

Timetable

Week 1	Choose the activities = Badminton (JUMP SMASH) Shot Putt
Week 2	Decide on which specific parts of the chosen activities will be analysed. Prepare specific tables to record data for observations of both activities. Allowing for the performers strengths and weaknesses.
Week 3	Observe activity 1 = Badminton, grip, smash. Record observations on table
Week 4	Identify the performers strengths + weaknesses
Week 5	Observe activity 2 = Shot Putt, stance, push, follow-through, arm position. Record observations in the table
Week 6	Identify the performers strengths + weaknesses, chose one of the activities for evaluation
Week 7	Look at performers all round ability
Week 8	Research possible reason for performers strengths and weaknesses in the school library and internet
Week 9	Discuss and give reason for the performers possible strengths and weaknesses using theories from the research found.
Week 10	Chose which weakness of the performer is best to attempt to improve and give reason for this choice.
Week 11	Devise a training plan to improve the chosen weakness.
Week 12	Carry out pre test on the performer relating to their weakness.
Week 13	Training WEEK 1
Week 14	Training WEEK 2
15	Training WEEK 3
16	Training WEEK 4
17	Training WEEK 5
18	Training WEEK 6
Week 19	Carry out post tests on performer relating to their weakness
Week 20	Write up clear method of what is included in the schedule. Explain why the method should result with the intended results

Data Collection Table For Performers Strengths And Weaknesses

Activity 1 = Badminton, JUMP SMASH

GRIP	STANCE	SHUTTLE CONTACT	FOLLOWTHROUGH	FEET POSITIONING	RECOVERY
<p>Good Firm grip holding at bottom of handle</p> <p>Fingers tightly pushed together</p> <p>Orthodox style</p>	<p>Appears well balanced before beginning shot</p> <p>Often square on to opponent</p> <p>Legs straight throughout shot</p> <p>Watching shuttle in air</p>	<p>Good contact</p> <p>Smooth stroke</p> <p>Shuttle often hit in an upwards motion</p> <p>Opposite arm usually left by side – not held up</p>	<p>Collapsed onto left hip after shot</p> <p>Lose of balance</p> <p>Head thrown away</p>	<p>Feet close together</p> <p>Feet usually pointing forward</p>	<p>Often left out of position, due to falling away on the follow-through.</p> <p>Manages to get back into centre of court fairly quickly</p>

Results of the friendly doubles game were:

Performer + Partner

15 points (winners)

Opposition

5 points

Data Collection Table For Performers Strengths And Weaknesses

Activity 2 = Shot Putt

STANCE	PUSH	FOLLOW-THROUGH	ARM POSITION
<p>Solid stance</p> <p>Feet facing correct place</p> <p>Bent over on right hip well</p> <p>Left arm relaxed and hanging loose</p>	<p>Slow push with no power</p> <p>Hips left till last minute to turn almost throwing side ways</p> <p>Arm low one push</p>	<p>Often collapsed onto his left hand side</p> <p>Took his eyes of the shot putt as he threw</p> <p>Often fell out of the circle</p>	<p>Arm fully extending with push</p> <p>Elbow held up correctly</p>

The distances recorded using a 4kg shot were:

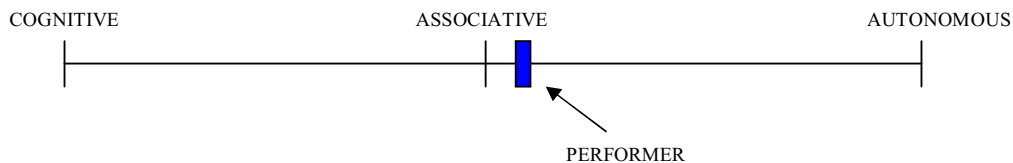
- 1- 6.78
- 2- 8.50
- 3- 7.90
- 4- 7.69

Evaluation

The activity that I have chosen for evaluation is badminton. I shall now discuss the all round performance of the performer taking into consideration his strengths and weaknesses and what factors are causing certain outcomes.

If I were to place the performer on a learning continuum he would be positioned as shown in figure 1

fig 1



I have placed the performer just after the associative phase because *'Fitts and Posner'* define the cognitive phase as being the initial phase of the learning process. Some sport scientists define it as the 'have a go' stage as the performer has already played badminton before he is therefore not being faced with the acquisition of new skills. The associative phase is defined by Kevin Wesson, (Sport and Pe), as being 'after much practice and a variety of experience'. Certain qualities of this phase include:

- Motor programmes being developed.
- Gross error detection and correction is practised.
- The skills are practised and refined under a wide variety of conditions.

