Treneru lamatas, jeb nepareiza zinātnes izpratne

A coaching pitfall or misapplying science.

Guided by his many years as a top international coach and his powers of reflection, Peter Coe, deliberates three coaching principles for seeing athletes through to the top.

The thoughts I'd like to express in this article arose from Frank Horwill's robust empirical defence of his findings using the Balke Test when compared with laboratory tests which were used forecast different outcomes. Horwill's argument demonstrates how easily science can be poorly applied and misunderstood. Of course, as coaches we should certainly be willing to engage with science, but unfortunately we start with a major problem. We have a population that has, at best, barely a nodding acquaintance with science but has a widespread belief that science has an answer for all of their everyday problems. If they don't get a pill or an antibiotic but only good advice from their GP they feel cheated. This is doubly unfortunate because the GP will often be their first serious encounter with science.

Over the years my association with physiologists seriously interested with exercise and testing has been very fruitful – first with Dr. John Humphreys at Leeds Carnegie and now with my current guru Professor Davis E. Martin of Georgia State University from whom I continue to learn. Professor Martin is that rare thing, a serious academic scientist who in his own words "understands the war in the trenches". And by that I mean the actual practice of coaching runners.

Turning my attention back to the validity of ideas and theories, the wise selection of useful scientific information by coach isn't an easy thing to do. The art of this process in my opinion is in first knowing your sources. It is not easy for many whose only sources are the hints, claims and suggestions in many popular journals and sadly the law says that ignorance is not much of a defence. Also it doesn't help when trying to apply science. World-wide there are some very good brains beavering away at the frontiers of new knowledge. But in all fields the knowledge is far in front of the know-how of useful application be it astrophysics or medicine.

I am guided as a coach by three scientific principles, and discussion of these is what I'd like to devote the next section of this article to. The first principle that I'd like to refer to is that there isn't anything such as a certainty. In other words, no theory can be shown to be correct-only that no one has yet devised an experiment to show that it

is wrong. All that we are left with, then, are degrees of probability that can vary from high to low.

The second principle I'm guided by, which came to me in the words of an old Swiss lecturer who saw me struggling over an applied maths problem, was that when ever you are stuck go back to first principles and apply some basic reason to the problem bogging you down.

My third principle comes from the fourteenth century English philosopher, William of Occam, who said, "Entities are not to be multiplied beyond necessity." Which I interpret to mean, if in doubt try to keep things simple because aiming for simplicity is smarter than worrying about appearing dumb.

Now despite the many articles written about human exercise physiology it means a very deep and complicated subject. The problem for most coaches, therefore, is that they do not know enough to make a decent attempt at evaluating all the snippets they get from the media or in lectures. For a long and successful career for their athlete(s) much depends upon the coach's ability to select his or her sources of information carefully and wisely. Life is often unfair, and the coach today is almost in a no-win situation. When a coach applies any scientific claims or finding to assist his or her athletes, the responsibility for the outcome is theirs. After all, it was their selection and application of available information, not that of some other person.

Thorough my working life both as a professional engineer and when coaching runners I have profitably used scientific advice but the manager must carry the can for bad selection. In manufacturing engineering, for example, the toolmakers are very skilled workers and one mistake on a large die can be extremely expensive. No wonder they say, "Look twice before you cat once".

At this point I would like to return to the three principles I introduced above and speak more about each one. To begin, as I stated earlier, principle number one is: There isn't any certainty, only degrees of probability.

To make my argument for this principle consider as an extreme example the proposition that the sun will always rise in the east and set in the west. In your lifetime it is a good bet, but even if the earth avoids a cosmic disaster it will stop spinning until it always presents the same face to the sun. Therefore, because the earth has been measurably slowing down for a long time this is only a very high, but still diminishing probability.

Horwill felt secure in his argument about the validity of the Balke Test because he had verified his application of it by having an athlete perform and demonstrate the accuracy of his assessment. He was working empirically.

And it's here where keen, sharp observation of the athlete's performance in training and racing is essential. A quick look at a stopwatch may be all the time you can have to take your eye off the performance. You will not notice the early development of fault in style, foot placement, stride length and response to suddenly imposed strong stimuli while fiddling with gadgets. I quickly spotted the inherent danger of working with gadgets which record only small bits of information while missing the big

picture. I refused all others of video recorders and heart rate monitors because they would have diverted my attention from carefully observing and digesting what I saw. Of course my strictures on video recording do not strictly apply to highly technical field events and sprinting. Even so, ideally one should have a good camera assistant. Your attention as a coach should be on watching performance without being distracted by technical problems of lighting and recording.

