# PowerWise

# Frequently Asked Questions (FAQ)

## 1. What is Pairwise comparison?

Pairwise comparison is a method of comparing two options at a time to rank or choose from a set of alternatives. It's a popular way to ask survey questions and is often used in decision-making, voting and studying preferences. Pairwise comparison is based on the idea that it's easier for people to make decisions when faced with two options instead of many. Here's how it works:

- Break the options down into pairs
- Have respondents pick their preference from each pair
- Record the vote and show a new pair of options
- Repeat until all options have been compared

For example, if you're starting a new podcast and have a list of 20 names, you can use pairwise comparison to rank them. Instead of trying to rank all 20 names at once, you can break them into pairs and pick your preference from each pair. Pairwise comparison is used in many fields, including:

- Psychology: Also known as paired comparison, it's used to study preferences and attitudes
- Voting systems: Used to rank candidates in elections
- Social choice
- Public choice
- Requirements engineering
- Multiagent AI systems

*The above content was taken from Googling: "Pair Wise Comparison"*

## 2. What is the PowerWise method?

The PowerWise system is based on two systems: the Pairwise system and power ratings (similar to the Sagarin method). It performs a simulated schedule where each team in a division 'plays' every other team in the division and the winner is determined by head-to-head play or best record against common opponents or the team with the better power rating. It orders based on most deserving team and not necessarily the best team. It employs a tie-breaker when teams have the same PowerWise result (PWR) based on the same criteria.

3. **What is the difference between "best" and "most deserving?"**

"Most deserving" is based on past performance and "best" is based on projected future performance. When evaluating most deserving, one examines only the current season body of work. When evaluating best, one considers not only current season of work but employs algorithms that predicts which teams that will go the furthest in the championship tournament. Rating algorithms are not necessarily predictors as in the case of PowerWise where the Pairwise does not predict the future. But the power rating does both, including probabilities of winning the championship.

4. **Why ny keep the current RPI system or use the new NPI system for division III sports?"**

The motivation for replacing the current RPI system is described at https://arxiv.org/pdf/2508.04919 The NPI system which stands for NCAA Power Index is based on win-loss records and not goal margin nof victories. In addition, it does not consider head-to-head outcomes. The Powerwise includes both.

5. **What is a "simulated" schedule in PairWise?**

The PairWise 'simulated' schedule considers a level playing field such that if there are 100 teams in a division then each team 'plays' each and every team once for a 99 game schedule. Thus, all teams have an identical schedule except for home and away sites. The teams are then ordered based on their won-loss (W-L) records based on comparison criteria.

6. **How does the PowerWise method proposed for lacrosse determine which team wins the comparison?**

PowerWise has a hierarchy where head-to-head decides the winner. If that test fails because the pair do not play each other or play but are tied in their matchups, then common opponents become the criteria. If they have no common opponents or their records are tied, then power ratings based on goal differentials becomes the determining factor.

7. **How does the hockey method determine which team wins the comparison?**

Hockey uses a combination of head-to-head records and common opponent records. If a team wins one or both of them, they are awarded the win. If the pair splits both where one team has a better head-to-head record and the other team has a better common opponent record, than a tie-breaker is employed and the winner is the team with the better RPI. RPI is also used when teams have no head-to-head matchups and no common opponents.

8. **How are power ratings computed?**

   Power ratings are determined by goal margins of victory for all games played and the power ratings take into account the strength of opponents and the home field advantage.

9. **Can a team benefit by running-up the score?**

There are two ways to prevent running-up the score. The first is to put a cap on the goal margin of victory where any scoring beyond the cap is ignored. The second way is to modify the power rating equation where the power rating difference between two teams is directly proportional to the goal margin of victory raised to some exponent. The value of the exponent determines the rate of diminishing return as the goal margin increases.

**9. Why is head-to-head so significant and take priority over common opponents and power ratings?**

In a pairs matchup, nothing seems more credible than what takes place on the field between two teams. Common opponents may be limited to just one opponent and power ratings is analytical.

**10. What does it mean that head-to-head and common opponent records are on-the-field results and RPI and power ratings are analytical?**

The former two are decided on the field and require no analysis. The power ratings are based on an algorithm and require computation of data, namely game scores, home field advantage and strength of opponents.

**11. Why is PowerWise so effective?**

It is a simple concept devoid of any mathematical complexity and when applied to sports ratings it comes down to straightforward criteria: simulated identical schedules for all teams, head-to-head matchups, common opponent records and, if necessary, a Ratings Percentage Index (RPI) for hockey and a goal differential power rating for lacrosse

**12. Why is 'simplicity' so important?**

If people cannot understand a system, they tend to distrust it. If a system is simple, it makes it more transparent and allows the individual to reproduce and validate the results. If the system is complex, it becomes a "black box" and less transparent. The principle of parsimony states that simpler explanations are generally preferred over more complex ones when explaining a phenomenon.

**13. Why is it fair?**

It is a simulation where every team 'plays' every other team; *i.e.*, identical schedules, and wins and losses are added up and teams are sorted from best record to worst record. PowerWise does not discriminate against weaker conferences as happens with the RPI.

**14. Is it accurate?**

There is no evidence that mathematically-intensive computer ratings accompanied by a committee of experts produces results any more accurate than Powerwise results. In fact, all algorithms or methods are subject to potential faulty assumptions and inherent errors due to insufficient data.

