

What is Sports Science and What can it do for You?

By Wayne Goldsmith

There are several good reasons why successful coaches use sports science and sports medicine in their training and competition programs:

- Sports science and sports medicine can be the **OBJECTIVE of the SUBJECTIVE!** The nature of competitive sport is highly anecdotal and emotional. Elite Sport is about all the highs and lows of the achievement of excellence in high pressure situations. In this environment, sometimes it is difficult to be objective and analytical about performance and what needs to be done.
- Applied sports science and sports medicine offer a link between current research ideas and findings and the practical application of these new discoveries to the enhancement of sporting performance.
- Sports science and sports medicine by their nature require the use of analytical thinking independent of bias and prejudice. Their aim is to challenge what's known to develop new and better ways of doing things. They are less likely to be tied down by tradition, habit and routine.

The effective use of sports science and sports medicine for the practicing coach comes down to these key principles:

- WHAT TO DO
- WHY TO DO IT
- HOW TO DO IT
- WHEN TO DO IT
- HOW MUCH TO DO
- HOW TO MEASURE THE EFFECTS OF WHAT HAS BEEN DONE

This last principle – “How to Measure the Effects of What was Done” is crucial in the process. One-off sports science / sports medicine activities have limited value. A single lactic acid test is of limited value unless it is accompanied by a thorough analysis, a discussion of results with the coach and athlete; a plan and program designed to improve performance based on test results and a retest program designed to compare changes in results over time.

It is important to remember:

- **Nothing works in isolation.** Having a program based on one sports science discipline at the neglect of all others is not going to be effective.
- **Science is not a short cut.** It is not instant. It is not the easy way. It is not the only way. It is just one of the many tools a coach can use to get the job done.
- **Be wary of the quick fix solution.** Advertising and marketing of “guaranteed improvement” pills, programs and potions rarely do anything except make your wallet lighter.
- **No coach can be fully qualified in all the sports sciences and sports medicine.** An important skill of successful World Class coaches is to know when to call in the skills and experience of experts in the sports sciences and then manage them into a team based approach to successful performance.

What is Sports Science and What can it do for You?

BIOMECHANICS

Biomechanics is the study of how mechanical principles and physics apply to the movement of living. It is literally the “physics and mechanics of life”.

An understanding of biomechanics and how it relates to efficient, effective movement is essential for all coaches. In elite performers, the ability to maintain technical excellence under conditions of fatigue and pressure is vital for optimal performance.

An important aspect of biomechanics is the rapidly growing and exciting field of technique analysis where simple biomechanical techniques and readily available technologies such as video cameras are used in a practical and effective way to improve athletic performance.

PHYSIOLOGY

Without doubt physiology is the most discussed, most written about, most widely researched area of sports science. Whatever you call it – sports physiology, exercise physiology – it is the study of how, why, when and where physiological responses and adaptations occur during training and competition.

In most sports BIOMECHANICS and PHYSIOLOGY are intricately linked. As athletes fatigue, technique often breaks down. Inefficient technique means the body has to work hard and use more energy to maintain the same activity / power level. This leads to even greater fatigue and eventually to significant performance decreases.

It is important that athletes practice maintaining excellent technical skill in times of physiological fatigue during training.

In elite team sports where key tactical decisions are often made prior to breaks in play, (quarter time, half time etc) it is vital that the high performance coach understands and can identify the effects and indicators of fatigue and make the appropriate strategical changes at the right time. Players demonstrating fatigue through poor decision making, slowing down in play or a reduction in skill level need to be replaced or interchanged at the appropriate moment to maintain the momentum and playing standards of the team as a whole.

PSYCHOLOGY

Sports psychology is the branch of sports science that deals with how the mind works during training and competition.

An important concept for all coaches is understanding that just as PHYSICAL TRAINING (technique, sporting skills, speed, strength, power etc) all need to be practiced throughout the training program, MENTAL training should be an integral part of every training session.

What is Sports Science and What can it do for You?

Again the interdependence of sports sciences is important to note here. A well trained athlete who has spent many years of training to achieve optimal performance physiologically and biomechanically must also possess the psychological skills to be able to use these physical skills in times of fatigue and pressure in competition.

This relates specifically to the pressures of high performance sport and the unique pressures of Olympic competition. In sports like swimming and track and field, the success rate of athletes at the Olympics in being able to perform equal to or better than their personal best effort is around 30%.

That is, that around 70% of athletes are unable to perform at their personal best under the pressures of Olympic competition. The challenge for the high performance coach is to be able to simulate the intensity and nature of Olympic pressures in lead up competitions and training.

PHYSICAL THERAPIES / INJURY PREVENTION

The physical therapies (physiotherapy, massage, chiropractic, osteopathy, acupuncture etc) have traditionally been associated with the treatment of injury. However, a vital area in high performance sport is in the identification of POTENTIAL INJURIES and the minimisation of time lost to avoidable injury.

Intelligent coaches and team managers have sought the advice and expertise of physical therapists to work with their athletes PRIOR to the commencement of the training season to evaluate likely and possible injury risks.

Think of it this way. If you owned a motor vehicle that you planned to drive on a long journey, an intelligent step to take BEFORE leaving home would be to have a mechanic look over the vehicle for wear and tear. This simple process can save you time, money and heartache in the long term by identifying possible problem areas before you set out for the holiday.

The same principle applies to athletes. The season is like a long journey. It makes sense to have athletes assessed before starting out on their "long journey" to try and avoid the physical pain and psychological impact of injury and illness.

