Brian Mackenzie's
Successful Coaching

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Letter from the editor

I expect at some stage in your coaching career you have had athletes that have all the physical and technical abilities to perform well but you know they just lack the all important component, self-confidence. So what can you do about it? Frank Reynolds, in his article 'Confidence – an essential ingredient in the recipe of success' explains how to develop a confident athlete who can handle the butterflies and channel the nervous energy into a successful performance.

Goal setting is a simple motivational technique which can provide some structure for your athlete's training and competition programme. Goals give a focus, and there are a number of well known acronyms to guide goal setting. One such acronym is FITT (frequency, intensity, time and type) and Brad Walker explains how the FITT approach can be applied in the planning process to avoid injury.

In 490BC, Pheidippidesran from Marathon to Athens, a distance of approximately 25 miles, to tell the Athenians that the Persians had been defeated. To commemorate this achievement the marathon race was conceived. These days with events like the London Marathon, New York Marathon etc open to everybody, completing a marathon has become an objective for many aspiring runners. Gavin Hall explains his practical steps in coaching 'mere mortals' for the marathon.

Agility is the ability to change the direction of the body in an efficient and effective manner. To achieve this you require a combination of balance, speed, strength and coordination. Vern Gambetta's article explores these components and explains how they may be developed.

The debate on whether pre-adolescents should lift weights or not has raged on for many years. Brian Grasso's article will help clear up some of the concerns raised.

The speed of your athlete in full flight is determined by two factors: foot strike rate and stride length. A further essential ingredient for a runner is the ability to accelerate as quickly as possible to maximum speed. Phil Campbell explains the science and biomechanics behind the acceleration techniques that will increase your athlete's speed.

Many sports require the athlete to use the shoulder and arm in throwing (eg javelin, discus) or holding an implement to strike an object (eg baseball, tennis, squash). Danny O'Dell explains the shoulder anatomy and suggests an appropriate training programme to reduce the risk of shoulder injury.

The 'Test of the Month' over the past few issues has been reliant on terra firma so this month I take a look at an assessment process which will allow you to monitor the aerobic capacity of your swimmers and, from the test result, set target times for their swimming training sessions.

Finally Nigel Hetherington, in his regular 'What the experts say', reviews the latest research work.

Brian Mackenzie, Editor

Contents

Planning

The FITT principle ... in relation to injury prevention

Brad Walker explains the FITT principle and its application to avoid injury

What is the FITT principle?

The FITT principle (or formula) is a great way of monitoring your exercise programme.

The acronym FITT outlines the key components of an effective exercise programme, and the initials stand for:

made worse by incorrect application of strength training and conversely, improved by correct application. An assessment is a mandatory precursor to any child-based strength-training programme.

Exercises for young athletes

Here is a list of exercises, adopted from *Children and Sports Training*, to use with young athletes. The exercises in this list get progressively more difficult. Start younger athletes on the earlier exercises and progress them systematically over the years.

- Obstacle courses, rope pulling, climbing.

Loads must be kept low and proper form strictly followed

- Vertical strength (standing push-ups), hanging exercises.
- Bodyweight exercises and medicine ball based activities/throws.
- Horizontal strength (push-ups, pull-ups).
- Dumbbell and barbell exercises.
- Single leg squats, dead lifts, step-ups, good mornings.

Brian J Grasso
Athletics Coach, Chicago

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Speed

Acceleration techniques and speed development

Phil Campbell explains the science and biomechanics behind the acceleration techniques that will increase your athlete's speed

There are certain numbers that will be remembered for a lifetime. Most sports enthusiasts will never forget their best 100m sprint time, and in the USA, no one forgets their personal best 40-yard sprint.

Why do athletes remember their personal best speed time all their lives? It is probably because speed is highly correlated with performance in most sports and speed has been shown in 2004 to predict athletic performance in US college football. For years, there were opinions about which tests were most valuable because no one really knew which, if any, of the tests would actually predict success for college athletes. A new study now provides the answers.

The research background

The purpose of this investigation was to examine the relationship among six physical characteristics and three functional measures in college (US) football players. Data was gathered on 46 NCAA Division One college football players. The three response variables were 36.6m sprint (40 yards), 18.3m shuttle run, and vertical jump.

The six regression variables were height, weight, percentage of body fat, hamstring length, bench press and hang clean. A stepwise multiple regression analysis was performed to screen for variables that predict physical performance. Regression analysis revealed clear prediction models for the 36.6m (40 yards) sprint and 18.3m shuttle run.[1]

During recent years in the US, a system of selecting athletes for college and professional sports teams has evolved into several major physical tests involving speed, agility and strength given to athletes on the same day. These tests are called the 'combines' in the USA. Having a good day at the combines can produce on-the-spot scholarships from large universities and it can mean literally millions of dollars in sign-on bonuses and salaries for athletes entering the professional ranks.

