An Objective Rating System for Pickleball Players and Teams

Many prominent sports such as table tennis, badminton, and squash, as well as, highly regarded games such as chess and GO have well established rating systems with high degrees of precision. These objective numerical systems of rating and ranking players have significant value. They provide an objective and precise method for seeding players in tournaments and, when desired, grouping individuals and teams of similar abilities. An objective and accurate rating system also gives individuals a method for impartially accessing their level of skill and progress.

A rating system for individuals who are playing doubles matches, where that individual's partner may change frequently, is problematic. But even though developing a system is difficult and the results imperfect it does not mean a rating system is impossible or valueless. The rating system below is a modified ELO system as are the sports and games mentioned previously. Any rating system should be tested and evaluated based on its ability to predict the outcome of matches and modified so as to produce the best results possible.

Assumptions made and Criteria to be met in the development of an algorithm for individual and team ratings:

1) Cost, human and material, of determining and updating a player's ratings should be minimal.
2) The ratings would be based on "posted and submitted" results from sanctioned tournaments.
3) Currently Pickleball players are subjectively placed on a scale from 1 - 5 with what could be considered to be one significant digit of precision. Ideally an objective system for Pickleball would have a similar range but with three significant digits of accuracy and precision as in numerous other sports and games.
4) Optimally a player's ratings would be adjusted after every sanctioned tournament they participated in.
5) A player might have three ratings: one for singles, one for mixed doubles and one for un-mixed doubles.
6) In most "non-recreational" matches there is going to be an attempt to identify the "weaker player" and take advantage of that individual. Thus, in some sense, the "weaker player" is going to contribute more to the success, or failure, of a team than the stronger player.
7) When individuals or teams compete it is expected that the higher rated team will win the majority of the matches and the larger the difference between their ratings the more consistently they should win.
8) The relative difference between the ratings of two teams and the outcome of a match should affect the subsequent ratings of individuals in a relative fashion. For example:
   a) when a highly rated team wins over a much lower one there should be little or no change in their ratings
   b) when a highly rated team loses to a much lower rated team there should be a substantial rating change
   c) when similarly rated teams play each other the resulting change in their ratings should be modest
9) Matches to 15 points have less validity than those to 21 and those less validity than best 2 out of 3.
10) It will take time (data) for a rating to "stabilize" (to three significant digits) using any system but the length of time will be minimized by a good initial "subjective" placement.
11) Not only should individuals have ratings but teams should have ratings based on the individual ratings.

A Proposed Algorithm (MELO V1.1):

Initial placement would a player's current USAPA rating 5.0, 4.5, 4.0, 3.5, 3.0 After the rating system "stabilizes" (perhaps during a testing period), a player new to the system would have an initial rating (as in table tennis) that is the average of the best win and the worst loss in the first tournament played or if no losses the rating of the highest player defeated, or if no wins the rating of the lowest player lost to. For the established players as well as the new player, it is as important to not under place the new player as over place them.

A team's rating is the rating of the higher rated player plus two times the lower rated player divided by three.
(Note for singles ratings this step is skipped)

WRO = Winning team's (or single's) old rating and LRO = Losing team's (or single's) old rating

PW = Probability of winner winning = $1/(1 + K^{(3(LRO-WRO))})$ PL = Probability of loser winning = 1 – PW
(Note that 1 = 100% or certainty and 0.723 = 72.3% etc …)

K = 14 for a best 2 of 3 match, K = 10 for a game to 21, and K = 6 for a game to 15

WNR = Winner's new rating = WRO + PL / 10 LNR = Loser's new rating = LRO – PL / 10

Ongoing statistical analysis of the ratings and associated probabilities will indicate if the K values need to be adjusted as well as the maximum number of points exchanged between winning and losing players.

The difference in points between those of the winning team and losing team could easily be included in the algorithm as an additional factor in determining the fraction of points exchanged between players.