“HARD” AND “SOFT” TECHNOLOGIES IN SPORT

A PRELIMINARY RESEARCH PROJECT IN BEHAVIOUR MODIFICATION: (A “SOFT” TECHNOLOGY)

Courtney Boxill

Sub-divisions of The Paper

This paper has three parts:

1. The “hard” technologies of sport psychology
2. The “soft” technologies of sport psychology

The “Hard” Technologies Of Sport Psychology

Griffiths (1999) a renowned sport psychologist in Australia assured that “cricket coaching is 50 years behind sprint coaching” in USA and Europe. The author added that he subscribes to a sprint coaching journal and it appears to him that he is reading a physics journal. Sprint coaching depends to a great extent on physics. This suggests that top coaches of this track and field event use a great deal of “hard” technologies. There are several sport academies in Australia. They have contributed significantly to that country being at the top of the official ranking in cricket for a long period. If cricket coaching in Australia is so far behind sprint coaching a realist can imagine how far behind are CARICOM countries. Obviously we have a lot of “catching up” to do.

Two hard technologies will be addressed in this paper:

1. The use of the encephalogram cap, telemetry etc.
2. The use of high speed cinematography, electrocardiograms etc
3. Use Of The Encephalogram Cap, Telemetry etc

The latest “hard” technology in sport psychology is the use of machinery and equipment to achieve confidence, focus, motivation, concentration etc. Some of the machinery and the equipment that are used to optimize the attainment these requirements for good performance are an encephalogram (EEG) cap, a telemeter, a computer and a multicoloured video display terminal, headphones, and equipment that provides audio and visual feedback.

The objective is for the athlete to attain an ideal performance state (IPS). The athlete takes a seat in the IPS training room. Gel is placed on six sites on his head. An EEG cap is placed on his head so that the six embedded electrodes touch the gel. The athlete presses two keys on the keyboard and adjusts the EEG cap so that it fits snugly on the electrode sites. When this is done his working brain comes on the computer screen in colour. Continuous audio and visual feedback informs the athlete whether he is moving towards or away from his ideal performance state. A telemeter was used previously to record his IPS during several training sessions that were staged. The IPS that is unique to this athlete is fed into the computer memory.
Confidence, motivation, concentration etc. are made up of brainwaves that are unique to each of these aspects of an athlete’s ideal performance state. Achieving these brainwave patterns of the athletes IPS are learned from the continuous auditory and visual feedback that he receives.

After approximately ten minutes of training the athlete begins to become adept at finding the desired brainwave patterns. The author states that one does not know exactly how control of the brainwaves occurs. Apparently the auditory and visual feedback contributes as the different sounds and visuals inform the participant when he is moving away from or toward an attribute of his unique ideal performance state which was locked into the memory of the computer.

There are some other hard technologies in use today. One of the well known users is Dr. Jim Loehr who has a training centre that is visited by several world famous athletes from several sporting disciplines. This sport psychologist in Ungerleider (1996) is convinced that “we need to reeducate the coaching community that sport is really the integration of sport science with the actual playing of the game”. This quote suggests that academics at UWI should take up the challenge of doing scientific research in sport psychology as well as in other disciplines.

Dr. Loehr uses “high speed cinematography to evaluate every motion, every tic and every idiosyncrasy within a player.” Then this and similar information is fed into a computer about our batsmen. There is a computer programme that can simulate what happens to our batsmen when they are in the middle. The simulation can also tell which balls are likely to induce a batsman to make a bad stroke and get out. Our competitors’ bowlers then go to the nets and practise bowling these balls until they perfect them. They then use these deliveries when our batsmen are in the middle.