When you see a problem with the feet, look to the arms first for correction as there may be an easy fix here

With the results of this new study, future 'combines' may focus on two acceleration tests. In the USA, the 40-yard sprint is king for many sports, except baseball, which uses the 60-yard distance required to run bases.

Big ticket items in teaching acceleration techniques

There are several acceleration techniques that can be taught in a few training sessions that will increase the speed of many athletes. Techniques like ankle dorsiflexion, pocket-chin arm swings, acceleration position, and the grand prize of speed training is the Valsalva acceleration technique.

Dorsiflexion

Most untrained athletes run with their toes pointed downward. They may have fast leg turnover, but just like throwing a ball without using the wrist, the power is missing unless the foot is dorsiflexed (pointing up) and ready to fire off the ground. Dorsiflexion of the ankle simply means to raise the toes and, in essence, cock the foot before striking the ground. This action engages the ankle and the foot for additional power generation and this can mean additional stride length for the athlete. The claw drill and many of the skipping drills teach athletes to dorsiflex their feet.

Pocket-chin arm swings

Without exception, teaching proper arm mechanics for maximising running speed is the most difficult. Many athletes do not see themselves unless they are taped and they frequently gauge what they are doing with their arms based on their perception of how their arms feel during sprinting. In most cases, arms swings are incorrect and need repositioning.

'Pocket-chin' is a good way of teaching arm mechanics and the butt bumpers drill is the best I have

seen for teaching correct arm swing mechanics. Have your athletes sit on the ground with both legs straight in front (side-by-side) with arms locked at 90 degrees. In slow motion, have athletes swing one arm backward until the hand reaches the pocket, and one arm forward until the hand reaches chin level (approximately 12 inches away from the chin). This is the 'pocket-chin level' position.

Performing this drill in slow motion initially is a good idea until the coach sees that the athletes are getting the feeling of the arm positions. Move to half speed, then to full speed for three sets of 5-10 seconds. If performed correctly, it is easy to see why this drill is called butt bumpers.

In 1970 I was taught to run with arm swings pointed in a straight line forward. Now we know that this instruction slightly restricts the hips during running and therefore makes the athlete run slower. The arm swings should be pointed slightly toward the centre of the body in order to maximise the hips, which can increase stride length. Too much side-to-side will over-rotate the hips and cause problems. If an athlete points the arms past centre of the body, this can make the feet push off the surface in a duck-footed style rather than push the athlete straight toward the target. When you see a problem with the feet, look to the arms first for correction, as there may be an easy fix here.

Challenge them to perform pocket-chin drills with 'locked 90 degree arms' at home looking in the mirror, sideways and front-ways.

Acceleration position

Due to the work of Brian Mackenzie, coaches are hearing about the importance of proprioception training for sports. This term becomes very important in teaching the acceleration position. The number one mistake made by athletes trying to run faster, is to stand up too soon in fly phase running without going through the 'drive phase', which is marked by an aggressive forward lean (at the ankles).

The description of an airplane taking off, low at first, but climbing slowly with effort made to not jump up to quickly and bump the passengers heads, seems to be an understandable analogy for most athletes.

Performing the standard calf stretch, with one leg back and one forward while leaning on a fence is a good way to reinforce the acceleration position – straight back, bent at the ankles.

Valsalva acceleration technique

A slower athlete can beat a faster athlete to the ball, to the hoop, to the tackle, to the touchdown and to the finish line if the slower athlete is trained to hit the acceleration position (body straight, forward lean from the ankles) with arms pumping pocket-to-chin level and tactically using the Valsalva acceleration technique at precise points.

If you look up Valsalva manoeuvre on the internet, you will find that this describes briefly holding the breath. When applied properly for a brief burst of 2.5 seconds, this technique can be the greatest single producer of an instantaneous explosion in force, speed and strength known in science. Like many techniques, this one is so powerful that it can cause harm but it also delivers championship plays.

The athlete tightens the abs, and holds the breath for 2 or 3 seconds as max effort is applied. This is the Valsalva manoeuvre

We all use the body's natural ability of increasing strength by unconsciously performing the Valsalva manoeuvre. My favourite analogy to explain this to athletes is to describe a situation where the athlete's mother hands the athlete a jar with a tight lid. The mother needs some extra strength to open the jar so she calls on the athlete for help. On first attempt, the lid is too tight for the athlete. On second attempt, the athlete increases the intensity and pushes hard with maximal effort.

