

**LAWN BOWLS  
COACHING**

***Beyond In the Groove***

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## INTRODUCTION

There have been many books on how to play Lawn Bowls, perhaps starting with the *Manual of Bowl Playing* by W W Mitchell, first published in 1864 in Glasgow. Most books were written by someone who was, or had been, a great player. Some simply give hints about things that have helped them, and some provide a system.

In the early 1960s, the Royal Victorian Bowls Association assembled a group of some of the best players of the day, and asked them to put together an instruction booklet, based on their consensus view as to the best way to learn to play bowls. “*In the Groove*” was published in 1963. It was added to in 1971, and revised in 2006, and is still in print. The foreword to the 2006 edition of *In The Groove* notes that it is *the definitive coaching text in Australia*. However, its first sentence notes that the advice given is primarily for the beginner.

In more recent times Bowls Australia has published a number of Coaching Manuals, and developed courses based on these, which are delivered by the State Associations. These manuals are primarily about the process of coaching. Bowls Australia and various people have published drills for practice sessions.

When *In The Groove* was written, all bowls available followed pretty much the same track, and this had not changed for many years. Since the mid 1980's, a change to the minimum bias standard, and the development of new ways of designing bowls, has led to the

development of bowls that follow tracks that are quite different from the track earlier bowls followed (See Appendices 1 and 2). To get the most out of these new bowls, you need to know a lot more about the forces acting on a bowl, and the opportunities offered by the new geometry.

In recent times, various branches of science have been called on to assist in coaching at the elite level in many sports. Apart from the science of how to teach, the branches of science most obviously relevant to Lawn Bowls are Physics, Biomechanics, and various aspects of Psychology. Information from these areas can be used by coaches to develop elite bowlers, and by bowlers who want to become champions.

This booklet is an attempt to provide this information.

This booklet is written for a right handed bowler. Left handed bowlers will have to make the appropriate transpositions.

## **HOW WE LEARN**

Delivering a bowl is an example of what is called a psychomotor skill. An activity that involves very precise use of the muscles, controlled by the brain. Learning psychomotor skills involves creating, refining and strengthening links between the brain and the muscles involved.

These links are created by practice.

When you practice, you should start with a "mental representation" of exactly what you want to happen. This should be a picture in your head of the result you want to achieve. It can also be more than this. It can include an image of the track the bowl is going to follow, and the pace it will be moving. It can include a mental representation of the sensations of pressure and tension in all the muscles you use delivering a bowl. It can even include the feeling of being well balanced. Practice then involves trying to deliver a bowl so that exactly what you have pictured actually happens. You note the results, and then go through the whole process again. As you do this, links are formed between what you are seeing on the green, the image in your head, and what your muscles actually do when delivering the bowl. At the physiological level, it may be that the brain "recognises" that certain pathways are being used frequently, and creates myelin sheaths as insulation around these pathways, so that the signal can pass along them more readily, and with less interference.

There are a number of implications for practising to improve psychomotor skills:

1. The three things that are important if skill is to be increased to the highest level are
  - A - a mental representation of what you want to happen,
  - B - an awareness of exactly what your muscles are doing as you deliver the bowl, and
  - C - an awareness of exactly what does happen.

2. Repetition is critical for learning to occur. You must play the same shot over and over again. Since this is not what happens when you are actually playing a game, then *playing a lot of bowls games is a poor substitute for practice.*
3. Playing the same shot over and over again after you have stopped concentrating fully on what you are doing will not improve your skill at playing it. Most people should practice for only half an hour at a time. If you really want to be a champion, then you could have a break, and come back later for another half hour session. Of course, there are people who have the ability to stay fully focused for longer, and they can benefit from longer sessions.

How much do you need to practice? Sports scientists now have as a general rule, that you need to repeat an action 10,000 times before your performance peaks. Ian Schuback, in his 2015 book, says when training for world championships (of which he won 4) he practiced every morning and afternoon six days a week - a total of 21 hours a week. He suggests that if you want to improve your game, a minimum of 3-4 hours a week practice is required. It's a big time commitment. That shouldn't be surprising - in most sports the top players put large amounts of time into practice.

That's practice. When you deliver a bowl during a game, you stand on the mat, look at the green, call up the appropriate image for the shot you have been asked to

play, go through it in your head (cognitive rehearsal), and then just do it. You are "in the groove".

It is probably best if you do this while standing on the mat. However it is possible to do the "cognitive rehearsal" before you step on the mat. This will save time, which could be important if you are playing to a "shot clock". You will see some very good bowlers who do this, and then play the bowl very quickly when they step onto the mat.

Some aspects of the game of bowls involve a decision making process, such as deciding what sort of shot to play. It is very important to distinguish between learned skills and decision making processes (which you also have to learn), because they are each controlled by a different part of the brain, and the way you learn to be good at each of them is quite different.

You learn to be good at activity that involves a decision making process by learning rules and then learning how to apply them. For instance, a skip needs to learn how to build a head, to maximise the chances that the team will finish the end with the best possible result. Rules can be learned from a book, or taught by another person, and learning to apply them is best done by observing what happens in the various situations involved.

You develop a high level of skill by practice.

## **DELIVERING A BOWL**

One of the first challenges to be overcome in delivering a bowl consistently is that we deliver the bowl with one hand, which is to one side of the body. The force we use to send the bowl on its way can easily have a sideways moment - that is, we will tend to throw ourselves sideways, and off balance, as we deliver the bowl.

Unless we can control this tendency to fall sideways and forwards, our brains will take some action to prevent a fall. And the action it takes can affect the track the bowl takes.

This is not a problem unique to bowls. As toddlers learning to walk, we learn to use muscles in our torso and legs (core strength) to counteract the tendency to fall sideways that is inevitable when we walk by moving one foot forward at a time. This can be seen as a psychomotor skill, that we learn, and maintain, by practice. We are all quite good at it, and do it quite unconsciously.

We can rely on a similar learned skill to keep our balance and deliver a bowl along the track we want it to follow. It is an aspect of what is sometimes called "core stability". Most people have enough core strength and core stability to play a draw shot on a fast green. Someone who is fairly young, and who does hard manual work for a living, or has developed very good balance, may have enough to play any shot, on any paced green. But to draw consistently on a slow green, or to play heavily weighted shots, many people need a delivery that will minimise the extent to which they



throw themselves off balance, and thus minimise the extent to which they have to rely on core strength and stability.

Your brain will not let you fall, and if necessary, your brain will do something to stop this happening. And it can do it automatically. Most likely you will:

1 Swing your arm across the front of your body (to your left), to counteract the tendency to fall to the right. This need not be a problem if you do it after the bowl has left your hand, but will be disastrous if you start swinging before this has happened. You will hear the cry "I have pulled it".

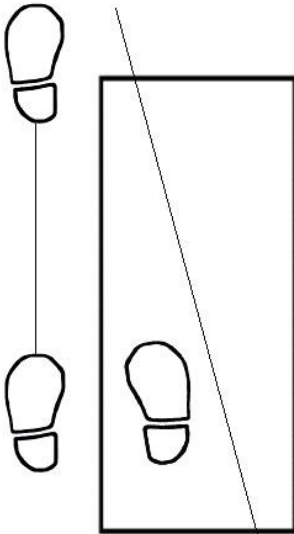
2 Move your right foot forward and to your right as (or immediately after) you deliver the bowl,

3 Move your head and shoulders upward and backward and to the left just as you deliver the bowl. This restores your balance, but will normally cause the bowl to be short. You will hear people say "you are coming up too soon" when this happens.

4 Reduce your follow through, to have a "flick" delivery. It is very hard to have a consistent line when you do this.

5 Drop the bowl from a foot or so above the ground. Unless you do this in exactly the same way each time, your length will be inconsistent. And you may damage the green.