All of these qualities are shown by the performer and, more importantly, consistency. The performer has competed for a club but never progressed any further. His training is very inconsistent; as he averages one training session every other week. When I observed the performer he was participating in a friendly game of doubles. The performer's partner is also at the associative phase but closer to the autonomous phase along the continuum. Some characteristics of the autonomous phase are listed below and the performers partner is able to reach some of these qualities but not the majority, indicating that he is slightly lower than the high skilled phase.

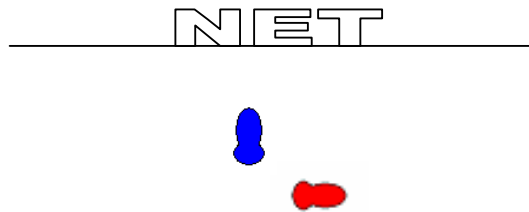
- The performance of the skill has become almost automatic.
- The skill is performed effectively with little, if any, conscious control- it is habitual.
- The performance is consistent with highly skilled movement characteristics.
- The performer is able to concentrate on additional higher-level strategies, tactics and options.

The performers partner competes for a local club and has represented his county, training on a weekly basis. The performers opponents are both at the cognitive phase having only played badminton during physical education lessons at school.

When carrying out the jump smash the performer consistently makes contact with the shuttlecock but his technique could be improved considerably. Firstly his feet were incorrectly positioned, and were kept very close together, both pointing forward towards the net. Due to him being right handed, the correct positioning should have been that his left foot was pointing forwards towards where he is going to hit the shuttle with his weight over his leg. His right foot should be behind him shoulder width apart and pointing out to the right. Shown in figure 2.

Fig 2.

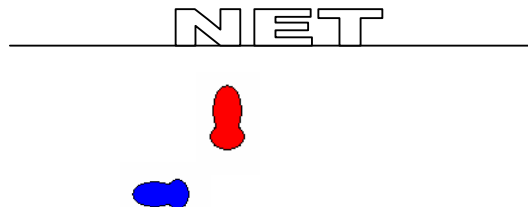
RIGHT FOOT
LEFT FOOT



When making contact, the correct position is to be in the air with, for the performer, the right hip coming through so when striking the shuttlecock his hips should be square on facing his opponent. Although the performer was square on to his opponent when striking the shuttlecock both feet were on the ground. After striking the shuttle the 'follow-through' is very important when competing. It is also vital that once he has carried out the 'jump-smash', he immediately gets ready for the return. When landing from the shot the performer's feet should be the opposite way from their position before the shot, as shown in figure 3.

fig 3.

RIGHT FOOT
LEFT FOOT



The performer did land like this a few times but mostly found himself falling away and losing his balance. This affected his recovery, and the ability to be ready to return a shot because his positioning on the court was incorrect due to him falling to one side, which was nearly always to his left. Another reason for the performer to have the incorrect foot positioning was due to his left arm during the shot. The position for this arm is to be held in front of him in the air as if he was reaching for the shuttlecock above his head. Then, once he had jumped to hit the shuttle he pulls his left elbow towards his left hip. This causes his right hip to automatically fire forward giving the performer maximum power to lash at the shuttlecock. Unfortunately, the performer did not do this very often and this resulted in:

- A lack of power
- A lack of accuracy

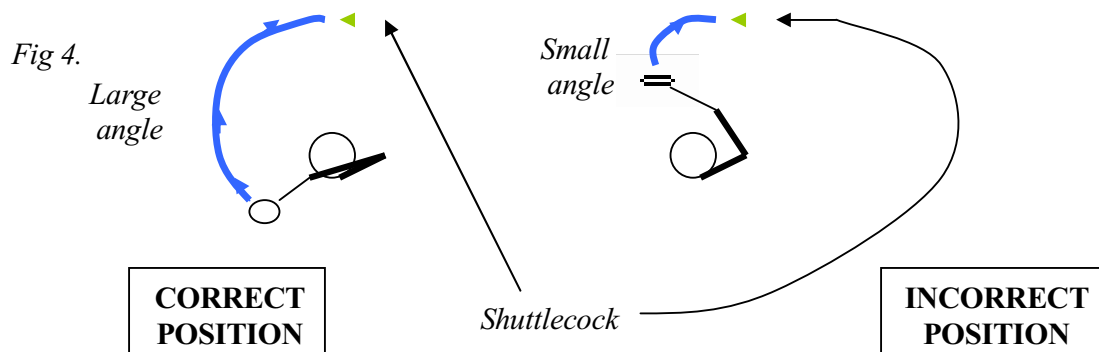
It resulted in a lack of power because not having his left arm held up caused the performer to not have the ability to drive his arm back thus causing the right hip to swing forward, thereby not giving him the power from his wrist, arm and torso. It also resulted in a lack of accuracy because when the left arm is held up pointing to the shuttle it causes the performer to know of its positioning and therefore is able to strike it at its best position. The result of this sometimes caused the performer to miss the shuttlecock altogether.

