

ductive for events that call for increased arousal. For example, an athlete may wish to have a higher heart rate and blood flow when getting out of the blocks for faster reaction time, while maintaining lower muscle tension in muscles needed for stretching.

Many coaches believe the shoulders have to be relaxed for maximum speed. Examples of coaching practices I have observed include telling an athlete to 'stay relaxed' or 'relax' their shoulders as training cues. Many athletes are unable to judge their state of relaxation, and even when specific systems, such as the shoulders need relaxing, the athlete may not know how to totally reduce tension on elevated shoulders.

We have used electromyography (EMG) to train athletes in the subtle quantitative differences in tension in the shoulders. They can train on and off the track in practice and 'practice competition'. If it is true that vaulters need to 'feel' the muscle push at the top of the pole, or throwers need to have the timing and sequence of the muscle contractions occurring in the correct sequence, using instrumentation tells the athlete exactly what s/he is doing.

Some coaches spend time and money bringing in experts to teach relaxation for their teams. But, if the expert doesn't know what is required in the events of the athlete, the benefits may be few. For example, while very small fluctuations in arousal control of breathing may interfere with some events, such as starts from the blocks, they will have less impact on other events such as starts in distance races. Most non-sport relaxation teachers suggest breathing that results in lower arousal level in athletes. This may be helpful for regeneration but may not be beneficial to performance. Perhaps finding what breathing makes the athlete faster or less fatigued is the first step in optimizing arousal and performance. To encourage quick and consistent starts out of the blocks, we spend more time training athletes in controlled breathing using specialized breathing exercises or even Respiratory Sinus Arrhythmia (RSA) bio-feedback. Biofeedback RSA is the

coordination of respiration with the variability of the heart rate:

1. as one inhales, the heart rate increases, and
2. as one exhales, the heart rate decreases.

With modern technology, researchers can identify "busy brains" by analyzing the wave patterns.

For distance runners, we spend more time working on maintaining a zone of optimal heart rate, through exercises to slow heart rate and decreasing unnecessary muscle use.

In summary, the coach should know what psychophysiological level is required for each section of the event in the same way they know what biomechanical changes to make at different points of the event.

Each athlete will need individualized assessment and testing against performance to determine what works best. What works for one may not work for another.

Knowledge of the person

Many coaches and sport psychologist have trusted the athlete to know what the appropriate state of arousal is for obtaining the optimal level. Three general methods have been used to ascertain what the person needs for optimum arousal and performance:

1. Ask & Observe Best Performances

One method has been to ask and observe those athletes who consistently have elite performances to see if they are aware of what works best. For example, in in-depth interviews with ten Olympic track medalist, I asked what was the 'state' that preceded good starts from poor starts. The consensus on fast starts was:

- 'not thinking'
- a focus on "doing things"
- same routine as practice
- relax and stretch.

Individuals identified slow starts with extra self-talk, regardless of whether it was negative, positive, or performance based. Research confirms what the best sprinters

know: Shut down the chatter in the left hemisphere of the brain.

To finetune their awareness with performance we compared their comments with:

- reaction time out of the blocks,
- the starting position coming out, and
- the coach's assessment of mechanics.

For the athletes whose awareness does not match their performance, we institute biofeedback training in the appropriate system.

When asking each athlete what is the best state for him/her, it has been my experience that the first response is what they believe the coach wants them to say. I always ask twice what it is they are doing. Or like Columbo, I ask them to walk me through, physically and verbally, what I would have to do to do the skill

2. Paper and Pencil Inventories

Hanin (2000) has spent a lifetime developing a system of helping athletes identify the mood state prior to good and poor performances. The simple notation of the adjectives that describe how each athlete feels prior to a good performance may be the one of the easiest and low cost methods for enhancing awareness of pre-performance states and can be found in his text *Emotions in Sport*.

3. Psychophysiological Assessment

There are a few athletes who have no idea what they do when they perform, and more that are unaware of what they do in high stress competitions. I find it especially helpful to do a complete psychophysiological profile for these athletes to identify their general system tendencies. This is done for:

1. normal settings,
2. stress situations,
3. recovery from stress, and
4. the use of imagery.

Typical measures are:

1. electromyography for muscle awareness and control,
2. electroencephalography for attention