One effective way to minimise the tendency to fall sideways is to deliver the bowl so that your weight is as close as possible to directly over your front foot at the moment the bowl leaves your hand. This will minimise the sideways component of the delivery action. It does, however, have important implications for where your feet have to be when you step forward.

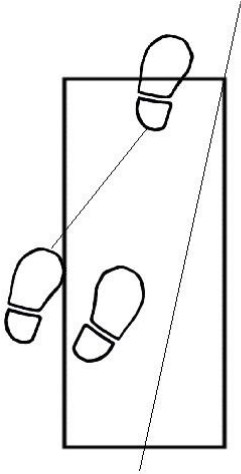


Backhand foot positions

The rules say you must start with your right foot on or partly on the mat. It does not actually matter where your foot is on the mat. Different people have different preferences. You must then identify the track the bowl will follow when it leaves your hand. The hand holding the bowl, and the bowl, will be directly above one point on the track that the bowl is to follow when your hand is by your side. For most people the track will be about 50 mm (2

inches) away from their right foot, but it may be further for people with wide hips. You then envisage the track the bowl will follow as you deliver it, and step forward with your left foot, to a point just to the left of the track the bowl is to follow.

Since for a backhand shot the track the bowl is to follow will be at an angle to your left. then a step forward to a point just left of this line is not far from a step straight forward.



Forehand Foot Positions that is almost straight forward. Quite different.

However, for a forehand shot, the track the bowl is to follow will be at an angle to your right, not to your left. Again you start with your right foot just to the left of the line the bowl is to follow, and parallel to it. Again you have to move your left foot as you step forward to a point just to the left of the track the bowl will follow, but this time this action involves a step quite markedly to your right rather than a step

It is quite important even for beginners to understand the different steps forward for a backhand and a forehand shot. Unless this is impressed on them they may step forward in the same way for backhand and forehand. One or the other will tend to throw them off balance, which will be uncomfortable. They will tend to prefer the hand at feels comfortable, and so will have a distinct preference for either the backhand or the forehand.

You then deliver the bowl, passing your hand as close as practicable to the edge of your foot. How close this is will vary from person to person. If your foot is in exactly the right spot you will find that you can deliver the bowl with a full follow through without feeling off balance. You do not watch your feet as you bowl, of course, so you need to practice the step forward until you can step to the exact right spot without watching your feet, and without even thinking about it. Initially you may need to have someone watch your step forward.

You will find when you step out in this way that there is a natural tendency for your right knee to move behind your left knee as you move forward.

You can also counter the tendency to fall sideways by putting your left hand on your left knee as you deliver the bowl. You then use the muscles in your arm to counter the tendency to fall sideways. And you can step forward with your front foot at an angle to the line the bowl is to take. You can then use the muscles in your foot to counter the tendency to fall sideways.

Sometimes people who want to bowl are not able – for various reasons – to deliver a bowl in the conventional way, or who are not able to play at their best doing this. There are various unconventional ways to deliver a bowl, however, that can work almost as well. A club coach should be able to assist someone in this position to adopt an appropriate strategy.

The most common is the use of a Bowlers Arm. This allows you to deliver a bowl without bending, and because the Arm functions as an extension of the length of your arm, you can deliver a bowl with quite a lot of pace with much less effort. Because you don't use your fingers you will never have the fine control of pace in a draw shot on a fast green, but if you are having trouble putting enough pace on the ball on a slow green or for a drive shot, or maintaining a consistent line in playing such shots, you will be able to do better with an Arm.

### **GETTING ENOUGH PACE ON THE BOWL**

Delivering a bowl involves using a number of different muscle groups, and bowlers vary in the way they combine the various muscles involved.

1        You use the muscles in your shoulder, arm, wrist and hand. You will see bowlers who use a "fixed stance", kneeling down on one knee before commencing the delivery. Or stepping out to the side, so that their feet are well apart when they deliver the bowl. They are only using muscles in their shoulder arm, wrist and hand.

2        You can twist your body as you deliver the bowl, much like golfers do. This is using muscles in your abdomen and back. This is fine, but as you get older you may find that you can't do it as well.

3        You can be moving forward as you deliver the bowl. You can do this in such a way that your weight transfers from your back foot to your front foot at the

moment - or just before - you actually release the bowl. This adds a surprising amount of pace to the bowl. If you do this you must ensure that you do it every time you deliver a bowl. Some people will generally transfer their weight forward when they are feeling confident, but stop doing it if their confidence drops. We all know some "front runners" who will play well when they are winning, but play less consistently when they fall behind.

Some players walk off - or even run off - the mat as they deliver the bowl. This imparts a good deal of momentum to the bowl. Some bowlers will run off the mat during the delivery when they play a drive shot, but not otherwise. This is a very effective way to put a lot of pace on the bowl.

4        You can start with your arm fully extended behind you before you start the delivery, and/or take a longer step forward. If you apply a constant force with the muscles in your shoulder and arm - even if quite a small force - then because your arm is moving a longer distance, it accelerates to a faster pace. You do need a strong hand to control the bowl when your arm is moving quickly.

You can vary the pace on the bowl - and how far it will travel - by varying the amount of backswing, or the length of your forward step. For a draw shot on a short end on a fast green, you would use very little backswing, and take a short step. For a weighted shot on a long end on a slow green, you would use a big

backswing and/or take a longer step. "In the Groove" calls this the Theory of Elevation.

5 If you start the delivery with your arm straight - that is, not bent at the elbow - behind you, then at some point during the delivery action you can bend your elbow, thus applying force to the bowl with the muscles in your arm.

6 If you start your delivery with your wrist "cocked" - that is bent backward - then when you straighten your wrist, and move your hand forward, you use the muscles in your wrist to apply force to the bowl.

7 If you give a final push with your fingers just as the bowl leaves your hand, this adds force to the bowl too.

You will find bowlers who only use some of these muscle groups to deliver a bowl, and some who use all of them, but to a different degree. Research in the field of biomechanics has shown that to have the maximum degree of precise control of the force applied, you should use all the muscle groups involved, and use them all at the same time. However you deliver a bowl, you need to deliver it exactly the same way each time. This takes a lot of practice.

Whichever muscles you use to deliver a bowl, it is important that the final force on the bowl as it leaves the hand is applied with the fingers. Because the ends of your fingers have more nerve endings than other parts of

your body, then if the final force is applied to the bowl with your fingers you will have more precise control over exactly how much force is applied, which will lead to more control over exactly how fast the bowl is travelling. Applying the final force with the fingers will also make the bowl start spinning before it hits the ground. If you don't do this it will slide along the green for a short distance before it starts rolling, and unless it slides for exactly the same distance each time, both your line and your length will be inconsistent. "Sliding friction" is much greater than "rolling friction."

There are some other aspects of the delivery that will give you more control.

1. Develop a smooth steady action with a long follow-through. This will be more easily controlled than a delivery that involves jerks or flicks, no matter how much pace you are giving the bowl. And it will enable you to control more precisely the direction the bowl is travelling in when it leaves your hand.
2. Place the bowl on the turf rather than drop it. If you drop the bowl onto the turf you have to do it in exactly the same way each time. More practice will improve your ability to drop the bowl in a consistent way, but you will never be as consistent as someone who places the bowl onto the turf.
- 3 Get it away without a wobble. This requires that the plane of the running surface of the bowl as the bowl leaves your hand is in line with the track the bowl is to



follow. If the bowl wobbles for its first few metres, your line and length will be inconsistent, unless you wobble it in exactly the same way each time. It doesn't really matter where your fingers are on the bowl, but it is best if they are in the same place every time.

