THE

'Intelligence Revolution'

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Exercise Measurement Technology

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The field of sport science has a long and illustrious history. The Ancient Greeks published detailed material on health and strength, producing training plans for their Olympic athletes. The Renaissance was a boon for the field as well, once the inner workings of the human nervous and circulatory systems were first described in detail by modern science.

But for the thousand-odd years that physiology has been studied, measurement techniques have lagged behind our ability to analyze the results. We have always had theories, but lacked ways to test them.

Despite the success of the scientists of the past, the biggest limiting factor in research and development was always *delay*. A physiologist would study living people and discover the habits of the most successful athletes. They would attempt to explain why these particular habits were successful, and would suggest refinements, but testing those theories was difficult. It takes time to see results.

Moreover, scientists had no way of knowing what was actually happening in the human body while training was taking place in the field. This made testing small adjustments nearly impossible.

After the invention of the portable heart-rate monitor in 1977, this began to change: sport science was no longer confined to the laboratory. Training became more scientific with instantaneous feedback on adjustments to intensity levels, allowing physiologists to directly measure cardiovascular improvement and fatigue.

Since then, there has been a proliferation of incredible physiological measuring devices, providing data on all facets of sport and exercise.

PERFORMANCE LAB

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Analysis is now lagging behind tech

Now, thanks to the constant exponential increase in computer performance, we have more technology – and more high-resolution data – than sports scientists can handle.

The possibility of combining accelerometer and heart rate data with weather information, terrain maps, locally-measured barometric data (and so on) is an unprecedented achievement, but it is the job of physiologists to learn to interpret this data in a meaningful way. More importantly, it is a physiologist's job to provide *meaningful advice* to the athlete. Modern analysis techniques can, and should, provide a clear picture of what the athlete is actually doing.

It is no longer enough to simply tell an athlete that their heart rate is slow and that they should perform better. Instead, we should detect and analyze an athlete's technique, and determine how they can perform better.

This is the known as the 'intelligence revolution' in personal training. Once we can responsibly move from asking an athlete to simply change their speed, to asking the athlete to change their technique, everything changes.

The barrier

The barrier between the current state of sport technology and this 'intelligence revolution' is the sheer bulk of possibility. The more data we have to analyze, the more possible interpretations we can make. We can't in good conscience tell an athlete that they are suffering from muscular fatigue unless we know what other athletes' biometric data looks like on a similar incline, in similar weather conditions, with a similar training history.

An analysis tool capable of providing true coaching requires data from thousands of athletes of all ages, conditions and aspirations, collected over years of testing and analysis, as well as very advanced real time analysis techniques.

Performance Lab has been working on such a tool for 20 years.

The 'ARDA' Engine

Performance Lab is a high-performance training consultancy. Unusually, Performance Lab spends little of its time coaching players from on the side of the pool or track. Most of its effort is spent coaching athletes from all over the world, remotely. Athletes collect as much raw data as possible from their workouts (using portable ECGs, accelerometers, GPS, etc.), and send it to the Performance Lab team. Performance Lab uses patented software analysis techniques to study the data and provide very specific, directed coaching.

This method has been hugely successful for a very long list of well-known competitive athletes, as well as for people working out for health and general fitness. The software includes wisdom garnered from training over 3,000 people (from elite to sedentary) over that time.

Performance Lab has been patiently waiting for exercise measurement devices to evolve to the point that they can run this analysis software, known as ARDA, in real-time, embedded in a device attached to an athlete.

Through advances in sensors (cost and miniaturization), technology convergence, processing power, and through the saturation of GPS-enabled devices, mobile devices like phones (or even wristwatches) are now able to perform the kind of fast data analysis and interpretation that ARDA technology requires to operate in real time.

A prototype of the ARDA Coaching Platform has been implemented, and is capable of providing true performance analysis and technique correction to athletes on today's mobile devices, and Performance Lab (trading as PLTech) is currently approaching hardware vendors to license the engine.

> *For more information, or to schedule a tech demo of the ARDA Coaching Platform, please contact:*
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