His partner was very good all round and his feet positioning were exceptional, using his feet well to make the best of the shot. Their opponents, at the cognitive stage, appeared very uncomfortable when aiming for a 'jump-smash' and often missed the shuttle due to trying too hard to hit the shuttle with a great deal of effort. The positioning of their feet was often inconsistent and they hardly ever lifted their feet off the ground during the shot.

The performer had a good upper body technique by holding the racquet behind his head and leading with his elbow with the forearm snapping outwards to strike the shuttle. Unfortunately his arm speed was not showing the whipping action needed to smash the shuttle with optimum speed. Thus enabling his opponents to often get their racquet to the shuttle for the return. Just before making contact the wrist is the last movement in the upper body flicking forward to give the downward flight so to beat the opponent. The performer was relatively consistent at doing this but was sometimes unable to get the direction. This is due to many factors:

- Not jumping, therefore stopping him from hitting it over the net
- Hitting arm coming through late, therefore hitting the shuttle low but not high enough to get it over the net.

The performer's partner also showed good technique doing everything correctly with his upper body. Furthermore, he demonstrated high-quality use of his non-racket hand to get the most out of his shots, with as much power as possible and excellent accuracy. The non-experienced doubles were very inconsistent and held the rackets just above their heads leaving a reduced angle to strike the shuttlecock. Shown in figure 4.



Possible Physiological And Psychological Reasons For The Performers Strengths

The performer had many strengths and weaknesses. Many strengths of the performer were physiologically based such as:

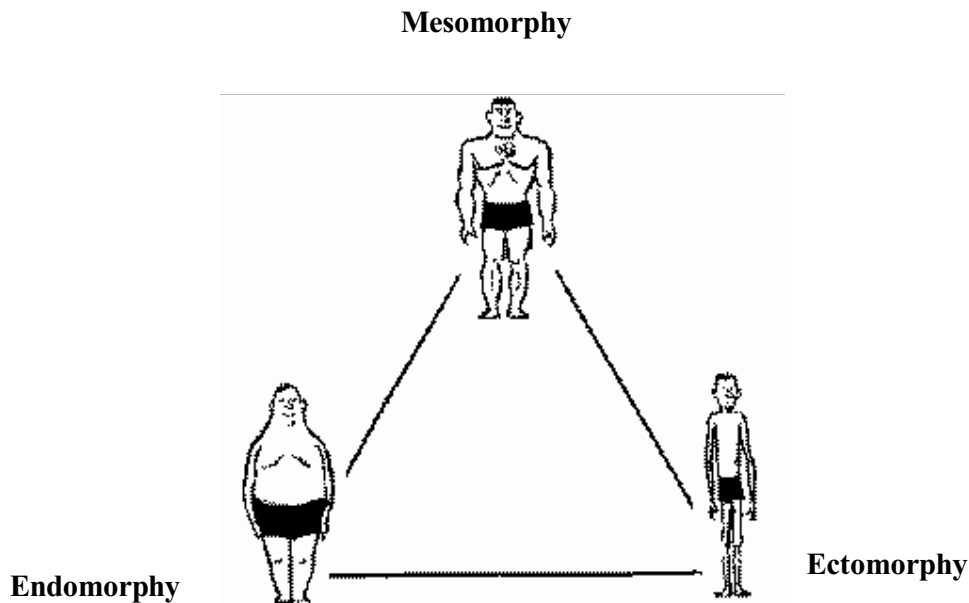
- Body Composition

“The component parts of the body in terms of the relative amounts of the body fat compared to lean body mass”¹

Body composition is very important in most sports and badminton in particular. The shape of the body is referred to as somatotypes. There are 3 extremes, which are;