4        Ensure the plane of the running surface of the bowl is vertical when you release it. If the bowl is leaning outward when you deliver it, it will take a narrower track. You will find some people who always seem to put the bowl down on a narrower track than others, even with the same model of bowl. This generally means they deliver a bowl with a slight outward lean on it. Some people do this deliberately when they want to bowl to take a particularly narrow track - they call it "standing the bowl up". It can be a useful skill, but you have to practice it a lot to be able to do it consistently.

If you are not consistent in the way you deliver the bowl, then it might be worth getting a coach to watch your delivery action, and suggest changes you could make.

### **PRACTISING THE DELIVERY**

The first, and perhaps most important thing you need to practice is your delivery action. Take your bowls onto the green, and try to deliver the bowl in exactly the same way, maintaining perfect balance, for about half an hour. Don't worry about where the bowl finishes. Your objective is to be able to deliver the bowl in exactly the way you want to without thinking about it, and to do it

in the same way every time. And you should try to use all the muscle groups involved, at the same time, to maximise control of the pace.

## **THE DRAW SHOT**

The draw shot at its most basic involves delivering the bowl to come to rest exactly as it reaches the jack. If you get the line right, and the pace right, it will do exactly that.

### **Getting the line right**

1        The method of getting the line right you will naturally use if you have played many other ball sports is to picture the actual track the bowl will follow, and deliver the bowl so that it will follow this track. You can do this either by picturing the whole track, or looking at some point on that track. The shoulder, being the point where the bowl is furthest from the centre line, is a common point, but it could even be the jack. You then deliver the bowl so that it will follow this track, or pass over the point you are looking at. *You are not actually putting the bowl down aimed directly at the point you are looking at.* If you did, it would be narrow every time. Your brain makes an automatic adjustment, and you actually put the bowl down heading towards a wider point. Probably without realizing you are doing this. It is important to realize that if you use this method, you must *not* try to put the bowl down heading directly at the point you are looking at. Trust your muscle memory – if you have done enough practice, your brain will know how much adjustment in the line you have to make. And you don't have to worry about having your eyes directly

above the track the bowl is to follow. Your brain can adjust for this.

This is basically the technique used in many sports. A bowler in a game of cricket looks at the point on the pitch that they want the ball to land on, and relies on muscle memory to control the way the ball leaves the hand to achieve this result. A darts player looks at the point on the darts board where they expect the dart to land, but the dart actually leaves the hand travelling towards a point above this, since it too will follow a curved path. People who come to bowls after playing such sports will often have developed the skills to concentrate on the result they want to achieve, and rely on muscle memory to control the direction the bowl is actually traveling in when it leaves their hand. This is sometimes called "having a good eye".

The track your bowls will follow may be very different to the track other bowls will follow, and very different to the track your bowls will follow on a different surface. You need to practice on all types and pace of surface. If you have done too much of your practice on a particular green, you will find it difficult to adjust to a completely different green. The locals will then have a big home green advantage.

If the point on the track you are looking at is not very far in front of you, the direction the bowl follows as it leaves your hand is very close to directly towards this point. The bowl doesn't move sideways very much until it slows down, so it looks as though it is travelling in a straight line for the early part of its journey.

2 There is an additional tactic you can add to this to ensure you get your line exactly right.

You identify a point you can aim directly at, and deliver the bowl as though it had no bias. The bowl will start turning before it reaches this point, of course, so it won't actually follow the line. Your aiming point will be outside the track the bowl actually follows. The aiming point can be on the bank, a point on the green the same distance away as the jack, or a point a couple of metres in front of you. Any point on the line will work. During your delivery, you then concentrate on your follow through, and watch the bowl to ensure that it leaves your hand heading straight towards your aiming point. This will be easiest if you have a full follow through, and your head is low to the ground at the point of delivery. How wide the aiming point is depends on the pace of the green, and what bowls you have. You identify your four aiming points (the points you look at for a draw shot on each hand, in each direction) during the roll up. The line to the aiming point will be at the same angle to the centre line for short and long ends.

If you use a point on the bank as your reference point, then you need to be aware that if the mat is brought forward, this point will be a bit closer to the centre line.

There are advantages in picking an aiming point the same distance away as the jack (but off to one side, of course). This gives you an idea of how much pace you have to give the bowl. Note that because the bowl

follows a curved path, the distance it has to travel to reach the jack is about 5% more than if it travelled in a straight line. So your aiming point is one to two metres (depending on whether it is a short or long end, and the pace of the green) past a point that would be jack-level. If you are playing in a strong wind that is blowing along the rink rather than across it (a headwind one way, and a tail wind the next end) then it may help initially to set your aiming point well short of its normal position for a tail wind, and well past it for a head wind.

Aiming at a point the same distance away as the jack also makes correction of your line if you are narrow or wide easier. If you finish a foot narrow, you can correct this by aiming at a point about a foot wider than last time. If you are a metre wide, you simply move your aiming point about a metre towards the jack. You use the same process to draw to a jack that has moved to one side, or to draw to a position.

Practice involves picking your point, and putting bowls down aimed directly at it, with just enough pace to reach it. If you can do it consistently, then all you have to do to draw accurately when you start a game is to find your four aiming points. It won't matter what pace the green is running at, what kind of surface it is, whether there is a wind, or whether the green has "runs" in it.

### **Getting the pace right.**

Getting the pace right is the hardest part of the game. Some books on bowls talk about the theory of elevation. This is based on the notion that if your swing follows a

longer arc, and takes much the same time to execute, then the bowl will leave your hand travelling at a faster pace. And the pace will roughly depend on the length of the arc. So for a faster pace (long end, slow green) you could start with the bowl held high in front of you, take a big backswing, and/or a longer step. *If you are taking the same time to deliver the bowl*, the bowl will then leave your hand travelling at a faster pace. Some people hum a song to themselves while delivering the bowl. This is quite a good way to ensure you take the same time to deliver each bowl.

An effective aid to taking a longer step for a long end is to start the delivery action with your left foot further back than your right foot. For a short end, you start with your left foot further forward.

Information on pages 11 to 14 can also help you control the pace of the bowl.

**A more precise way to get pace exactly right.**

These processes work (particularly if you are using a Bowlers Arm), but on their own are not enough to make you a top bowler. You need to refine the skill in getting the pace right through practice, as described on page 4. Practice creates a link between your image of how far you want the bowl to travel, and what your muscles do in delivering it. There is no substitute for a lot of practice to be able to get your pace right.

The degree of fine control you can develop is related to the strength of the link between the image and the sensations in your muscles. Your fingertips have more

nerve endings than your hand or arm, so you will be able to develop more control if you always deliver the bowl with your fingertips – and concentrate particularly on the sensations in your fingertips when you are practicing.

Slow greens – and weighted shots – involve extra force by some or all of the muscles involved. You have to learn to coordinate the muscles involved by practice. What that means is that practicing a draw shot on a 17 second green will not help you much when you play on a 12 second green. You need to do some practice on slow greens.

You must be able to call up a strong and precise image easily. You can improve your skill at this, by practising it. And you don't actually have to be on a bowling green to practise getting your images clear and strong. If you have the ability to do it, and enough experience, you can probably do a lot of your practising without going near a bowling green.

### **SHOTS WITH MORE PACE THAN A DRAW SHOT.**

For other than draw shots, the bowl will follow a different track. One approach to getting the line and pace right for such shots is to envisage the track you want the bowl to follow, and identify the point the bowl would finish if there was nothing in the way. You then draw to that point.

Otherwise, you will have to envisage the track the bowl will follow, and the pace it will need to be travelling at to achieve the result you want, and deliver the bowl so that it follows that track. You practice this shot by playing it over and over. The track it will follow will be different for different types of surface, and for different paced greens. To be able to visualize the track consistently, you will need a lot of experience, and practice, on different paced surfaces, and different types of surface. You can also help get the initial line and pace right by envisaging a spot on the green that you can deliver the bowl directly at, with just enough pace to reach it. The point this time is not same distance from you as it would be for a draw shot. The figure on the next page may help determine exactly where such a point would be.