**15. Why is transparency important?**

Ideally, it is preferred to know exactly how the final results were tabulated and when results are not transparent, confidence in the procedure diminishes. Reproducibility allows an individual to validate results and predict the future based on "what-if?" scenarios only if the method is transparent.

**16. Why is consistency important?**

Teams strategize based on expectations to gain a berth in the tournament. When rating systems change, strategies change.

**17. Why is convergence important?**

Results of ratings are not released until 5, 6 or 7 weeks have passed. The top and bottom teams have taken shape and it becomes clear who the front-runners are. However, this is deceptive because many weeks are needed to resolve the majority of teams and in particular, the "bubble" teams. It has been shown that power ratings converge faster than methods which rely on only win-loss records. With a scarcity of the data, a method that converges faster will produce more accurate results.

**18. What is mathematical integrity?**

A method has mathematical integrity when (1) it does what it claims to do; (2) uses appropriate data; (3) is not biased; (4) converges to a solution; (5) has reasonable assumptions; (6) stays within the guidelines of its assumptions and (7) is properly vetted. It is mathematical heresy to discard important data; *e.g.*, game scores, especially when data is scarce to begin with (a low number of games).

**19. Why is forecasting important?**

Teams need to be able to predict what it will take to make the championship tournament. This requires "what-if?" calculations to determine the paths to getting an invitation before the remaining games are played. This includes the conference championship where an automatic bid is awarded. In order to evaluate a team's chances, the method must be simple and the calculations need to be reproducible.

**20. What does "gaming" the system mean?**

It means there are ways to schedule games such that it gives a team an advantage over other teams. For example, the RPI system favors teams that play tougher games even if you succumb to a lopsided loss. So, under the current system, don't schedule weak opponents.

**21. Why are "ad-hoc adjustments" a problem?**

Ad-hoc adjustments occur when you define a system but continue to add special circumstances that modify the rating. For example, in the NPI, overtimes, bonus points for defeating a higher ranked team, home-field multipliers and modifying the ratings against weak teams make results possibly more accurate but at the expense of added complexity and reproducing the results becomes a nightmare.

**22. Why are assumptions and arbitrariness a problem?**

Faulty assumptions or arbitrariness results in arbitrary selections, especially the "bubble" teams.

**23. What if in the final PowerWise, two or more teams have identical records?**

A tiebreaker is used similar to each Pairwise comparison for those tied teams if only two teams are tied. First is head-to-head, then common opponents and finally power ratings. If three or more teams are tied, then the process does a comparative evaluation of these teams based on head-to-head, common opponents and power ratings.

**24. Do post-season conference tournament games count?**

Yes but they are treated no different than regular season games.

Under consideration is the following:

- Conference tournament games are treated separately from the regular season.
- Pairwise comparisons apply only to regular-season games.
- Teams earn bonus points for each conference tournament win.
- The bonus points are weighted based on the strength of the opponent.
- Only the final four teams are included, while Patriot League and Big Ten play-in games are treated as regular-season contests.
- Bonus points are added to each team's regular-season Powerwise Index.
- A team cannot lose points by participating in its conference tournament.
- Teams that do not qualify for their conference tournament (such as Duke) are not eligible for bonus points.

**25. Is Strength of Schedule (SOS) taken into account?**

Yes, in the 3rd step, the power rating considers the strength of the opponent in determining a team's performance against that opponent along with the goal margin of victory.

**26. What does coupled and uncoupled strength of schedules mean?**

A coupled strength of schedule means that a team's SOS is determined by the strength of its opponents and its performance againsts its opponents. An uncoupled SOS means that a team's SOS is based on the strength of its opponents but NOT its performance against its opponents. That means a team can have a very difficult schedule and get credited for a difficult SOS regardless of the outcome of its games. The RPI's SOS has come under criticism for this reason.

**27. How often is head-to-head or common opponents the criteria that determines the winner?**

It depends on the number of teams in a division and the average number of games played by a team. In men's Division I lacrosse, there are 76 teams with each team playing an average of 16 games. Head-to-head winners occur about 20% of the time and common opponents about 45%. For men's Division III lacrosse with 242 teams, head-to-head occurs only 5% of the time and common opponents occurs 20% of the time.

**28. Why is the home/away site not taken into account when considering head-tohead or common opponents?**

It would not only make the system more complex, it would also punish a team unfairly. Consider a heavy favorite playing a weak team at home and defeating the weaker team. It would receive less than 1 point for a win. Now consider another strong team playing that same weak team and playing away. It would receive greater than 1 point. Why should one strong team receive a boost when both strong teams could defeat the weaker team regardless of playing home or away?

**29. If a team plays a weak team, and wins handily, can you still lose points?**

A team cannot lose points by defeating a weak team, provided it defeats the underdog by at least the predicted goal margin determined by the two power ratings or the goal margin limit, whichever is less. However, the RPI will punish a team for playing a weaker team because a major component in the RPI is the SOS and playing a weak team by definition reduces the victorious team's SOS.

**30. If you schedule weak teams, does that hurt your ratings?**

The PowerWise method does not punish teams for playing much weaker teams provided it plays up to goal margin expectation. However, playing too many weak teams places more emphasis on the stronger teams it plays.

**31. Can Powerwise be used for other sports?**

Yes. It currently has been successfully tested against division I football, basketball, hockey, baseball/softball and lacrosse.