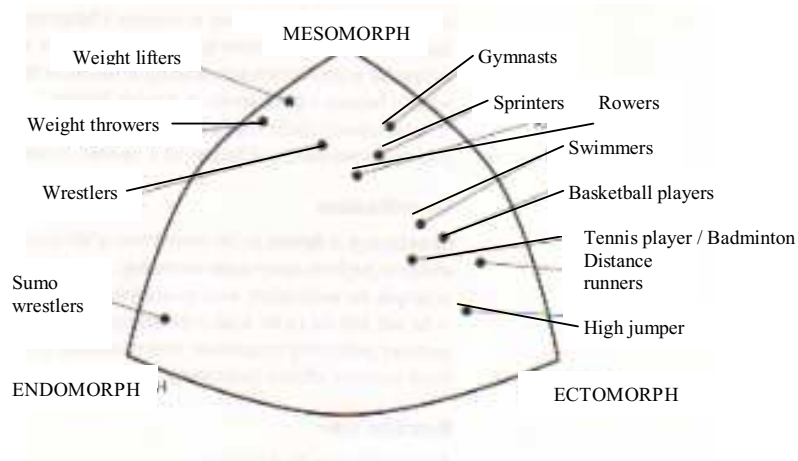
- Endomorphy
- Mesomorphy
- Ectomorphy

Fig 5.



¹ K Wesson, N Wiggins, G Thompson, Sue Hartigan, SPORT & PE, Hodder & Stoughton, 1998, P.96

Fig 6.



As shown in Figure 6 I have added badminton beside tennis players because the fitness requirements and somatotype are almost completely similar in both sports. This is shown as being close to ectomorphy, but also having characteristics of mesomorphy. The performer is an ectomorph with some qualities associated with mesomorphy, therefore ideal for badminton player. He has relatively strong arms as shown by the handgrip dynamometer recording a weight of 62kg, which is rated good on the national ratings. He and his partner were both mostly ectomorphs, who generally have;

- Little muscle.
- Little fat.
- Narrow chest and shoulders.

Their opponents were both endomorphs, which are not really suited for badminton; the characteristics of this somatotype are;

- Relatively fat or pear shaped body.
- Wide hips and shoulders.
- Wide neck.
- More fat on the body.

These endomorphs are more suited for power events as shown in figure 6.

Another possible reason for the performers strengths could be his reaction time.




“The time taken to initiate a response to a given stimulus”²

In badminton the stimulus is visual, which is, the shuttle on its way to your side of the court. The performer had good reaction times that indicate that he has good selective attention. This process selects relevant from irrelevant information from the display, therefore the performer can recognize certain specific cues from opponents and ignore irrelevant aspects. This prevents information overload and allows the performer to focus on what is necessary. During the game the performer

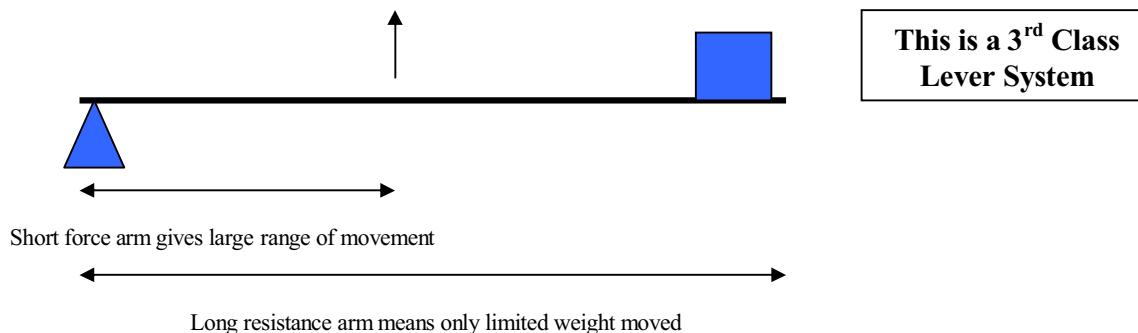
² K Wesson, N Wiggins, G Thompson, Sue Hartigan, SPORT & PE, Hodder & Stoughton, 1998.

showed excellent reflexes, managing to move across and reach shots that were particularly difficult. His partner was also very successful at reacting to shots and making good return shots. Their opponents were both very slow at returning shots and didn't react to the shuttle until it had been returned and passed over the net. This could be due to their endomorph somatotype and inability to move as quickly due to having to carry more weight.