Point A is the mat. B is the point you want to draw to, or play through. Point C is the aiming point for a draw shot. To draw a resting toucher, you would deliver the bowl along Line AC – that is, directly towards C, with just enough pace to reach it.

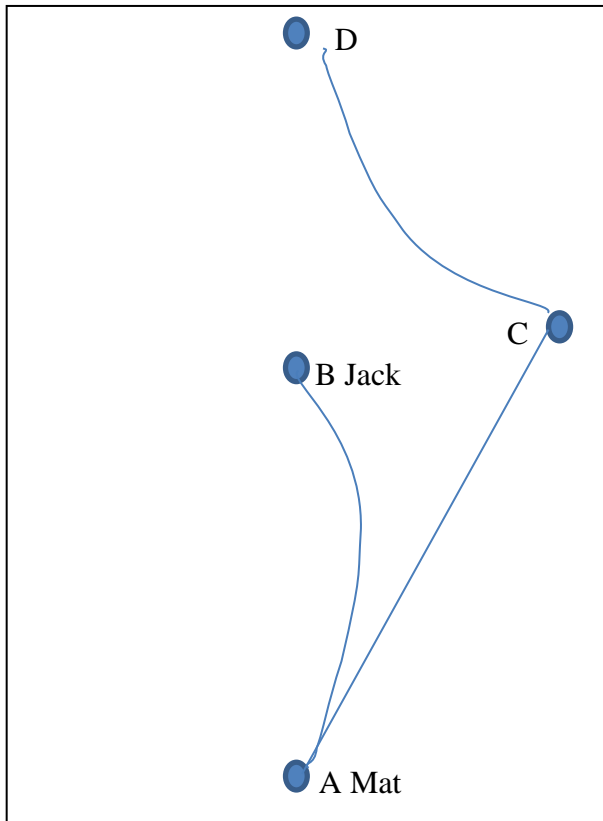
If you deliver your bowl towards any point on the curved line between C and D, with just enough pace to reach that point, then your bowl will pass through point B. You will trail the jack, or if point B is another bowl, you will make contact with it. Which point would you pick? That depends on whether you have to play around or under short bowls, and on how far you want to trail the jack – or move the bowl you are playing onto. But



playing to any point on the line C-D will result in your bowl passing through B.

The shape of the curve from C to D is the same as the shape of the curve from B to A - that is, the track the bowl actually follows.

Playing and practising weighted shots is easier to do for a short end, of course, because for a long end point D is well past the end of the green.



Another way to play weighted shots is to visualize the track the bowl will follow, and where it would come to rest, if the jack, or the bowl you are trying to contact, were not there. Then draw to this point.

### **PRACTISING TO BE FLEXIBLE**

It is all very well to be able to play a specific shot consistently, but in a game you often have to play many different types of shot. It is important to be able to adjust quickly and accurately. If you are good at calling up an image of the shot you are about to play, then you should be able to do this, irrespective of what shot you have played immediately before. However, many people find it helpful to practise adjusting, and you do this in exactly the same way you practise anything – by doing it over and over again, after visualizing it. To be able to adjust quickly to a full length end when you have just played a short end, you take two jacks onto the green, placing one at the maximum distance and one at the minimum distance, and practise drawing alternately to the long and the short jack. Or if you have trouble drawing when you have just played a drive shot, you could alternately drive at a jack, and draw to it with the next bowl. Practising such adjustments will improve your ability to make them.

You can also practise adjusting your pace by having a number of jacks, each one a metre further away, and drawing to each one in turn

You need to practice on different greens, under different wind conditions. If you spend all your time practicing

on the one green, with the wind always in the same direction, you will find it difficult to adjust to a different green, or different conditions.

### **BALANCE**

You need to be well balanced to play consistently. And the more effort you have to use to deliver the bowl (ie playing a drive shot, or playing on a very slow green) the more important it is to be well balanced. A standard test of how good your balance is, is to see how long you can stand on one foot with your eyes closed. Balance is one of the things that does deteriorate as you get older. This is one of the reasons why older bowlers are rarely as good at the drive shot as they were when younger, and why older players prefer fast greens.

However, it is possible to improve balance - again by practice. One simple technique is to lift your heels so that you are standing on the balls of your feet (on your toes), and then lower yourself onto your heels, and go back onto your toes. If you do this regularly your balance will improve. And there are many other ways to practice being balanced.

### **FOCUS.**

Apart from the ability to make the bowl do what you want it to do – which you develop by practice – the other attribute you must have to win games is the ability to focus, or concentrate. Most bowlers can put down a perfect bowl from time to time, but what makes you a good bowler is the ability to do it consistently – and this requires focus. And you can improve your ability to

focus. Focus can be seen as having two major components.

### **ATTENTION**

You must be devoting all your attention to the processes involved in the delivery of a bowl. This requires a clear image in your head of exactly what you want to happen, and the elimination of all competing thoughts. You must not allow yourself to be distracted during a game.

Chatting with your team and your opponents is fine in a social game, but it will distract you. If you really want to play your best, you must concentrate only on what the bowls are doing for the whole game. Try not to follow distracting trains of thought.

### **NERVOUS SYSTEM AROUSAL LEVEL**

The other major component of focus is having the right balance between being relaxed, and being pumped up. If you are too relaxed or too pumped up you will not focus as well. Being at the optimal level is sometimes called being in the zone – zone being short for Zone of Optimal Functioning, or ZOF.

Many people are too relaxed most of the time - and this prevents them from focusing well enough to perform at their best. There are ways you can pump yourself up. One simple technique involves deliberately tensing your muscles over and over again. Another involves chewing gum – you chew faster and more vigorously to pump yourself up. Cheering, shouting and high 5ing, the excitement of playing in an important game, having a

supportive and noisy crowd watching the game, and motivational speeches from the coach can do it too.

Stimulant drugs in moderate doses – such as caffeine in coffee or nicotine in cigarettes – will also pump you up and improve concentration. The use of illegal stimulant drugs to improve concentration and performance is of course banned. Sedative drugs such as alcohol relax you, and will generally make your concentration worse towards the end of a game. Most people should never drink alcohol during or even before a game if they want to play their best. If they insist on doing it, then going to extreme lengths to pump themselves up will counteract this particular alcohol effect to some degree.

However, when players reach the Zone, stirring them up more will make their performance worse. They will then choke, or fail to perform well when the pressure comes on. If someone is in the Zone, then their performance will deteriorate when all around them are cheering and shouting. So if you are going to make a lot of noise to pump yourself up, you need to remember that it may make the players around you worse. If your opponents are outplaying your team, then disturbing everyone's concentration may improve your chances of winning. In bowls, however, this has traditionally been regarded as poor sportsmanship, and is actually prohibited in LAW 13 (though rarely enforced).

Putting yourself into the Zone also involves ensuring that you are not too pumped up. You ensure this by consciously relaxing. Again, this is a skill that you need

to learn, and to develop by practising. There are many techniques you can use to relax, but one athletes commonly use is known as centering. Developing this skill, and practising it, involve consciously tensing the muscles in your hands, arms, shoulders and neck while breathing in, and then consciously relaxing them while breathing out. Deep, slow breaths. You need to practice this regularly (perhaps every day) to be good at it. After a time, you will find that you can step onto the mat when you are about to deliver a bowl, take one slow deep breath, let it out, and be relaxed. Going over the shot you are about to play in your head will then usually be sufficient to pump you up to the Zone of Optimal Functioning. And you will be in a position to play the perfect shot.

