



PACS uses two separate algorithms for establishing Skill Levels for PACS players. They are independent of each other which is why players who play both (8 ball and 9 ball) will sometimes have handicaps quite different from each other. Here is a brief explanation of how the algorithm works....

Each player’s performance is evaluated on three rolling time periods, their most recent 5,10, and 20 matches. Based on their performance, the algorithm computes a “power rank” for each of those periods. Think of a players “power rank” as their batting average. It is computed using a mathematical equation. **IT IS THE SAME MATHEMATICAL EQUATION FOR ALL PLAYERS.** The power rank of a player DOES take into consideration the skill levels of their opponents. The largest determinant in the assignment of a players “power rank” is match wins and losses for 8 ball. For 9 ball, the largest determinant is “Match Points” per match. After all, that’s what determines if a team makes postseason or not. Break & runs are nice and pretty, but have little to do with a players PACS handicap. [In PACS, subjective data that is easy to manipulate is not a consideration when determining a player’s power rank.](#) Over an EXTENDED amount of time, match wins and losses are a much more important piece of data than innings. A win vs a loss is concrete while determining whether a shot was a “miss” or a “safety” is subject to interpretation by the scorekeeper. Every time a player plays a match (assuming they have played at least 20 matches in their PACS history), they are adding 1 match (the match just played) and subtracting 1 match (the match that occurred 6, 11, and 21 matches ago) in their new power rank. The algorithm is created so that when a players power rank deviates by more than 1/4 point in either direction from their current skill level in **ALL THREE of the rolling periods**, it sets up a trigger to tell me that the person should move up or down in skill level. To illustrate, the screenshot below is a real life example of how the algorithm works. All of the “power ranks” are formulas that take into account the skill level of the player, their opponent, and whether the match was won or lost. You will notice that at the point that the player got three “green lights” in all three of the rolling periods (5 match, 10 match, and 20 match), the players skill level moved from a 4.0 to a 4.5.

Skill Level	5 match power rank	10 match power rank	20 match power rank	
4.0	4.07	3.93	3.72	
4.0	4.12	4.35	3.91	
4.0	4.02	4.67	4.09	
4.0	3.29	4.35	4.11	
4.0	4.12	4.45	4.15	
4.0	4.12	4.09	3.90	
4.0	4.17	4.14	3.95	
4.0	4.27	4.14	4.12	
4.0	4.32	3.80	4.11	
4.0	4.24	4.18	4.27	
4.5	5.07	4.59	4.26	← because all 3 rolling periods are 4.25 or greater (which also caused 3 "green lights"), the player moved up to a "4.5" skill level
4.5	4.27	4.22	4.29	
4.5	4.34	4.30	4.49	
4.5	4.49	4.40	4.38	
4.5	3.89	4.07	4.26	
4.5	3.97	4.52	4.30	
4.5	4.77	4.52	4.33	

But it doesn't end there. Every player also has a tournament power rank and a non-tournament power rank. Tournament power rank includes any match that was played in postseason....therefore a play-in match would be considered a tournament match. When I am entering the person's stats every week, the very first thing I look at is the difference between their tournament power rank and their non tournament power rank. The number (the difference) is even shaded in various shades of red and green so that it jumps off the page at me. No digging required, its right there. If any player thinks that I don't know that they have had a large degree of success in tournaments compared to their non tournament record, they are mistaken. Once a player has a statistically significant number of postseason matches under their belt, it becomes an increasingly more important component in the evaluation of their skill level.

The algorithm also has tools that measure volatility and looks for statistical anomalies in a player or teams numbers. When I see numerous things for a player or a team that are extremely unlikely to occur (using rules of probabilities), I do also take that into consideration. Every player should have some volatility in their game. We are not robots. Losing streaks and winning streaks should occur and are more common than not unless you are the greenest of the green or playing at the highest skill level and rarely lose.

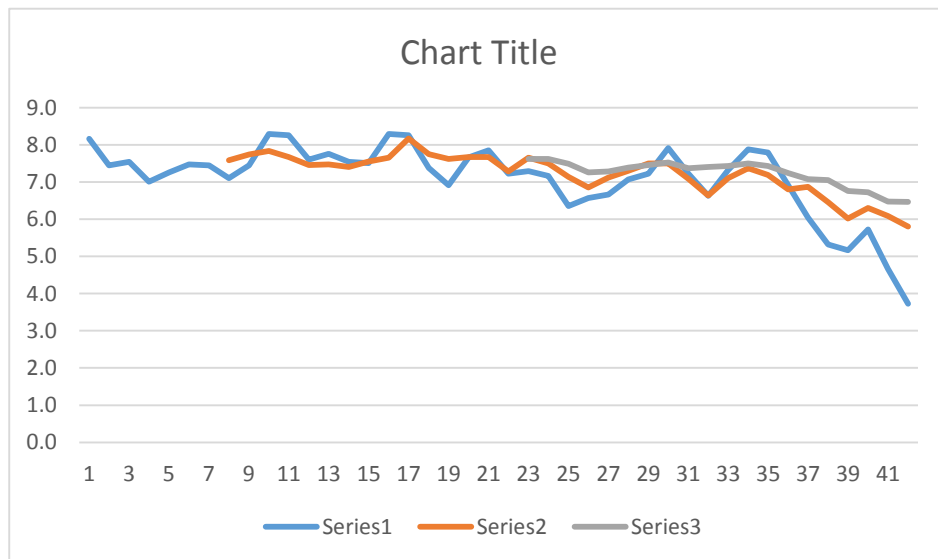
Here are just a few of the things that I would look for that would create red flags...