The last physiological reason for the performers strengths is his levers. There are three components of a lever:

- Fulcrum (pivot point) 
- Effort (force) 
- Resistance (weight) 

In terms of playing a 'jump-smash' in badminton, the fulcrum is the shoulder joint (ball and socket joint), the effort being the biceps, triceps and forearm muscles and the resistance is the racket and shuttlecock.



“3rd class lever systems can be used to increase the speed of a body”³

Because the performer holds the racket right back behind him prior to striking the shuttle it gives him a massive lever in which he can generate a long pull. This in turn enables him to hit the shuttlecock with maximum force if he has the arm speed to do this.

There are also some psychological reasons for the performers strengths and they are:

- Motivation
- Stage of Learning

³ K Wesson, N Wiggins, G Thompson, Sue Hartigan, SPORT & PE, Hodder & Stoughton, 1998

Motivation

The performer is very well motivated when it comes to playing badminton. This motivation is all intrinsic because at the level he is playing at there are no extrinsic motivating factors such as money or prizes. He enjoys the training and because of this, is very prepared to listen and learn new techniques and tactic. This is vital if he wishes to advance further.

Stage of Learning

The performer is at the associative stage of learning, which is the motor stage of learning. A motor program can be defined as very little conscious control. So the performer can now carry out the movements required to perform a good smash, without thinking too much about his body position. This may not always be the case but the performer does know how a 'jump-smash' should feel and has a mental image of this. Also at this stage the performer can now start to use internal feedback. This is where he can, after completing a shot, think back on his performance and judge his success and thereby correct his own errors. This is particularly important when in a game because the performer can detect errors during a game and change his performance accordingly. This, for example, could be the performer noticing that the racket is not being held behind his back before a shot and not having his usual power.

Possible Physiological And Psychological Reasons For The Performers Weaknesses

The performers weaknesses could be explained by a number of physiological factors. Firstly the lack of strength in his right arm is a massive fragility because this stops him from smashing the shuttle with a great amount of power. Strength can be defined as,

“...the maximum force that can be developed in a muscle or group of muscles during a single maximal contraction”.⁴

The type of strength required is elastic strength, this is because during a game that can last a very long time, the muscles required are used over and over again and require the same force every time.

Not only was there an enervation in the right arm, the left arm was also quite uncoordinated. This is seen by the arms laziness before, during and after the shot. A lack of coordination was also spotted with the feet positioning. This shows that there is a weakness in the performance ability to know where his arms and feet are and is therefore unable to rectify this problem. This is known as kinaesthetic feedback, which the performer needs to improve.

The performer is also weak at balancing when put in certain situations. Particularly after performing the ‘jump-smash’ and just starting the recovery stage. Dynamic balance is the required component of balancing when you are on the move, although practising static balance will help with being able to maintain the required body shape. The reason the performer may have poor balance is because he has never taken part in any activity that requires great balance capabilities. This can be improved with practice. Balance also fits in with lower body strength and the ability to tune the small muscle fibres in the legs to be able to work whenever required. It is clear that the performer is lacking in lower body strength because the jump was often missing from the smash. This strength, like the strength required in the upper body can be improved very easily through weight training and plyometrics. It is likely that the performer has not tried any type of weight training and therefore does not have the strength to continuously jump with every smash during the game.

The performer does have one psychological factor that hinders his performance a great deal and that is his self-esteem.

“Self-esteem is the extent to which we value ourselves”⁵

Unfortunately, it has been researched that people with low self-esteem lack in their own confidence and are self-protective. This causes a big mental problem for the performer when it comes to facing opponents whom he believes to be of a better standard than himself. Before the match even starts he has it already fixed in his mind that he will lose. His self-esteem can be improved through people who are significant to him such as teachers, coaches and parents treating his efforts with respect and support. The reason for his low self-esteem is not necessarily because people close to him often criticise his efforts but could simply be due to his efforts not being commended regularly or even when appropriate. The performer's view of himself will not change overnight but will gradually improve giving him greater confidence in his abilities.

⁴ K Wesson, N Wiggins, G Thompson, Sue Hartigan, SPORT & PE, Hodder & Stoughton, 1998

⁵ Davis, Bull, Roscoe, Roscoe. Physical Education and The Study Of Sport, Mosby, 1997, P.316

From my evaluation of the performers weaknesses it is obvious that there are three possible factors that could be improved in order to improve his performance. These are:

- Strength

This is particularly weak in both the upper and lower body. Improving this would develop the performers power in the smash, accuracy, direction and likelihood of the shuttle getting over the net and into the opponents court. Because he would have stronger arms and legs, thus enabling him to smash harder and jump higher. Improvement in strength could be made through weight training and plyometrics.