Other equipment Dr. Loehr uses include electrocardiograms (EKGs) and wireless heart monitors to measure the extent to which a tennis player achieves his stress recovery balance in the period between when one stroke ends and he begins preparation for the next. Stress recovery balance is also important for batsmen and bowlers. For batsmen, stress recovery balance is the necessary condition after a stroke and before preparation for the next delivery. During this resting period the player’s heart rate should drop and his breathing should indicate that he is totally relaxed. When one’s stress recovery balance is not achieved then the athlete’s body is tense. His muscle reflex actions are not smooth as they should be. If this high stress level is maintained during the resting periods this can result in bad shot selection as well as uncoordinated strokes. In this scenario (1) the batsman is more likely to make a “get out shot” and (2) the bowler is more probable to lose his length, line and guile and give away four runs. There are “soft” psychological principles that can be used to achieve stress recovery balance.

**“Soft” Technologies**

Two very important “soft” technologies will be addressed in this paper:
1. Visualization
2. Optimum arousal level

**Visualization**

Visualization is also called visual motor behaviour rehearsal (Suinn, 1984). There is a belief that most great sportsmen are great visualizers. Three famous athletes who practise(d) visualization are Michael Jordan, Tiger Woods and Ato Bolden. Michael Jordan was so enthused with sport psychology that he had one on his personal staff. Ato Bolden in a radio programme in which he was interviewed was asked if he uses sport psychology and which areas were important to him. He
replied that his coach, John Smith, believes very strongly in visualization and he uses it, for example, before a race.

Visualization is the rehearsal of an event in the brain. It is very necessary for the visualization to be vivid. When this occurs the brain cannot differentiate between the actual event and the visualization. For a visualization to be vivid all the senses that are used during the event are applied. So in addition to the five well known senses, the vestibular, and kinesthesis, the senses of balance and movement respectively should also be part of the visualization. In addition, the emotions in which the athlete engages during competition also contributes to the vividness of VMBR.

The reader should be warned that just as it takes plenty dedicated practice and a great amount of time to become adept with skills, a similar enthusiasm is required to master visualization. Furthermore, when this skill is mastered “there is documentation showing neuromuscular activity during visual motor behaviour rehearsal (VMBR).” (Suinn, 1980).

VMBR has several uses. Four of them are given hereunder:
1. To practise skills
2. To identify and correct errors
3. To rehearse an event
4. To assist in recovering from injuries

Many of our athletes who represent CARICOM countries are not even aware that visualization exists. We really have a lot of catching up to do.

Optimum Arousal Level
Arousal comprises several factors. Three of them are anxiety, motivation and focus. There is a curvilinear relationship between arousal and performance (May & Asken, ibid). According to these authors when arousal is low, performance is also below one’s ability. As arousal increases, but is not yet optimal, performance improves. When arousal is optimum, anxiety, motivation, focus etc are ideal. As a result the athlete performs at his peak. However when arousal goes beyond its optimum arousal level performance begins to decline. Martens and Landers (1970) and Klavora (177) confirmed this curvilinear, an inverted-U, relationship between arousal and performance from their research.

West Indian cricketers tend not to perform at their peak consistently. The research findings that are stated above strongly suggest that their inconsistency may be related to variations in their arousal levels. These findings also suggest that the defeat of the Trinidad and Tobago World Cup football team, the Strike Squad, by the United States team in November 1989 may be because the members of the Strike Squad had passed their optimum arousal level. All the hype by the media and the anxiety of the population appeared to have been passed on to the Strike Squad. Our CARICOM athletes need psychologists who can train them to add obtaining their optimum arousal level and other appropriate “soft” technologies to their preparation and application during competition repertoires. It is necessary to emphasize that these training programmes in sport psychology should begin with under-19 teams. The necessary training cannot be effectively done when a national team is on tour. That is the occasion for application of what was mastered long before.
The collective ego and self esteem of nationals of CARICOM were boosted when the West Indies cricket team was the best in the world. These years of pride are unlikely to return if our athletes do not systematically and scientifically use ”hard” and “soft” technologies.

