger player has an expected score (which basically is an expected average score) of approximately 0.75.

A player's expected score is their probability of winning plus half their probability of drawing. Thus an expected score of 0.75 could represent a 75% chance of winning, 25% chance of losing, and 0% chance of drawing. On the other extreme it could represent a 50% chance of winning, 0% chance of losing, and 50% chance of drawing. The probability of drawing, as opposed to having a decisive result, is not specified in the Elo system. Instead a draw is considered half a win and half a loss.

