Speed in Computer Handicapping - Part 1
by Joe Mainardi

In virtually every book I've ever read on thoroughbred handicapping, I've *never* seen an author fail to discuss the Speed Rating and Track Variant, an integral part of the *Daily Racing Form* past performances. While many authors say that these numbers are useless, a few authors defend them. Like Howard Cosell, you either love them or you hate them; either way, you should find interesting the things that I discovered when I did some simple research.

Let's review how the *Daily Racing Form* computes these two figures. The Speed Rating is calculated as follows:

1. **Subtract the final time of the past performance (PP) from the three-year best time at the distance at that track.** For example, if the time for a 6 furlong PP is 1:10 3/5 and the three-year best at 6 furlongs at the same track is 1:08 2/5, then the difference is 2 1/5 (2.2) seconds.
2. **Multiply the difference by 5.** This is an inaccurate estimate; a closer estimate would be 5 1/2 lengths per second! Regardless, it's what we have to live with. Following our example, we get 2.2 times 5, which equals 11.
3. **Subtract this result from 100 to arrive at the Speed Rating.** In our example, when you subtract 11 from 100, you arrive at an 89 Speed Rating.

Calculating the Track Variant is easier that it appears. To compute the Track Variant, you perform the following steps:

1. **Separate the Track Variants for the entire day into eight categories.** There are three separate areas with two choices each (2*2*2=8): distance (route/sprint), surface (dirt/turf) and condition (dry/off track).
2. **Sum the appropriate Track Variants and divide by the number of races in each category.** In the example, if the sprints for a particular day produce values of 4, 10, 11 and 23, you get a Track Variant of 12.

Looking at this last step, you can see where the problems begin. While the Track Variant is a 12, it is skewed by the races that created the 4 and 23 Track Variants. The race in our example has a line of **89-12**, which appears to be reasonable, but the slowest race has a line of **77-12** and the fastest race has a line of **96-12**. These two races are not very good indicators of the abilities of either of those two winning horses on that day. It should be noted that this discrepancy is a by-product of the individual races. This problem would just as likely exist on Breeders' Cup Day as it would on a Thursday at Hialeah!

Good speed handicappers know how to create accurate figures from the Speed Rating and Track Variant. This month's article covers speed calculations using the Speed Rating and Track Variant, as well as one for the Beyer Speed Figures. While the formulas look complicated, a computer program like **Hor$ense** does the work in no time.

Before getting started, I have listed all of the abbreviations used from here on. Here they are:

PPDIST - distance of the PP
FIN - final time for the PP
LBF - number of lengths behind at end of PP
LPSF - lengths per second at end of PP
PPREC - adjusted best time for the PP
PP3YR - computed 3-year best at distance of PP
SR - Speed Rating
TV - Track Variant from PP

PTV - Track Variant for the individual PP
ATV - adjusted Track Variant
FTV - filtered Track Variant
RCT - likely number of races used to compute TV

BSF - Beyer speed figure
FBSF - sprint/route factor used in determining a BSF
DBSF - distance factor used in adjusting a BSF

Speed Rating & Track Variant:

Using the Speed Rating and Track Variant to estimate speed requires a somewhat complicated formula. The reason for this is that the raw Track Variant is not an accurate indicator by itself (as noted above), and must be heavily modified. Along with the Speed Rating and Track Variant, other information is needed.

The first equation is for the 3-year best at the PP distance. Start by taking the final time of the PP and add the result of the number of lengths back the horse was at the finish divided by five. The next step is to subtract the Speed Rating from 100 and then divide that result by five.

The final equation is: PP3YR = (FIN + (LBF / 5)) - ((100 - SR) / 5)

To produce the PP Track Variant, you subtract the 3-year best from the final time of the PP and multiply by five.

This equation looks like: PTV = (FIN - PP3YR) * 5

NOTE: Remember that we must use the 5 lengths per second supplied by the *Daily Racing Form*.