A drive shot will tend to pump you up. If you play a draw shot immediately following a drive, it will help to take a deep breath, and relax your body, when you step onto the mat to play the draw shot.

Fatigue will make it difficult to concentrate. Bowls is not a physically demanding game, so the effort expended in bowling will not make you fatigued. But when you concentrate on what other people's bowls are doing, you will unconsciously tense your muscles in the way that you would if you were delivering the bowl. This can be a good thing to do, but to minimize the fatigue effects, you need to be in a state of relaxed awareness while you are watching bowls. In the Zone, in fact.

## **PLAYING AS A LEAD**

The lead has to place the mat and deliver the jack, and put down the first bowls. The lead and second are frequently referred to as the Front End in a four. Their job is to set up a head that the Back End (the third and skip) can use to win the end.

## **PLACING THE MAT AND DELIVERING THE JACK**

Your skipper will tell you where to place the mat. Unless the skipper says otherwise, it should be placed the same distance from the ditch each time.

Delivering a jack is much the same as delivering a bowl. The jack is smaller, so it is best to hold it on your fingertips, and have your fingers close together. Your right foot should be on the mat pointing towards the skipper, and you step straight forward, and deliver the jack straight down the centre line, since it has no bias.

A jack has a smaller diameter than any bowl, so it has to be delivered at a faster pace than a bowl to travel the same distance.

The skipper will stand where he or she wants you to bowl the jack. It can be important for the lead to be able to bowl the jack to the exact length that the skipper is indicating, so it is worth practising this. However, because the jack will need to start its course at a faster pace than a bowl, then when you practice rolling the jack it may be a good idea to put down a bowl immediately after you have put down the jack.

Practising to roll a jack is therefore best done by taking a number of jacks and bowls, and bowling them alternately to a specific point on the green, for about half an hour. On your own. If you do this you will soon become quite good at it.

### **OBJECTIVES FOR A LEAD**

It is very common for the jack to be moved during a game. In a high standard game it can often be moved at least once every end. It is almost always moved backwards - very rarely forward. So bowls that are short of the jack have very little chance of being in the count at the conclusion of the end; a bowl behind the jack - even a couple of metres behind - is more likely to be in the count. More likely than a resting toucher, in fact, which will be a target for the opposition Back End.

If your Back End is very good, particularly with weighted shots, the Lead may be asked to ensure none of their bowls are short. The only way to ensure this is to aim for a point behind the jack. If you have been practising well, you should be able to get most of your bowls within a metre of your aiming point. So if you aim to draw to a point one metre behind the jack, very few of your bowls will be short. Most will be between jack level, and two metres behind the jack. All potential counters. But you would only do this if the skip asked you to.



## **PLAYING AS A SECOND OR THIRD, OR PLAYING SINGLES**

The major difference between what a lead does and what other players do is the range of different shots the others play. In any position, most of the bowls you put down will be draw shots. But for players other than leads there can be other objectives. Unless you are skipping or playing singles, you must play the shot that the skip calls you to play. The instruction from the skip should tell you what result is to be achieved, rather than how you should play the shot. Management by objectives rather than by specifying process. It is best to think of the different shots in terms of the objectives. The first 4 are commonly called weighted shots. They are played with more pace than would be used for a draw shot.

- 1 Playing onto a bowl with sufficient pace to roll it away, and take its place. After a draw shot, this should be the second most common shot attempted. The line you take is a little bit narrower, and the pace you deliver the bowl at is a little bit faster than for a draw shot. The way you develop skill at this sort of shot is to set up a head with a bowl close to the jack, and see if you can play onto it, with just enough pace to take its place. And do it over and over again, for about half an hour. It might help to have someone helping you, by re-setting the head when you disturb it.

If you take your line by looking at a point and delivering the bowl directly at it (rather than by looking at the track the bowl will follow, or a point on it) then your aiming point will be a point on the CD curve that is closer to point C than to point D (see page 23).

- 2 Playing onto a bowl with sufficient pace to take it – and perhaps others as well - out of the head. After playing this shot your bowl will not normally be in the head either. This shot involves a draw to a point on the C-D line much closer to point D. In practice the amount of pace you use will often depend on what short bowls you have to be under, or around. Again, the way you learn to be good at this shot is to play it over and over again, for half an hour.

If you play with a lot of pace (ie a drive) you can sometimes move more than one bowl out of the head, or even break up a head completely. Sometimes you might have no option but to try this, but the results are unpredictable, and you can easily be worse off after playing such a shot. The safest strategy is to use the minimum amount of pace you need to achieve the desired result.

- 3 Trailing the jack. If your team has more bowls at the back than the opposition, then playing onto the jack to move it back can give a good result. Aiming at any point on the C-D line will work. In practice the amount of pace you use will often

depend on how far you want to move the jack, as well as what short bowls you need to be under, or around. Since the jack is a fairly small target, this shot has a lower probability of success than most.

- 4 Playing through a short bowl, with the aim of either pushing it close to the head to be shot, or hitting with enough pace for your bowl to roll through and be shot. This shot can be fairly easy if there is a row of short bowls, making a big target, and could be used a lot more than it is. As a rough guide, a bowl you strike full on will travel about a third of the distance your bowl would have traveled had it not hit anything. And your bowl will travel about one sixth of this distance. So if your team has a row of bowls one metre short of the jack, and you play onto them with enough pace for your bowl to travel three metres past them if it finds a gap, then any bowl you hit should move forward about a metre, close to the jack. If you play with enough pace for your bowl to finish 6 metres past them if it finds a gap, then if your bowl hits one of the short bowls full on, your bowl will roll through about one metre. It will be close to the jack. Obviously, this is a better option if some of the short bowls are your opponent's. To get the pace right, again you must practise the shot. Set up a head with a row of short bowls, and play onto them, over and over again, for about half an hour. It can be helpful to have an assistant to

help reset the head whenever you disturb it. You will be surprised at how much more reliably you can play this shot after even one or two practice sessions.

- 5 Drawing to position. If you already have bowls in the head, and the skip believes your opponents may trail the jack, you may be asked to draw to a point at the back where your skip thinks the jack might finish. Very similar to drawing to a jack, but you need to visualize the track to the position your bowl will finish, rather than the track to the jack. Again, you need to practise doing this.
- 6 The block shot. Occasionally you will be holding shot, with the back positions covered, and will be happy to hold the shots or shots you have, and there may be only one shot that your opponent could play that would achieve a result. It may be possible to put in a short bowl that will make it more difficult for your opponent to play the shot that is needed to win the end. It takes a great deal of experience to recognize such a situation – there is rarely only one shot that your opponent can play, and simply forcing your opponent to change hands (for example) may not be worthwhile.

To be able to play such a shot, you need to practise drawing to a position, as in 4 above.

## **PLAYING AS A SKIP**

The skip has to be able to play all shots, and decide what shots the other players in the team should play. There is no substitute for experience, and watching good players in action, to develop skill in tactics.

The skip also has to get the best results out of the team.

It is important for the skip to give instructions that will trigger the right responses. If the bowlers in the team are experienced, and have been practicing, then they will be playing shots by visualizing what they want to achieve when on the mat, and then relying on their technique to ensure this happens. So it is important that skips tell their players what result they want to achieve with the shot they are calling, and if necessary tell them what side of the green to play, but they must not try to tell them how to play it. To do that is to tell them to override the automatic mechanism with a decision making process. The result will never be as good. Simply saying "draw to here, backhand" or "sit on this bowl and take its place, forehand" or "make contact with this bowl with enough pace to move it 1 metre" would be good. It is tempting to give instruction sometimes such as "keep the same line and just add a bit more pace". But you mustn't do that. Describe the result you want. Don't tell them how to achieve it.

