



Handicapping: Some Less Desirable Methods

Background

Over the years we (TopYacht) have spoken to a large number of clubs and in particular to handicappers. Two things stand out:

- Everyone seems to handicap differently.
- There are at least two handicapping systems that provide a very poor basis for sensible handicapping. Consequently neither of these methods is directly supported within TopYacht.

Not-So-Good Method One.

The “Knock Back” Method.

This method has been around a long time. It is very easy to apply and that has undoubtedly been its big appeal, particularly before the days of desk-top computers to do the calculations.

- The handicap of the winning boat has its handicap increased by say 5% or 10 points;
- The second place getting has their handicap increased by say 3% or 8 points; and,
- Third place getter has their handicap increased by say 2% or 1 point and all other handicaps are left untouched.

There are many variants of this form of handicapping.

There are two significant problems:

1. Observations of lots of performance graphs, from lots of boats in lots of races, across many clubs has clearly shown that all competitors performances vary from race to race.

However, most competitors’ performances fluctuate around an “average” performance-value.

Occasionally they perform considerably above their average (they were in the right place at the right time when they picked up a wind change), or considerably below their average (they were in the wrong place at the wrong time when they picked up a wind change).

However, for most races they will perform within +/- 5% of their average value.

Under the knock back system they can have their Allocated Handicap knocked back just because they had one particularly good race, regardless of whether the winning margin was one second, one minute or one hour. This seems rather unfair. A better handicap system considers the performance trend of the competitors rather than just the outcome of each race on its own.

2. Consider the following two examples.

Example 1.

In a tiny one-design fleet there are three boats called Alpha, Beta and Charlie. They are sailed by three sailors who are all reasonably competent. At the start of the season they are allocated a handicap of 0.950. The handicap system employed for this tiny fleet will only increase the Allocated Handicap of the winner.

In Race 1, Alpha beats Beta by 1 second over the line, with Charlie a further 3 seconds behind. This was in a 100 minute race.

Alpha has his Allocated Handicap increased by 10 points to 0.960.

In Race 2, Beta just beats Alpha across the line by 2 seconds with Charlie a further 3 seconds behind in this 100 minute race.

On corrected time¹:

Beta has a corrected time of $100 * 0.950 = 95$ minutes.

Alpha has a corrected time of $100.05 * 0.960 = 96.05$ minutes

Charlie has a corrected time of $100.1 * 0.950 = 95.095$ minutes.

For Alpha winning the Race 1 by 1 second, it now has to sail Race 2 better than a minute faster to win!!

Example 2

In this tiny one-design fleet there are three boats called Alpha, Beta and Charlie. These boats are sailed by three sailors who are all reasonably competent but the boats are quite different in weight with Alpha being the lightest by far, then Beta, then heavy-weight Charlie. At the start of the season they are all put on a handicap of 0.950. The handicap system employed for this tiny fleet will only increase the Allocated Handicap of the winner.

In Race 1, and limited only by their boat weight, Alpha beats Beta by 6 minutes with Charlie a further 4 minutes back.

This was in a 100 minute race.

So Alpha has his Allocated Handicap increased by 10 points to 0.960

The other two boats remain at 0.950.

In Race 2, and not surprisingly, Alpha again comes in first then Beta then finally Charlie.

Alpha's Elapsed Time is 100.0 minutes

Beta's Elapsed Time is 105.0 minutes

Charlie's Elapsed Time is 109.5 minutes.

On corrected time

Alpha has a corrected time of $100.0 * 0.960 = 96.00$ minutes

Beta has a corrected time of $105 * 0.950 = 99.75$ minutes.

Charlie has a corrected time of $109.5 * 0.950 = 104.00$ minutes.

Again this seems quite unfair. Alpha won by 6 minutes in the first race. As his Allocated Handicap has only been adjusted down a tiny amount, he will continue to win many of the future races on handicap. Eventually the handicap system will catch up with him but not before he has won the Handicap Series.

These examples are obviously extreme, but they illustrate the point that a handicap system that adjusts for a place rather than adjusts by an amount related to relative times is not a fair system. Further by only adjusting a first few boats it will take a long time for the HC system to stabilize.

¹ The definition of Corrected Time is the Elapsed Time multiplied by the Allocated Handicap

Not-So-Good Method Two.

Another older handicap system provides each boat with a handicap in the form of a 'handicap time'. This system is valid if it relates to a race of known duration, but has little validity if that single handicap time value is expected to provide fair handicapping for races of any length.

Without doubt it is much easier for sailors to think in terms of 'I must cross the line 27 seconds in front of Fred to win' rather than to think 'My handicap is 0.890 and Fred's handicap is 0.899 so must get over the line a bit before Fred to beat him'. So this system has a definite appeal.

However, handicaps are a **relative** measure of the performance of competitors. Put another way, the relative performance of competitors can ONLY be directly compared as a *ratio* and **not** as a *difference*.

Note: The following refers to Time on Time handicapping and **not** to Time on Distance handicapping which automatically provides the second parameter necessary to allow a Handicap time to be specified.

Example 3

Jim is just a bit quicker than Fred around a race course. If Jim has a handicap of 1.000 then Fred may have a handicap of 0.990. This means that Fred is only 99% the speed of Jim. If Jim takes 120 mins to go round the course then Fred should take $120 * \frac{100}{99} = 121.21$ minutes. I.e. Fred is 1.21 minutes slower than Jim.

Consider the case of a 60 minute race for Jim. Fred it would take $60 * \frac{100}{99} = 60.61$ minutes. I.e. The time difference is 0.61 minutes.

Clearly it cannot be said that 'Jim must beat Fred by 1.21 minutes'.

Mathematically valid handicaps are usually expressed as a 'Time Correction Factor' (TCF). To translate a TCF handicap into a Handicap time then the length of time the fastest boat will take must be specified. Consequently, the additional time each of the slower boats is likely take can also be specified. If a race is intended to last 120 minutes for the fastest boat (Jim), Fred' predicted finish time will be 1.21 minutes later. So both Jim and Fred now know the time difference that is required for Jim to beat Fred.

However, if the planned for 120 minutes time for the fastest boat does not eventuate due to fickle winds and Jim takes 200 minutes to finish the course, then the 1.21 minutes predicted separation is no longer valid.

So while this handicap time is a useful guide for the competitors, it is not a valid quantification of their relative performances. Using the TCF will still indicate that Fred is going to be only 99% as fast as Jim, and will take $\frac{100}{99} = 1.01$ times as long to complete the course: in this case being 202.02 minutes.

Conclusion.

Handicaps provide a **relative** performance measure not an **absolute** one.

² The numbers "100/99" reflects the fact that Fred is only 99% the speed of Jim.