Now we need to create an *adjusted* Track Variant. If the Track Variant from the PP and the Track Variant from the above equation are equal, then the ATV equals the PTV. When TV does not equal PTV, the adjusted variant requires major calculating. We want to come up with a number that represents the likely number of races used to create the Track Variant, which is then used to estimate the adjusted Track Variant. If the PP was run on the turf, then it is likely that there were no more than two turf races run at that distance type (sprint or route). If the PP was a dirt race, you have two ways to go. If the PP was a route (PPDIST >= 1 mile), then an acceptable estimate is three route races. For sprint PP's, there were probably five sprint races run that day. This number is assigned to the RCT variable.

Now that we have established RCT, we can apply our previous work. I use the "80/20" rule, where the Track Variant for the individual PP is worth 80% of the adjusted Track Variant, while 20% is filtered with a filtered track variant.

This is the equation: $FTV = ((TV * RCT) - PTV) / (RCT - 1)$

In simple terms, the filtered variant estimates what the Track Variant would be if we didn't include the PP that we're analyzing.

We've finally arrived at what I refer to as the past performance record for the PP (PPREC). By subtracting the ATV from the PP variant and dividing the result by five, and then adding the 3-year best, you come up with that value.

Here is that equation: $PPREC = PP3YR + ((PTV - ATV) / 5)$

Yes, the formulas are complicated..., but at least YOU didn't have to develop them!

Beyer Speed Figures:

By comparison, the Beyer Speed Figures are much simpler to calculate. We first calculate the lengths per second at the end of the race. This is done by taking the PP distance in furlongs and multiplying it times 66 lengths per furlong, and then dividing by the final time in the PP.

The equation is: $LPSF = (PPDIST * 66) / FIN$

Next, we use a factor that is calculated directly based on Beyer's original work in his "Picking Winners" book. If the PP is a sprint, then the factor is 14.56; for routes, use 14.36 as the factor.

The next step is to compute a distance factor that adjusts PPREC for the distance of the PP.

Here is the equation: $DBSF = (FBSF * LPSF) / PPDIST$

In much shorter order, we arrive at the past performance record using a Beyer speed figure.

This is the equation for it: $PPREC = (FIN + (LBF / LPSF)) - ((120 - BSF) / DBSF)$

The 120 in the equation represents the likely maximum for a BSF; this estimate comes from the *Daily Racing Form*, various articles and books. *That's it for the Beyer Speed Figures!*

Now that we have a past performance record (PPREC) for both types, I'll use it to compute the average time per furlong of the PP. In turn, this ratio is compared a similar ratio involving the three-year best at the distance of the current race. From the compared ratios, I compute an estimated final time.

We'll look at a few examples in the next article. Just hang in there, it should get easier. Speed estimating is the most difficult to explain. That's why computer programs are such a valuable tool... they take the tedium out of jobs just like this.

And now… for part two…

Speed in Computer Handicapping - Part 2
by Joe Mainardi

I've given everyone a full month to recover from the dizzying heights of the theories behind the Speed Rating/Track Variant (SR/TV) and Beyer Speed Figures (BSF) methods... so let's see how we do with some examples. From this data, you should be able to see what the differences between these two speed methods. In all cases, I have taken actual PPs from actual races (but I've withheld the names to protect the guilty). So, pull out last month's article – for reference, not to beat me with – and let's get started!

To keep things simple, I will use PPs that are at the same distance as the race being contested; different distances require additional computations that are both quite involved AND can be used as a sleep aid.

Sprint Examples:
For the sprint examples, I have chosen a six furlong race.

The first PP is for that famous "Horse A". The details on the data are:
    PPDIST = 6, FIN = 69.1, LBF = 6, SR = 89, TV = 12, BSF = 86
    PPREC based on SR/TV is 67.75, used in calculating an estimated final time of 1:10.50 seconds.
    PPREC based on BSF equals 67.70, used to estimate a final time of 1:10.55 seconds.