Skips need to give some information about the first bowl, so that the bowler knows exactly what did happen to their first bowl. This must be given immediately the bowl comes to rest. And it must simply be information -

ie, "1 metre short", or "this short" indicating with the hands. There is no need to give any other information - the player can see whether their line was right or not. And when the player gets on the mat to play their second bowl, you must again simply indicate the results desired. Saying "add a metre to your last bowl", or indicating how short or long the last bowl was, *at this point* will invariably make performance poorer. The player will generally have made the adjustment in their head already; telling them to make an adjustment again may well result in what is known as over correction. Drawing attention to an opponent's bowl will focus attention on it, and the automatic process involved will then lead to a draw to that bowl, or perhaps contact with it. Tell the player where you want the bowl to come to rest (which may be to one side or the other of the jack) and don't mention the bowl in the draw. "Stay away from this bowl" is one of the worst instructions possible.

Instructions such as "don't be short" are also pushing people to over-ride the image in their head for the required shot, and will lead to poorer performance.

Learning theory has established that behaviour is more likely to be repeated if it is rewarded. There is a natural reward in seeing the bowl do what you wanted it to do, so the nature of the game provides for all the rewards actually needed. However, skips or anyone else praising good bowls will enhance the team spirit. Saying something good about bowls that are obviously not good (eg, "good line" for a very short bowl) may tend to push the player to over-ride the muscle memory developed by

practice. This will result in poorer performance. Whether it improves team spirit or not will depend on the people involved.

It almost goes without saying that skips should never criticize their players – unless they need pumping up, it will always make them worse. A skip who does this will quickly find that no-one wants to play with them. And there are better ways for players to be pumped up, if that is needed.

### **TACTICS**

The skip decides what shots everyone should play. And while the object of the game is to get bowls close to the jack, it is the situation after all bowls have been delivered that counts. Simply asking everyone to try to get close to the jack will rarely achieve the best result.

The first priority is to have at least two bowls close to the jack - whether you or your opponent have shot. If you only have one, then the opposing skip may be able to play onto it and take it out, scoring a good number of shots. And if you have too many, then you may have made it easy for the opposition to play onto them – or to trail the jack to a position on the green where you have no bowls. Once you have a couple of bowls close to the jack (ideally not too close together) you need then to work out what the Back End (either your team or your opponent's) are likely to be trying to do. And it is usually best to assume they will be able to do it. If they are going to be playing into the head then it is likely the jack will be moved back. So it is usually important to

have bowls behind the jack, as well as close to it. A bowl in front (short) will rarely be any use. As a rule of thumb, it is best if you have two bowls close to the jack and two bowls behind it after the first four bowls have been put down. Often the skip will be able to see where the jack is most likely to be moved to, and will call one of the team to draw a bowl to that point. This could be called defensive tactics, and can be very effective. If you can stop your opponents scoring more than one or two on any end, you will rarely lose a game.

Normally you will want your front end (the lead and second) to have bowls close to the jack, and behind it. No short bowls. However, nobody delivers every bowl to the exact point they are aiming at. Some will be short, some long, some wide and some narrow. We could look on this as error.

Even if you are playing well, and are on average drawing to your aiming point, then 50% of your bowls will be short - not counting the few that may be exactly jack level. This is not a reflection on how well you are playing - the best player in the world at the top of their form would still drop 50% of their bowls short. How short they are - how large the errors are - will be different for a good player. The best measure of how well someone is drawing is the magnitude of the errors. That is, more of their bowls will be close to the jack, and fewer will be a long way from it. But half of them will still be short.



Given that the jack is very likely to be moved back, bowls behind the jack could all potentially become shot, but short bowls almost never will.

The only way to ensure that the lead does not put down any short bowls - or very few - is to have them draw to a point behind the jack. If they are drawing very well, then perhaps most of their bowls will finish within a metre of their aiming point. If they aim for a point a metre behind the jack, their bowls will therefore range between jack level and two metres behind the jack, with a mean of one metre behind. In a high standard game, this can be a worthwhile approach. In a low standard game, of course, it may be better to simply try to get bowls as close as possible to the jack - whether in front or behind it.

As well as playing a defensive game, skips need to know when to play attacking shots. For example, playing onto an opponent's bowl to take it out of the head. One of the hardest things a skip has to do is decide when an attacking shot is called for, and when to be defensive. There is no simple answer to this problem. If you play too many aggressive shots, it can lose you the game, unless you are very accurate with them. On the other hand, if you are too cautious, and don't try for a shot that would get you a big score when the probabilities favour such a shot, then this too can lose you a game – particularly if your opponents are playing such shots, and getting them.

As a general rule, it is best even in an attacking shot to use the minimum amount of pace that will achieve the result. You must always be aware of the possible harm you could do, as well as the possible benefits. If you have only one bowl in the head, it is very risky to play into the head with a lot of pace. Many a big score has been handed to the opposition when someone took out their own side's only bowl in the head.

With some players, skips should perhaps avoid over control. If a draw to the jack is required, and there is no particular reason why it should be played on the backhand or forehand, there may be an advantage in letting the player decide on which hand they feel most confident. Often players will be confident that they have an image of one particular kind of shot, and less confident about how good the image is for others. They will do best playing the shot for which they have a good image.

There may be a number of possible good outcomes. It might be possible to draw to the jack, or if a bit wide run into a short bowl and move it into the head. Or if a bit heavy trail the jack to a favourable position. It is tempting to mention all these possibilities to the player. However, each of the shots would involve a different image and *the player will do best if they have one clear image in their head*. So you should resist the temptation to mention more than one desirable outcome. Pick one of the outcomes, and instruct the player as to the result you want them to achieve.

Often skips will change from short to long ends, or vice versa, or have the lead take the mat up the green and play a short end. If the opponents are doing very well with a particular length or position of the mat, then any change may improve your chances. Taking the mat up the green and playing a short end can be a good tactic if your team has practised playing such shots. If your team is more experienced than your opponents, or practise more often, then continually varying the kind of end may give you an advantage. On the other hand, if your team is relatively less experienced, it will probably be better to keep the mat in the same position, and play the same length of end.

The majority of games are played to a medium length end. This means that a lot of bowlers who don't practise very much will not be as good with very short ends, or very long ends. You will probably have an advantage playing either very long or very short ends if your team have practiced on such lengths.

Often you will have to play an away game on a surface that is quite different to the surface you are used to. If you take your line for a draw shot by aiming directly at a point the same distance from you as the jack, then playing a draw shot on a completely different surface should not be any more difficult than it usually is. You simply identify your 4 aiming points during the roll up, and play normally. For weighted shots, you will need an image in your head of the track your bowls will follow on this green, and be able to visualize the C- D Line. (See page 23) It will be different from your usual track.

A clear image may take time to develop. If the green is not true, it may be very difficult.

If you usually envisage the track on the green that your bowls will follow, then you must use the roll up - and the early ends - to see the track that your bowls will follow for a draw shot. You can then as the game progresses envisage the track for a weighted shot. Whichever way you do it, you will find that on an unfamiliar surface, you will do better concentrating on drawing in the early stages of a game. The skip would be best to have the mat the same distance from the ditch every end, and have the jack rolled to a medium length end. On the other hand, if it is your opponents who are playing on an unfamiliar surface, you may gain an advantage by constantly varying the mat position and the length of the end in the early stages of a game.

Sometimes you will have to play on a poor quality surface. The surface may be uneven, with bumps, holes ridges and depressions. It will be hard to get a bowl to do exactly what you want it to. It is important when this happens that the skip assess which is the most consistent side of the rink, what position of the mat and jack will provide the truest track to the jack, and call the team to play on the truest part of the green as much as possible.