- Balance

It seems that the performer has poor balance capabilities and this causes him to loose time in recovering from a shot and preparing to make a return attempt. This is probably because he has never trained to improve his balance before. Advancement could be made through activities such as playing badminton on one leg, hopping drills and bounding. Balance should also improve with experience.

- Coordination

If the performer could coordinate himself better and have his feet in the right position he would benefit from having the correct body position and improve the chance of striking the shuttle with the best possible positioning. Also, if the left arm was under more control and used more effectively then the accuracy of striking the shuttle will be better and decrease the likelihood of missing the shuttlecock. Although a game of badminton itself requires great 'open skills' the actual precise body movements when performing a 'jump-smash' are identical every time therefore can be defined as a 'closed skill'. The performer should have a mental image of what the required movements are, therefore practice gradually entails refining performance and once the movement pattern has been established it should be repeated until it becomes habitual and the performer can reproduce that movement consistently without having to pay too much attention to what his limbs are doing. Going through the movement slowly so the body is under more control until eventually being able to do it correctly at full speed will aid the process of refining the performance.

After consideration I have decided that the improvement of strength would benefit the performer most because improving balance and coordination can be done through repetitive actions and can be left up to the performer to do in his own time or at his training sessions. Improving his strength takes a lot of consideration and needs a correct training programme that he will benefit from in relation to his badminton performance. The improvement of the performers strength will entail the development of both his elastic strength in his arms for maximum effort when striking the shuttlecock and power within his legs. This is because his legs could constantly be jumping for a long time possibly during a rally and will need to endure frequent contractions and resist fatigue. Plyometrics, which is when the muscles are taken through an eccentric contraction before a powerful concentric contraction, would be very beneficial to the performer.

I believe that I have all the facilities available for me to successfully allow me to carry out this improvement in the performer. I have an adequate gym with many different weights on offer, both freestanding and machine.

Plan To Enhance Performance

Before planning a training regime there are a few aspects that must be taken into consideration, these include:

- Specificity.
- Intensity-Overload.
- Duration.
- Recuperation.
- Warm Up/ Cool Down.

Specificity

This principle refers to the relevance of the choice of exercise to the activity to be improved, which in this case is badminton. The exercises should be specific so that after the 6-week training period the performer will be able to compete at a higher standard. This also includes which type of muscle fibres will be worked and that the same energy systems are used in training that are used in badminton.

Intensity

“Overload is the term used to describe training activities that are harder, more intense, and/or lengthier than normal physical activity undertaken by an individual.”⁶

Overloading a human places certain parts of their body under particular amounts of stress, because of this the human biological system responds by becoming capable of withstanding this stress. Therefore, the training should gradually show an increase in intensity as the program progresses, be it either an increase in sets or repetitions, or an increase in weight.

Duration

This must be taken into consideration so that the programme is strenuous enough to work the performer each session and not be relatively easy. On the other hand not put the performers health at risk by asking him to do more than his body can cope with.

Recuperation

It is vital that after each training session the performer is giving sufficient time to recover before another session, because if he has not fully recovered his muscles may be tight or sore and stressing those muscles at the same point could risk the performers health.

Warm Up / Cool Down

The purpose of a warm up is that it prepares the performer for,

“maximal levels of subsequent performance and reduce the risk of injury occurring within the performance”⁷.

⁶ Davis, Bull, Roscoe, Roscoe. Physical Education and The Study Of Sport, Mosby, 1997, P.128

⁷ <http://www.scrum.com/fitness/warmup/default.asp>

These should be carried out before every training session and last approximately thirty minutes. There are three steps to a warm up session:

1. Light jogging to increase the pulse rate, increase oxygen movement within the body and warm the muscles up gradually.
2. Light and gentle stretching of all the major joints and muscles. Each stretch should be held for at least 10 – 15 seconds and slowly stretched.
3. Drills relating to the activity. In this case holding a racket in performers hand and getting him to carry out slow movements of particular shots without the shuttle. This improves the performers flexibility and kinaesthetic awareness. Not only does a warm up help you physiologically, it also gives you a mental edge. This is because whilst warming up it gives the performer a chance to familiarise himself with the environment.