Principle number two – subject your actions to the light of reason – is related to another crucial point I feel compelled to discuss: specificity. For how well this is observed will always be reflected in the runner's performance. It will ensure lean economic training without wasted effort. To apply this principle begin by clearly defining your long term goal. Although at the right time some serious cross-country or road running may be a correct part of an athlete's training it is not part of the main goal. The runner with a high ambition must not become a "Jack of all trades". The most successful training is always the most specific. And at no time should the coach feel afraid to ask, Will what I'm having my athlete do produce the desired super-compensation during recovery?

Before setting and commencing any training session remind yourself of exactly what you want to achieve from it and then carefully analyze the content to make sure that aim will be achieved. For example, consider the use of high altitude training. When contemplating whether to utilize this type of training, ask yourself first, What is the distance of my athlete's main event? If it's the 800m, you should consider how the needs of an 800m runner might differ or be the same as those of a 10,000m runner. It might also be wise to consider if there are any serious disadvantages from long term or frequent spells at altitude. For example, as science has shown, the value of increasing VO2max varies with the event distance. An analysis of the 800m shows that the VO2max is not the main retarding factor especially at world class level. No world record, for example, in any distance event has been set in high altitude. At high altitude it is impossible to train at, and thus acquire, the speed and intensity at which modern world class distance running is performed.

Not so long ago which way to stretch or not to stretch was the flavor of the month, a useful topic for debate. Differing theories and opinions were offered but the populations in the tests seemed to be rather small for such positive assertions. Over many millennia nature has endowed its many species with instinctual behavior to assist or enhance their survival. I am sure that dogs and all cats, domesticated or the big wild ones, do not ponder deeply before stretching. It seems to me that some suggested training methods become adopted like fashion products when more serious testing could yield more information. When is sub-lactate threshold running useful? Does it contribute to a real step up in top level performance when it is so much slower than the pace required for max adaptation by the muscles? What use does it have in training for the extended sprint of the 800m? What special sessions should be used to cope with modern marathon racing in which they reel off sub five-minute miles with several at 4:40? These are just some of the questions related to specificity that I feel coaches today must continually ask themselves in order to get the most from their athletes.

Finally, my third principle, Occam's principle. Intended use of this principle was to simplify the search for the truth in the disputations of the old learned. The advice of

this principle is to avoid introducing too many unknowns into a problem. This is most apposite when evaluating the results of a Graded Exercise Test (GXT). Here the unknowns are the variations in results obtained from different locations. When training overseas or in any different training center with its own testing facility, it is easy to introduce many variables. Eager athletes or coaches hunting for the rise or fall in the athlete's score can easily receive varying results. The variables that may influence the results either directly or indirectly are many, and these are some examples ranging from the more obvious to the more subtle and it is all under protocol:

1. VO2max for the same runner tested on a treadmill will be different if taken on bicycle;
2. Another test center will have a different environment and different protocols;
3. Changes in laboratory temperatures will have an effect on test results;
4. Procedures may look very similar but the protocols of different personnel have their own fingerprint;
5. Duplicating the athlete's condition at the time of testing would be very difficult;
6. Did the athlete arrive for his or her test after the same morning bathroom routine, with a full or empty stomach, at the same time of the day and in the week and having followed the same two or three days training as the previous test;
7. Equipment especially in laboratories raises the problem of accurate and reliable calibration.

I have had for many years good blood pressure readings, rather low for my age, but sometimes in a hospital when an electronic recorder was used it gave a way off reading. My challenge was not always well received but the machine was always sent away for recalibrating whereas they always got the reading I knew from the old time spygmomometer, which is a fancy name for a graduated tube plus a stethoscope. This is a simple instrument but a reliable one, like Horwill's Balke Test, in which all he need was a watch and a mark where the runner finished. I also had a test recently on a leg extension machine which provided a wildly off reading. I could tell from the sudden fall and rise of the load during the test that the machine was not in order. Any mechanic could have figured that.

So it goes, then, that no thing is exactly so. The value of metrology is that the order of accuracy has to be defined. Clearly regular physiological testing is absolutely necessary to meet the demands of high class competitions but be aware that all things have limitations. Your test printout will be more use to you if you better understand some of the problems of testing and what order of accuracy you can expect. Setting up the correct protocol for a thorough GXT, as I illustrated above with my partial list of protocol variables, is a carefully detailed and complex matter. However, to ensure the best results when using GXTs to assess progress always use an unbroken series at the same center.

Full article available on The Coach magazine.