Sometimes a ridge or depression will affect some models of bowl more than others. Generally small lighter weight bowls, and the modern very narrow straight finishing bowls will be more affected than others. The practical significance of this is that some of

your players may be able to play reliably shots that would be very difficult for others.

Playing on a ditch rink is a particular example of this. On greens where play can be in both directions, the surface will drop a little near the ditch - because bowlers standing on it will have caused some compaction. This means that when drawing to the jack on a full length end, you must take exactly the right line on the ditch side. A line that is slightly wide will see your bowl stay out and finish well wide of the jack. It is usually better to play the other side of the green when you can for a full length draw shot. Other shots will not be much affected, unless bowls are too wide for the pace of the green.

### **PLAYING AS A TEAM**

You will sometimes hear people say “a champion team will always beat a team of champions”. It is true that, other things being equal, a team with good team spirit will generally beat a team without it. The way players in a team interact with each other can improve the performance of the individual bowlers.

One essential requisite is that the players play together often as a team. In a pennant competition, selectors should try very hard to leave a team intact once it is established. If someone is unavailable for a particular game, it is very important to disrupt as few other teams as possible in filling the gap. In putting the teams together in the first place, it is probably important for selectors to try to put together people who will be

compatible. There is no rule about how to do this – some intuition might be useful. Or you could try asking everyone who they would prefer to play with.

The other essential requisite is that everyone in the team knows their role, and does not try to take other team member's responsibility. It will destroy a team's morale very quickly if players try to tell the skip what to do – or tell the skip what shot they want to play. And being critical of the shot the skip has called - even to yourself – is very bad.

If you are in a team with other people, there are things you can do – and equally things you should not do – to develop team spirit. The most obvious thing you should do is be supportive, and make sure your team members know you are supportive. Show pleasure, and congratulate them when they put down a good bowl. When they put down a bad bowl, it is best to say nothing. They will know what they have done, and won't need you to rub it in, by being critical or sympathetic. You must accept that everyone has a bad day at times, and must never show anger, frustration or impatience. It might be you next time.

Not surprisingly, it is most important for the skipper to encourage team spirit in this way.

## **MAINTAINING SKILL LEVELS**

The process of delivering a bowl in a game should involve standing on the mat, calling up the image for the shot you are going to play, and then playing it. You will

naturally watch the result. This is exactly what practice involves, except that in a practice session you play the same shot over and over again. Once you have developed a high level of skill at the various shots, visualising and then playing the shot during a game will help to maintain the skill.

People who play a lot of bowls games sometimes feel that they do not then need formal practice sessions. Regular play will certainly help maintain your skill at the shots you play often. For most people, that means draw shots on a medium length end. Some people like to run at the head, and do it frequently. They can become good at it. However, if you want to improve, or maintain your skill in playing the shots that are not required very often, or play well on very short or very long ends, you will still need a regular 30 minute practice session. Pick a shot you want to practice, and then play it over and over again for half an hour.

## **IN CONCLUSION**

This Manual is not intended to prescribe a way in which everyone should play. The great bowlers of the world include a lot of people who have a very individual style. There will be a great player who breaks each rule you might put forward.

Practically any method of delivering a bowl can provide good results if you practise it enough. If a bowler is getting good results, and doing in consistently, then there is no reason for them to change. And it would not be helpful for a coach to get them to try.

Many bowlers (particularly older bowlers) do not actually want to be champions - they are quite happy to play at about the same standard as their friends, and enjoy their game, without putting a lot of effort into trying to improve. It is best to respect this.

### **FURTHER READING**

There are a lot of books available with suggestions as to how to improve your bowling. It is possible to learn something from most of them.

Theories about how skills are learned, and the role of motivation and attention in skilled performance have been around since the nineteenth century. A good account of the early work is the book for students written by Fitts and Posner, which is still available on second hand book seller's web sites.

There are various branches of learning theory that are used in explaining how psychomotor skills are acquired. The most useful of these come under the general heading of associative learning theories. Eriksson and Poole (2016) is a recent example of an explanation of these in layman's terms.

A number of people writing under the general heading of Sports Psychology have put together research material on learning, motivation and attention, and applied it to sports performance in general, using language a layman can follow. Albinson and Bull (1988) and Bull (1991) are examples of this.



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## APPENDIX 1 – WHICH IS THE BEST BOWL?

No bowl is better for all types of shot, on all types and pace of green.

There is an ideal track for bowls to follow for each of the different kinds of shot.

- For a draw shot, it is easier to get your pace right with a wide drawing bowl with a hook finish. Such a bowl will also be better able to get around any short bowls. The limiting factor is that it needs to be narrow enough to play a draw shot on a fast green on the ditch side of a ditch rink. So it shouldn't be too wide.
- For a drive, the narrower the track, the less pace you will have to use. Less pace means more control, so the narrower the better.
- For a weighted shot, the position is more complicated. The narrower the track and the straighter the finish, the more chance there is that the shot will be effective, *provided there is a clear path to the target*. For a bowl that is too wide, and has a marked hook at the end, you have to get the pace exactly right to play a weighted shot that is only a little more than draw pace.

Dedicated leaders, who will never need to play other than draw shots, can use quite wide bowls, with a pronounced hook. And if both the third and skip have narrow straight finishing bowls then the team can be in trouble if the jack is trailed. Narrow straight finishing bowls may not be able to draw around short bowls.

Most people will opt for a bowl that will follow a compromise track, wide enough to get around short bowls, and narrow enough to play onto a bowl with some pace, without having to get the pace exactly right.

What is the ideal compromise track? Work done when the original minimum bias standard was developed (in Scotland in 1893) suggested that on a full length end, a draw of 4 feet (1.2 metres) was ideal. That is about half way from the centre line to the boundary line at the widest point on the bowl's track. The best compromise track for you depends a bit on what sort of shots you want to concentrate on. But remember that the majority of shots every bowler plays, in every game, are draw shots.

If we still played on 9 second greens as they did in Scotland in 1893 when the first trials were done, bowls manufactured prior to 1987 (when the minimum bias standard was changed) would still follow the ideal track. However, new types of surface, and much faster surfaces, have meant that the bowls designed for 9 second greens are now not ideal. Dwarf couch turfs (eg tif-dwarf) and synthetic surfaces tend to hook more at the end, so you need bowls with a straighter finish than the older bowls, if they are to follow the ideal track.

You will be best with bowls that are as close as possible to your ideal compromise track for the surface you mostly play on. For tif-dwarf turf and synthetic surfaces running around 14 -15 seconds you will be best with the straighter finishing bowls (rather than those with a

pronounced hook at the end) that have a track narrower than the old bowls, but not as narrow as the bowls designed for 17 second greens. For playing on bent grass greens, a bowl with slightly more of a hook at the end may be better.

For greens running faster than 16 seconds, many bowls will be wider than the ideal track – hence the search for the narrowest bowl possible. You will often hear bowlers say they like fast greens, but for formal games the Bowls Associations try to ensure that greens do not run faster than 17 seconds. In fact for most people greens faster than 16 seconds detract from the game, because with the bowls they use, the probability of success for a shot other than a draw or a drive is lower on such greens. Good players will draw or drive. This takes a lot of the variety and interest out of the game. And a very fast green that is not perfectly true, or has a lot of wind, will be very difficult for anyone to play consistently on.

Of course, you will at times have to play on a surface that is different from the one you usually play on, and therefore your bowls will not be ideally suited to it. If your bowls follow a track that is wider than the ideal track (ie, playing on a green that is faster than your bowls were designed for) you will be able to draw or drive just as well, but will be at a disadvantage playing shots a little over draw pace. The winning tactic is to draw or drive. This will attract some criticism, but will get better results.