By using the fastest of the two times to estimate the seconds per length, we arrive at a figure of .178 seconds per length (1:10.50 / [66 * PPDIST]). The 66 is the number of lengths per furlong. Since the difference between the two times is .05, the two estimates are only about 1/4 length apart (.05 / .178 = .281). This is a case where the two numbers are very close. Let's look at one that is farther apart.

The next PP is from the equally famous "Horse B". Here are the numbers:
    PPDIST = 6, FIN = 69.9, LBF = 2.75, SR = 88, TV = 11, BSF = 84
    PPREC based on SR/TV is 67.96, used in estimating a final time of 1:10.52 seconds.
    PPREC based on BSF is 67.77, which is used to compute an estimated final time of 1:10.73 seconds.

Using the "fastest estimate" method from above, we again arrive at a figure of .178 seconds per length. In this case, the difference between the two times is .21, which means that the two times are just under 1 1/4 lengths apart (.21 / .178 = 1.180). This comparison points out the differences between the figures used in the two methods.

The results are:
    The SR/TV method, "Horse A" is about a head winner (.03 seconds) of "Horse B"
    The BSF method gives "Horse A" the nod by a little more than a length (.18 seconds) over "Horse B".

I don't know about you, but I would have a higher level of confidence in "Horse A" than "Horse B".

Route Examples:
Now let's shake that confidence a little bit. For the route examples, I have chosen a 1 1/16 mile race.

The first PP is from the illustrious "Horse Y". The numbers are:

PPDIST = 8.5, FIN = 103.5, LBF = 0, SR = 81, TV = 22, BSF = 86
    PPREC for the SR/TV method is 99.52, used in calculating an estimated final time of 1:43.68 seconds.
    PPREC for BSF equals 99.79, used to estimate a final time of 1:43.40 seconds.

The same formula from above still applies, and we arrive at a figure of .184 seconds per length. Since the difference between the times is .26, the two estimates are about 1 1/2 lengths apart (.26 / .184 = 1.413, for those of you without calculators).

The second PP comes from the infamous "Horse Z". The values are:
    PPDIST = 8.5, FIN = 103.5, LBF = 9, SR = 72, TV = 23, BSF = 72
    PPREC for the SR/TV method is 99.46, used in estimating a final time of 1:45.41 seconds.
    PPREC for the BSF method is 99.92, which is used to compute an estimated final time of 1:44.93 seconds.

Using the same methods as before, we arrive at a figure of .187 seconds per length. In this case, the difference between the two times is .52, which means that the two times are more than 2 3/4 lengths apart (.52 / .187 = 2.781). Once again, a big difference, but it's really uglier than it appears... if that's possible.

Here are the results:

The SR/TV method, "Horse Y" is about a 9 1/4 winner (1.73 seconds / .187) of "Horse Z"
The BSF method gives "Horse Y" the nod by a nostril more than 8 1/4 lengths (1.53 seconds / .184) over "Horse Z".

No real surprise here, and "Horse Z" certainly won't be in my Exacta!

Great, Joe! But what does all this mean? I'm so glad you asked. As you can see, the Speed Rating and Track Variant are NOT totally useless, if you have enough extra information to use them properly. My figures are typically close to the Beyer Speed Figures, but some discrepancies do occur. The reason for this is that the Beyer Speed Figures are based on times ***at certain class levels***, and the Speed Rating and Track Variant are raw numbers.

I view the differences in two ways:
1. From the **pure speed** point of view, then the estimated times computed using the Speed Rating and Track Variant are probably more accurate. This is best when handicapping speed and class separately.
2. If your handicapping style combines speed and class, then using the Beyer Speed Figures are probably better suited to your needs.

These are very accurate formulas, but they might not align with the system that you use for the way that you handicap. If you're going to create your own formulas – in a commercial program, or just for making lots of loot on your own – then make sure that they really work before investing any of your hard earned money. Start with quality, then work on making a profit. The profits will come in time. There are no quick fixes or shortcuts in handicapping!