If you will think about what the body does naturally in this situation, you will understand this valuable technique. The athlete tightens the abs, and holds the breath for 2-3 seconds as max effort is applied. This is the Valsalva manoeuvre.

The body increases blood pressure by additional 100 points very quickly with this natural action. Clearly, this is dangerous to older adults with potential for stokes and it can be dangerous to some young athletes. But this technique will assist an athlete to open the jar, lift more weight maximally and to beat a faster athlete to the ball, goal or finish line.

An athlete cannot perform a maximum lift while inhaling. Nor can an athlete quickly accelerate with maximum force while inhaling. The body is designed for the Valsalva manoeuvre and needs to be trained how and when to deploy the technique.

Valsalva acceleration strategy

Holding the breath too long can cause harm by making an athlete actually pass out. One occurrence is reported in the literature where this technique was responsible for bursting a tiny blood vessel in the eye of an athlete during heavy maximal lifting.

It is easy to observe that the Valsalva manoeuvre is frequently used safely as a natural function of the body to increase strength, but it is only held for 2-3 seconds naturally.

A 100m sprinter would have time to plan for four Valsalva acceleration techniques during the short 10-second event, or a masters sprinter like me may get in five before the finish. The miler may place the Valsalva acceleration technique in the race strategy 100m before the finish line to power that extra kick.

The 400m sprinter may want to deploy this technique in the four handoff zones during the single lap around the track. The baseball player may want to deploy this acceleration skill twice during the seven-second trip to first base.

The football player may strategically use the Valsalva technique to break on the ball for a surprise steal. The applications for this acceleration technique are endless.

Conclusion

We have all seen the superstar athlete interviewed on television after making a game-winning play.

'How did you make that great play?' asks the reporter.

'I knew that the game depended

on it. I gave it everything I had and I made the play' seems to be the frequent answer.

That is what we hear, but the athlete should have explained:

'I wanted to make the play so I made the extra effort to get into the acceleration position (with a straight body bent from the knees), pumped my arms pocket-to-chin level and I positioned my shoulders lower to the ground than my competitor to drive my body forward toward the target. I took the extra energy necessary to apply the Valsalva technique to temporarily raise my blood pressure by an extra 100 points so I could get there faster then my competitor.'

Some athletes make great plays without knowing the science of acceleration, but what if all your athletes trained with these techniques throughout the season? Perhaps this technique explains why some teams that do not match the physical attributes of stronger teams still find ways to win championships.

Perhaps the inferior team realised that they had to go deep inside, work hard, get into the acceleration position on every play and use the Valsalva technique more to beat the superior team.

'Who wants the victory the most, will win this game' is what we say to the team. Perhaps we should train athletes to use this natural technique designed to assist the body to get into maximal effort so athletes will have the skills necessary to beat a faster athlete and not wait until it is the game-winning play to deploy it.

I rest my case. Speed is a skill and skills can be improved.

Phil Campbell. MS, MA, FACHE
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Test of the month

Critical swim speed

Brian Mackenzie explains how to monitor the aerobic capacity of your swimmers with the critical swim speed (CSS) test

Objective

The critical swim speed (CSS) test, devised by Ginne[1] in 1993, can be used to monitor the athlete's aerobic capacity. The result of the test can also be used to determine the appropriate target time for each repetition of a swimmer's aerobic training session. CSS is defined as 'the maximum swimming speed that can theoretically be maintained continuously without exhaustion'[2] – just below the swimmer's lactate threshold.

Required resources

To undertake the CSS test you will require:

- swimming pool
- stop watch
- an assistant.

Test process

The following protocol should be followed:

- start each swim from a push start – not a dive in
- allow a full recovery between each swim
- record the time for each swim in seconds
- calculate the athlete's CSS.

How to conduct the test

The test comprises of two maximal swims over 400m and 50m. A suitable rest period should be taken between each swim to allow the athlete to recover fully. The assistant should record the times for each swim.

Calculation of CSS

The calculation of the swimmer's CSS, based on their 400m and 50m times, is as follows:

$$CSS = (D2 - D1) / (T2 - T1)$$

Where D1 = 50, D2 = 400, T1 = time for 50m in seconds and T2 = time for 400m in seconds.

Example:

A swimmer completes a 50m swim in 31 seconds and a 400m swim in 291 seconds

CSS = (400-50) / (291-31)
CSS = 350 / 260
CSS = 1.35 metres/second

Use of CSS to set training times

The calculated CSS can be used to determine training times for an aerobic training session[1].

Example:

Training session is 6 x 400m. The time per 400m repetition can be calculated as follows:

Time per 400m repetition = Distance / CSS

For an athlete with a CSS of 1.35 then the 400m repetition time would be:

400 / 1.35 = 296.3 seconds = 4 minutes 56.3 seconds