A player has very predictable patterns in their match wins and losses. A player who is very streaky in both directions ( like every time they are bumping up against a possible skill level change) or a player who wins 2, loses 2, wins 2, loses 2, etc. for eternity would both meet this criteria. If numerous players on a team show this pattern, it is even more cause for concern. For a seasoned player who has a roughly 50% winning percentage in their PACS career to suddenly have a 10 match losing streak, the probability of that is  $1 / (2^8) = 1 / (2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2) = 1 / 1024 =$  a 1 in 1024 probability. Other leagues might not factor in probabilities of things happening but PACS does which is why PACS is a superior handicapping system. It is highly unlikely this player will move down in skill level. Furthermore, if a player is mired in this kind of a losing streak and is rarely even getting to the hill, it is even more unlikely they will move down because it is a statistical anomaly.

A players' tournament vs non tournament power rank is light years apart. For example, if a player has played 15 tournament matches and has a power rank of 6.83 (which would indicate they shoot like a weak 7 in tournaments), but is a 4.67 (weak 5) in non-tournament play, that looks very suspicious. **MONEY (TOURNEY PERFORMANCE) TALKS**

A TEAMS tournament vs non tournament power rank is light years apart. For example, if a teams' average player power rank in tournament play is 5.72 (over multiple tournaments), but in non-tournament play, it is 4.33, that looks suspicious. **MONEY (TOURNEY PERFORMANCE) TALKS**

A player who has traditionally been a very consistently strong player has a very very steep and sudden drop off as their team is heading into the Invitational. In the chart below, the 3 lines represent the players 5 (blue),10 (gold), and 20 (gray) match power rank.



It is highly unlikely that the player represented in the chart above would move down in skill level before the Invitational as it is likely that they have not been “giving it their all”. If numerous players on a team have a sudden and extremely steep drop-off in their play, that also creates red flags and it is likely that none of these players will move down in handicap.

**8 ball vs 9 ball...** There are similarities and differences in both disciplines, so PACS believes that players should often have different skill levels in both games if they play both games at different levels compared to their peers. With that said, SOME ATTENTION should be given to a player’s numbers if they are MUCH lower in one discipline than the other. For example, if a player has played a statistically significant number of matches in each, but plays one game at a MUCH HIGHER level than the other, a “floor” skill level will probably be established. As a sports analogy, if a 400 meter sprinter has “world class” speed (like top 100 in the world), that sprinter is going to have a hard time convincing me that there are 3 billion people on earth faster than them in the 100 meter dash.

I could go on, but I think you get the idea. The algorithm is a very valuable tool and I am very confident in it. Unfortunately, I have not introduced artificial intelligence into it yet, so I still have to use a bit of my own when I see things that raise suspicion. A benefit of having a relatively small league is that I can more closely keep an eye on players who are giving strong reason to believe that they are sandbagging. That’s great news for the honest players, but not so great for the cheaters. I do try to give every benefit of the doubt to players or teams who might be sandbagging, but sometimes there is just too much evidence to ignore. New teams that are doing very well in either discipline (8 or 9 ball) comprised primarily of new players will be scrutinized a little bit more heavily as it is very possible that the players were under-ranked to start the session. If a player is frequently complaining to me or to others about handicaps, there is probably strong reason to believe that player is himself, sandbagging. As any prudent league operator should, I put no weight into anyone telling me “I would never sandbag”. Relying on numbers, tournament success, suspicious patterns and charting techniques provides a better handicapping system than rhetoric. Put another way, if it looks, walks, and quacks like a duck, it’s probably a duck. If your team is doing very well or has had recent success at tournament(s), please don’t tell me that your team is over handicapped. I won’t listen. **I PROMISE THAT THERE IS NOTHING THAT A GREAT SANDBAGGER CAN DO TO DEFLATE THEIR PAPER HANDICAP THAT I HAVEN’T THOUGHT OF. If it is determined that a player or players are a major contributor of a culture of sandbagging (cheating) for a team, any steps deemed appropriate by the league office may be imposed. These steps may include (but are not limited to)**

**Raising player(s) handicaps even if they have not played.**

**Not allowing new roster additions.**

**Suspending/banning player(s) effective immediately and without warning.**

**Suspending/banning the entire team effective immediately and without warning.**

**If any of the above happen, it will be because of OVERWHELMING EVIDENCE.** PACS expects that the affected player(s) will not be happy about it. It will be a final decision with no further negotiations or discussion. As mentioned numerous times, the goal is to be as fair as possible to the entire league. If players or teams want preferential treatment, PACS is not the pool league for them. PACS is also not for players or teams who wish to have success as career sandbaggers. If it means a player or team may occasionally quit because of my unwillingness to condone their cheating, that's fine. The integrity of the league is paramount for the success of PACS. I won't sell my soul to make a few dollars and I won't partner with cheaters. Those who want me to should find another league to cheat in.