A PRELIMINARY RESEARCH PROJECT IN BEHAVIOUR MODIFICATION
A “SOFT” TECHNOLOGY

Introduction
Skinner (1972) who is the founder of modern behaviourism questioned that autonomous man was in control. He did research to replace this belief by demonstrating that environmental control through contingencies and schedules of reinforcement was a more useful alternative.

Coaches in sport are responsible for teaching their athletes skills etc. They, therefore, are required to get their charges to learn what they teach them. The effectiveness with which this is done depends on the extent and effectiveness with which they use principles of learning.

The Nature of the Problem
The researcher was using sport psychology to help a high school football team that plays in the College League Football Competition. The coach had the players doing a shooting to goal exercise. He observed that the players were kicking the ball above the cross bar or wide of the uprights quite frequently. He surmised that the exercise was being done haphazardly. He did a behavioural analysis (May and Asken (1987) and as a result he decided to apply behaviour modification to the exercise. This was an opportunity to do a preliminary test of his goal/reward type of concentration.

Research Design
Half of the team participated in the experiment. Initially a between subjects design was used, as there was an experimental group and a control group. The control group did not participate in the experiment. However, when the coach saw the improvement of the experimental group he requested that the control group take part in the experiment as well. His request was granted. The design was then changed to a within subjects design with each footballer being used as his own control.

Hypotheses
For the between subjects it was hypothesized that the footballers who experienced the experimental condition, the behaviour modification exercise, would improve in their shooting to goal during practice better than the control group.
For the within subjects design the hypothesis was that participants will increase the frequency of shooting to goal properly during behaviour modification when compared with their baselines.

Behaviour Modification
Behaviour modification includes the following:
1. Establishing a baseline
2. Goal setting
3. Reinforcement
4. Providing feedback
5. Evaluation
6. Setting new goals

Establishing A Baseline
After identifying what his observations were and getting agreement from the coach that behaviour modification should be applied, the coach called 50% of his charges and told them that they will receive instructions from the researcher. The other members of the team continued practising shooting to goal.

Half of the experimental group was instructed to count the number of times out of five shots the person he was monitoring had scored or the goal keeper saved. The roles of the players were then switched. A baseline for each athlete was thereby obtained. The baseline information was given to the participants. The footballers agreed that there was need for improvement in the shooting to goal exercise. The researcher explained the steps, procedures and effectiveness of behaviour modification.

Goal Setting
Each player was informed what his baseline out of five tries was. They were then asked to set goals out of their next ten shots. Many of the goals were unrealistic and unattainable. The principles of goal setting and the rationale for each (May & Asken, ibid) were then shared with the players. The players reset their individual goals. These goals were more realistic and attainable. They were challenging enough to “stretch” the individual player.

Reinforcement
For this project it was not feasible to provide each athlete with the classical external reinforcement. As a result each player was instructed to reward himself verbally. This approach had three effects.

1. The athletes were using the principles of shaping when they rewarded themselves for each well directed shot. Each appropriate shot was an approximation to the goal.
2. Since the athletes were rewarding themselves for each well directed shot, the reward was being received in close proximity to the desired behaviour. Immediacy is a requirement for making a reward a reinforcer. (Miller, ibid)
3. Furthermore they were learning that they can become self-motivated.

Although the athletes were rewarding themselves, these are still extrinsic rewards. Ideally the athletes should so enjoy their successes at shooting to goal that this skill becomes intrinsically rewarding. Intrinsic rewards are very important according to Miller (ibid), because they optimize both performance and satisfaction of athletes. In addition intrinsic rewards can (a) eventuate into flow and get the athlete into his zone (Nideffer, 1985), and as a result perform at his peak more frequently.
Providing feedback
This entailed comparing performance under reinforcement conditions with baseline achievements. Each player improved and as was expected there was variation in the improvements.

Evaluation
The players were asked to evaluate the behaviour management exercise. The participants were very satisfied that they had improved their shooting to goal. They were then asked what they should do to continue their improvement. Most of them replied that they should continue practising. They were then reminded of the three major aspects of goal setting and were asked which of these will not be satisfied the most. A few of them realized that the answer was that their former goal was no longer challenging. This is true since they would no longer have to put out the required extra effort involved in improvement.