STRENGTH TRAINING

Strength training is one of the most difficult areas of sports training to understand. Ostensibly strength training is about increasing an athlete's ability to generate effective force but there are several complicating issues:

- How strong is strong enough?
- Do endurance athletes need strength training?
- What type of strength training is best for my athletes?
- How do I transfer strength gained in the gym to performance improvements?
- At what age should athletes begin strength training?
- What speed should my athletes lift weights?

What is Sports Science and What can it do for You?

- Should my athletes use machine type weights or free weights?
- Do my athletes need to learn Olympic lifts – clean and jerk, snatch?
- Do my athletes lift light weights many times or heavy weights only a few times?
- Will weight training make my athletes fatigued for regular training? Is this a concern?
- Do I continue strength training during a taper or near a major competition?

The overwhelming question for any coach to consider when designing and implementing a strength program is “Will this improve the performance of my athlete or team?” If the answer is no, then why are you doing it?

A focus of many elite sports programs is on CORE STABILITY training. This popular training technique focuses on athletes developing a strong, stable body core by developing the effective and efficient use of deep muscle groups such Transverse Abdominus and Multifidus. It is believed that from a strong stable core, athletes are able to generate power and apply force more effectively in the same way that a solid foundation prepares the way for a strong stable building structure.

When combined with the appropriate flexibility and skills training, strength training can provide a performance edge for most athletes.

“STABILITY PLUS FLEXIBILITY PLUS SPORTING ABILITY IS A NECESSITY FOR EXCELLENT SPORTING PERFORMANCE!”

RECOVERY

It has been said that “An intelligent coach bases their training program on the recovery ability of their athletes”.

Recovery refers to a wide range of processes that involve the monitoring of fatigue in athletes, the management of that fatigue and the enhancement of recovery through activities such as massage, sleep, sensible nutrition, hydrotherapy and mental restoration.

In elite international level events, where athletes are often required to survive the rigors of a HEATS – SEMI FINALS – FINALS FORMAT or compete at peak levels for successive days, the ability to recover is crucial to the overall success of the athlete or team.

One aspect of recovery which has proven useful is in the monitoring of warm down protocols. It is widely accepted that an effective warm down is essential to promote recovery between training sessions and competition schedules.

One indicator of the intensity of maximum capacity performances is the monitoring of athletes' blood lactate levels.

In recent years, the Australian Swimming Team has monitored recovery by taking post race lactate levels at competitions, and monitored lactate levels during the athlete's warm down

What is Sports Science and What can it do for You?

protocol. Through this simple procedure, coaches and athletes can be assured that the recovery process is well under way following warm down.

NUTRITION

Eating for sport – sports nutrition is one of the most controversial areas of sports science. Athletes are HIGH PERFORMANCE MACHINES. Just as Michael Schumacher would not fill his Formula One Ferrari with unleaded petrol at his local service station, high performance athletes require high performance fuels.

Nutrition plays an important role in recovery. Recent studies suggest that it is not only what an athlete eats that is important in the recovery process, but the timing of eating is also important. Research from the United States and Australia suggests that eating or drinking a simple carbohydrate rich food like fruit or ingesting a fluid such as sports drink immediately after training or competition may increase the effectiveness of the athlete's recovery program.

SPORTS MEDICINE

Sports medicine covers a wide range of medical services that are specific to helping sports people. A sports medicine specialist can have expertise in injury rehabilitation, injury treatment, the identification and treatment of illnesses and numerous other areas.

One area of sports medicine that is of increasing importance in elite sport is in blood testing and medical monitoring of high performance athletes.

Traditionally blood tests have been used to look for signs of illness and disease in sick or poorly performing athletes. Often these tests focussed on iron levels or ferritin in an attempt to analyse the athlete's oxygen carrying capacity.

In recent years, blood testing has also examined the effectiveness of athlete's immune system and its ability to function under the effects of training loads and competition pressures.

Coaches of elite athletes have also used blood testing on healthy athletes to establish all important "baseline" or "normal" values for each individual athlete. The rationale for this technique being that if it can be established what is happening inside the athlete when they are healthy, it is easier to identify problems if / when they occur.

The real trick with the effective use of the sports sciences is.....putting them all together.

It has been suggested that using the sports science and sports medicine disciplines is like mixing a cake.

Use the correct ingredients in the correct order in correct quantity and at the correct time and you create a delicious dessert. Add too much of one thing, cook it for too long, add an ingredient in the wrong order and you end up with an unpalatable mess.

What is Sports Science and What can it do for You?

For many sports the key to the effective use of sports science / sports medicine is thinking in a **MULTI DISCIPLINARY WAY**.

For example, the key factors in sports like swimming and running are:

Does the athlete possess the mental skills (**PSYCHOLOGY**) to maintain an efficient technique (**BIOMECHANICS**) during times of fatigue and stress (**PHYSIOLOGY**)?

In team sports like football and basketball:

Do the players possess the mental skills (**PSYCHOLOGY**) to maintain a high level of skill (**BIOMECHANICS**) and teamwork in times of fatigue and stress eg final ten minutes of each half, final five minutes of each quarter (**PHYSIOLOGY**).

It is in the intelligent use of this multi disciplinary, integrated approach that coaches of this century will find many breakthroughs and exciting new directions in their sports.

The copyright for the above article is owned by Moregold Sports Pty Ltd.

Authors: Wayne Goldsmith

Moregold Sports Pty Ltd

www.coachingbrain.com

This article is proudly brought to you by:

Australian Swimming Clubs

www.swimclub.com.au

Check out the latest swim rankings and your closest swimming club.

Achieve Success

www.achievesuccess.com.au

Tips and Information on how to help you
ACHIEVE SUCCESS in your life

Solutions Indata

www.solutionsindata.com

Professional Websites