If your bowls are narrower than the ideal track (ie, you are playing on a green slower than your bowls were designed for), weighted shots will be relatively much easier. This will give you an advantage. You should play weighted shots whenever you have a chance. Some people will call this "raking" and imply that it detracts from the game, but it will get results. It could be noted that the feeling that over-use of these shots was bad for the game led to the introduction of minimum bias standards in 1893.

You will notice that there is a continual stream of new bowls coming onto the market, all designed for very fast greens. Despite some common views that the narrower the bowl the better, these are not suited to slower greens.

No bowl will follow the ideal track on all greens under all conditions. Some people have several sets of bowls, and use different sets for different conditions. If you are good enough, and spend a lot of time practising with each set on the kind of green appropriate for it, this can work. But for most people, the difficulty in adjusting to a different sort of bowl puts you under too much of a disadvantage. Better to get a set of bowls that is suited to the sort of green you usually play on, and stick with it.

Bowls come in different sizes and weights. The heaviest bowl you can comfortably use is probably best, as it will be less affected by wind than a lighter bowl, particularly on a fast green. The difference between heavy and light bowls of the same size will not be significant on very

slow greens, though, which is why for the slower greens in the UK lighter weight bowls are still available. There is some advantage in using as large a bowl as you can control on a slow green and some advantage in using a small bowl on a very fast green (see Appendix 2). Use the bowl that best suits your hand.

Bowls manufacturers produce a gauge, to measure how big your hand is, and to show what size of bowl best suits it. Take it as a guide. You can hold a bowl that is slightly larger than the gauge suggests, if you grip it with your fingers wider apart, and if your hand is strong enough to grip it firmly. However, if you grip a bowl too tightly, you will lose some of your control over the pace.

So it's not a good idea to use a bowl that is too big.

Bowls are now made that are described as slimline. They are not as wide in their dimensions, though the track they follow is not necessarily narrower. They can be good for people with small hands, allowing them to use a larger and therefore heavier bowl than they would otherwise be able to manage. Some bowls now are made of material that is denser than the phenolformaldehyde (bakelite) that was used earlier, so for a given size, they will have more mass.

If you judge your line by looking at the track the bowl will follow and delivering the bowl so that it will follow this track, it will take some months of practice to adjust fully to a new bowl. So you should not generally contemplate changing your bowls unless they are really

unsuitable for the conditions. Until you adjust fully to the new bowl, your results will not be as good as they would have been with your old bowls.

If you judge your line by identifying your aiming points and delivering the bowl aimed directly at this point, as though it has no bias, you will have no trouble adapting to different bowls for a draw shot. Other shots require you to picture the track the bowl will follow, and it will take practice to be able to do this.

Having said all this, it should nevertheless be noted that the effect of practice is greater than the benefit you might get by switching from one model of bowl to another, so with enough practice you can play well with any bowl.

## **APPENDIX 2 – TECHNICAL DETAILS**

### **PHYSICS.**

Delivering a bowl (or rolling it down a chute) imparts momentum to it. Momentum is determined by the mass of the bowl, and its velocity (pace).

Once given momentum, the bowl will continue to travel in a straight line at the same pace until some other force is applied to it to change its direction, or its pace. The air the bowl travels through will have some impact on its pace and direction, but a bowl rolling over a softer surface will sink into it, and the forces related to this will cause the bowl to slow down and eventually come to a stop. This is known as rolling friction, but strictly speaking it isn't friction at all. Rolling resistance is a better term. How quickly the bowl will slow down depends on the mass of the bowl, the diameter of the bowl, and how soft the surface the bowl is running on is. We measure this when we measure the pace of a green.

There will be more rolling resistance for a heavier bowl, but because the heavier bowl also has more momentum, a heavier bowl will slow down at much the same rate as a lighter bowl, other things being equal.

Because rolling resistance is inversely related to the (square root of) the diameter of the bowl a smaller bowl (or a jack) will slow down more quickly than a larger bowl. So a small bowl needs to be put down at a faster pace initially to travel the same distance, and will slow down more quickly. A large bowl will not have to be



travelling so quickly to start with, but will tend to run on rather than stop quickly when it starts to slow down. In practice this means you are better with a large bowl on a slow green (doesn't have to be delivered with as much pace, and will run on rather than stop abruptly). Early books on bowls suggested using as large a bowl as you can handle, but this advice dates from the days when greens were much slower. A small bowl has to be put down with a lot more pace on a slow green, and for most people this is hard to do consistently, unless their delivery is very well balanced.

You are better with a small bowl on a fast green. For a large bowl, the amount of extra pace to add a yard is very slight – very hard for most people to judge. Using a small bowl, the extra pace to add a yard to the distance travelled is more substantial. Putting this another way, if your first bowl is a foot short on a 17 second green, it will be easier to add a foot with a small bowl than a large bowl.

The force exerted on a bowl because of the air it is travelling through involves some friction, but the most significant component is the lower pressure behind the bowl caused by the longer distance the air travels to go over or around the bowl. Details of how this works can be found in basic books on aerodynamics - this principle is what keeps an aeroplane in the air. A headwind creates forces which will slow the bowl down more quickly, and a tailwind a force that continues to move the bowl forward. In many ways a similar effect to playing on a slower or faster green, although the effect

on the track the bowl follows may be different for different bowls.

The bowl will only move sideways after it has left your hand if some sideways force acts on it. A cross wind will result in some sideways forces. And there are different kinds of sideways force that can be designed into a bowl.

- The first is a sideways moment of centrifugal force, if the centre of mass of the bowl is offset from the centre of the axis of rotation. This is known as precession. This could be achieved by boring a hole in one end of a bowl and adding a weight, and this used to be done once. But for a long time now it has been done by moulding the bowl to have more mass on one side.
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- The second is a sideways moment of the rolling resistance forces that slow a bowl down, due to an offset between the centre of mass of the bowl, and the plane of the running surface. And because the frictional forces apply at the point where the bowl is in contact with the green (ie, at the bottom of the bowl), and the momentum is acting through the centre of mass of the bowl, an offset between these points will also cause the bowl to lean, as well as move sideways. Centrifugal force will tend to stop the bowl leaning, so the bowl will lean more as it slows down. Leaning outwards will reduce the force due to precession, and leaning inwards will increase it

A lean on the bowl has the effect of reducing the diameter of the plane of the running surface. That is, the bowl will behave as though it were smaller - most significantly, slow down more quickly. Bowl designers can counter this to some degree by widening the running surface, so that the diameter of the plane of the running surface does not reduce as much as the bowl leans.

As well, the bowl can be designed to wobble - most obvious when it slows down. This has the effect of reducing sideways forces, making the bowl follow a straighter track, with less hook at the end. A wobble is not a problem if it happens in exactly the same way each time.

Prior to the early 1980's, bowls relied on precession to provide the turn, or bias. Precession can provide an ideal track on slow grass greens. On a very fast green, particularly on a tif dwarf or synthetic surface, these bowls have too much of a hook at the end to reliably play a "yard on" shot. To get close to the ideal track on fast greens, it is necessary to design bowls to incorporate the sideways moment of rolling resistance, or have a wobble.

By combining these various design features of the bowl, it is now possible to design bowls that will have variable amounts of turn (bias) depending on how fast they are travelling. So bowls can now be designed that will have exactly the same amount of average bias, and will all

finish on the same spot on the testing table - or the green. But they can be designed to follow quite different paths in getting to that point.

This allows bowls to be designed that will pass the minimum bias test on a test table, and be closer to the ideal track on a much faster green. On a slow green, of course, such bowls will be much narrower than the founding fathers decided was the minimum that should be allowed. It is arguable that the prescribed minimum bias test is now not doing its job – it allows bowls on a slow green that are really too narrow. Fixing this problem however would probably involve approving bowls for a specific pace of green, which would lead to many practical difficulties.