Setting New Goals
The players then engaged in setting new goals. There was improvement with goal setting this time as many of the participants set new goals that were challenging but attainable. The goals should be attainable so that they will get the reinforcer and thereby be motivated to keep putting out the extra effort rather than become frustrated and/or cheat.

Expectancy theory (Vroom, 1964) states that an athlete will put out the extra effort if he is convinced that the effort will lead to performance that will be followed by a reward that has incentive value for the recipient since it will satisfy a physical, social or egoistic need. The coaches’ job is to provide the appropriate exercises that would ensure that the extra effort that the athletes invest will result in desired performance. Furthermore, the training of coaches should include modules of sport psychology so that he will become a para-sport psychologist.

Adjuncts To Behaviour Modification
There are at least two adjuncts two behaviour modification. One is that the athletes become more motivated to perform. This was addressed above in what was stated about (a) reinforcement and (b) expectancy theory. The second attribute that is tangential to this input is concentration. (Suinn 1984) states that there are three types of concentration. They are the following:

1. The attention model of concentration
2. The stress model of concentration
3. The skill deficit model of concentration.

The author of this paper from his experience in observing coaches and practising sport psychology has added a fourth; the goal/reward model of concentration. It is obvious that this fourth type of concentration was taking place under the experimental conditions stated above. In addition, the narrow / internal focus aspect of the skill deficit model (May and Asken, ibid) was also present when the experimental group was doing the shooting to goal exercise.

The narrow part of this model came into being as members of the experimental group would concentrate on the following:
(a) What part of the ball the boot should hit
(b) That his body should lean over the ball and
(c) That his none kicking foot should be placed alongside the ball
It is likely that the coach of this team had taught the three requirements above. However, during baseline, the control period, these pursuits were not applied as assiduously as during the application of behaviour modification, the experimental period.

The internal focus of this aspect of the skill deficit model of concentration involves getting feedback from one’s body that the requirements of the internal aspect are being applied. It is necessary to emphasize that visualization can significantly assist in mastering this model of concentration.

When the coach realized that the experimental group was shooting to goal much better than the control group, he requested that the latter group also receive the experimental treatments. His request was granted. The research design was changed from a between groups to a within group design.

**Results**

The result was that members of the new experimental group had performance improvements that were similar to the original experimental group. A non-parametric statistical analysis of the data was not done.

**Discussion**

The data suggest that there is some credence that the goal/reward type of concentration exists and that coaches should use this “soft” technology as a teaching tool when they want their athletes to learn skills and to use behaviour modification to get their athletes to become disciplined and solve other problems where the generalized statement of the problem can be behaviourally defined.

However, there is a need for further testing of the hypotheses associated with the usefulness of the goal/reward model of concentration. A larger sample of athletes is needed so that a parametric analysis of the data can be done.

The goals that the participants set during the experimental treatment phase were, according to Griffiths (ibid) outcome goals. Rather, he advocated, in the interest of performance improvement, coaches and athletes should emphasize process goals. Three process goals for batsmen are (1) keeping the bat straight in the early part of an innings, (2) getting behind the ball especially to fast bowlers and (3) movement of the feet to both fast and slow bowlers. Process goals for shooting to goal were mentioned previously. Two of them were (1) placing the non-kicking foot alongside the ball and (2) leaning over the ball when it is kicked, if the objective is to keep the ball low.

Another research project that tests the efficacy of the goal/reward type of concentration should measure the frequency with which different aspects of process goals are increased as a result of the experimental treatments mentioned previously. Griffiths (op cit) asserts that the athletes have little to no control over results, but they have much more control over processes. Furthermore, when processes are mastered the desired results are more likely to be achieved.
BIBLIOGRAPHY


Vroom, V. H. (1964) Work and motivation: John Wiley and Sons, Inc