A cool down is also necessary after every session. This helps to minimise the onset of muscle soreness (therefore helping you to recover more quickly), allowing your body to return to its normal resting state at a more gradual rate and help to prevent future injury. Cool downs should involve a continually decreasing exercise intensity (i.e. easy jog to brisk walk) for approximately 5 minutes, and a period of stretching. Stretching is very important at this stage, and each stretch should be held for approximately 20 seconds.

The type of training must also be well thought-out so that the performer will reap all the benefits from this training program. There are two different types of training that could be possible for the schedule:

1. Continuous Training
2. Interval Training

Continuous training is exercising lasting longer than 60 seconds, “involving low forces and where breathing is comfortable”⁸. Examples of this include jogging or swimming. There are many different variations of this type of training method but all revolve around the same principle that the training is constant without defined repetitions and sets.

Interval training is “characterised by repetitions with an interval of time between; these are organised in sets; with a longer period of time between the sets”⁹. Interval training is more effective in establishing levels of fitness, and therefore biological changes, than the continuous method. “This is because the repeated high-level stressing of anaerobic systems for energy production, and the forcing of repetitions before full recovery is achieved.”¹⁰ The sorts of interval training featuring the interval concept include:

- Weight training
- Circuit training
- Sprint training
- Endurance training

As shown in the list, weight training is featured which will be a large proportion of the schedule. Due to the fact that weight training can only be sensibly carried out using interval training I have chosen this method. The performer will carry out two sessions each week on a Monday and Thursday giving

⁸ Davis, Bull, Roscoe, Roscoe. Physical Education and The Study Of Sport, Mosby, 1997, P143

⁹ Davis, Bull, Roscoe, Roscoe. Physical Education and The Study Of Sport, Mosby, 1997, P144

¹⁰ Davis, Bull, Roscoe, Roscoe. Physical Education and The Study Of Sport, Mosby, 1997, P144

plenty of resting time between each session. Both of these sessions will be interval training with the Monday session being weight training and the Thursday session being plyometrics. This will give the performer a whole weeks recovery for the stressed muscles because the weights will push the upper body and the plyometrics will work the lower body. Plyometrics are specialist exercises that enable a muscle to reach maximal strength in a short space of time. This works by stretching a muscle and then relying on its elastic properties to produce greater forces than are normally possible in the reflex contraction. Key points to consider when undertaking plyometric training:

- Warm up thoroughly.
- If you experience muscular or joint problems, stop immediately.
- Wear quality footwear, which provides ankle support and has adequate, but not too much, cushioning in the sole.
- Use a flat landing surface that has good shock-absorbing properties. Surfaces such as sprung-loaded floors are not appropriate, nor are heavily cushioning surfaces, such as a crash mat (they absorb too much energy and ruin the stretch-shortening mechanism of the exercise). The best surface is a grass field or tartan athletics track.
- If boxes or benches are used, make sure they are sturdy, and have a non-slip surface.
- Make sure you have an adequate area for your training. Do not put yourself at risk from obstacles (or others) that may encroach onto your activity.
- The work should be quality, therefore ensure that you are adequately rested between sets. *

To ensure that the performer has progressed he will be tested prior to the schedule, once after three weeks to make sure that progression has occurred and at the end of the six week training period. Although we cannot test his performance within a game we can test his maximum lifting weight. Measuring his maximum bench press and his grip dynamometer will give an indication as to whether the performer has improved. As mentioned the training will take place on Mondays and Thursdays and last for 6 weeks.

Before each session a warm-up will be carried out. This will consist of a jog for 3 minutes to increase the pulse rate and warm the muscles up. This will then be followed by stretches, which start at the head and work their way down the body ending at the ankles.

Monday Session

After the performer has completed a sufficient warm he will carry out his weights session. This will involve the following exercises:

	<i>Starting Weight</i>	<i>Advanced Weight after 3 weeks</i>
• Bench Press	20kgs	30kgs
• Upright Row	15kgs	20kgs
• Closed Grip Bench Press	20kgs	30kgs
• Bicep Curl	5kgs	10kgs
• Dumbbell Fly	1.5kgs	2.5kgs
• Dead Lift	10kgs	15kgs

(These exercises are shown on the following page)

* List adapted from <http://www.scrum.com>

- Each exercise will consist of 2 sets.
- Each set will consist of 15 repetitions.
- After each set there is 1 minute recovery.

The performer will carry out all the exercises every Monday.

Interval Training Programme (Monday)
1. Warm Up
2. Bench Press 15reps
3. 1 min rest
4. Upright Row 15reps
5. 1 min rest
6. Closed Grip Bench Press 15reps
7. 1 min rest
8. Bicep Curl 15reps
9. 1 min rest
10. Dumbbell Fly 15reps
11. 1 min rest
12. Dead Lift 15reps
13. 1 min rest
Then repeat stages 2 –13 once more
14. Cool down

Thursday Session

After the performer has completed his warm up as mentioned previously, he will carry out his plyometrics session.

This consists of the following:

- **Double leg zig-zags: 2sets of 10 repetitions**

”Place 10 hurdles about 30-60cm high, (or lower if necessary) in a zig-zag pattern, with approximately 45-60 cm between each hurdle. Keep the feet together, with your arms by your side and flexed to 90o at the elbow.

Use a double foot jump, in a diagonal direction, to clear the first hurdle, keeping the shoulders pointing forward and concentrating upon bringing the knees high. Upon landing, change direction and jump diagonally over the second hurdle. Continue to hop all along the chain of hurdles for 1 set.

- **Lateral hurdle hops: 2sets of 10 repetitions**

Stand on one side of a cone, (or hurdle 30-40 cm in height). Using a 2-footed take-off, leap sideways over the cone, with as much height as possible. Land on the balls of both feet, and immediately jump back in the reverse direction.

- **Stair Hops: 2sets of 10 repetitions**

Using two-leg (progress to one leg after three weeks to increase the intensity) take-off and landing, hop up a flight of 10 steps.

- **Alternate leg bounds: 2sets of 10 repetitions**

Start off with a rocking step, with your arms at your side, and one foot slightly in front of the other, as if you are about to take a step. Jump forward, with as much distance and height as possible. In flight, prepare for and land on the opposite leg, and take off immediately upon landing.

Alternate the front leg at the start of each new set.

- **Box Jumps to long jumps: 2sets of 10 repetitions**

Stand about 60 cm back from a box, or bench, approximately 40-70cm in height. Jump, in an explosive manner and using a double leg take-off, onto the box. Keep your trunk upright, and use a double-arm forward swinging motion. As you land, explode off the box, getting as much height and distance as possible. Land on the balls of both feet, and immediately jump as far forward as possible (as in a long jump).

- **Depth Jump to hurdles: 2sets of 10 repetitions**

Place a hurdle 1-2 m away from a box 40-70cm high. Jump off this box, keeping the knees very slightly bent in the air. Land on the balls of the feet, with the legs shoulder width apart. Flex the knees upon landing, and immediately explode over the hurdle, swinging the arms as high as possible in a forward direction, and propel the body as high as possible, concentrating on maximal effort. Variation can be achieved by obtaining 2 vaulting boxes of similar (and appropriate) height, and place the second one after the hurdle. After clearing the hurdle, and upon landing, jump onto the other vaulting box. The performer must ensure that whilst carrying out this exercise someone is spotting him to make sure that he does not fall off upon landing.

(Adapted from <http://www.scrum.com>)

Like the weights session, there will be a one-minute rest period between each set of exercises.

This schedule will work because it is using proven techniques within the world of sport.

By carrying out these two sessions each week I believe that the performer will increase his upper and lower body strength. This is because:

- When muscles contract, an electrical impulse is sent from the central nervous system. These impulses are sent through the nerve cells called motor neurones. A single motor neurone cannot contract a muscle but can stimulate many fibres within it. “The motor neurone, and the fibres it stimulates, is called a motor unit, which is the functional unit of skeletal muscle”¹¹. Therefore if the performer were to improve his muscle fibre quantity he would have more fibres contracting per motor neurone and therefore a lot more strength within the whole muscle.
- An average rally will last between 5- 15 seconds. Within this time the anaerobic energy system will be used. The energy supplied for this time will be from ATP-PC (Adenosine Triphosphate -Phosphate Creatine) and lasts up to roughly 20 seconds. The training sessions designed are ideal at improving this energy system because most sets will last roughly between 10- 20 seconds at high intensity. This means that when it comes to a game situation the performers energy system will be functioning efficiently.

¹¹ K Wesson, N Wiggins, G Thompson, Sue Hartigan, SPORT & PE, Hodder & Stoughton, 1998 P.34

Bibliography

AUTHOR	TITLE	PUBLISHER	DATE
K Wesson, N Wiggins, G Thompson, Sue Hartigan	SPORT & PE	Hodder & Stoughton	1998
Davis, Bull, Roscoe, Roscoe	Physical Education and The Study Of Sport	Mosby	1997
	http://www.scrum.com		