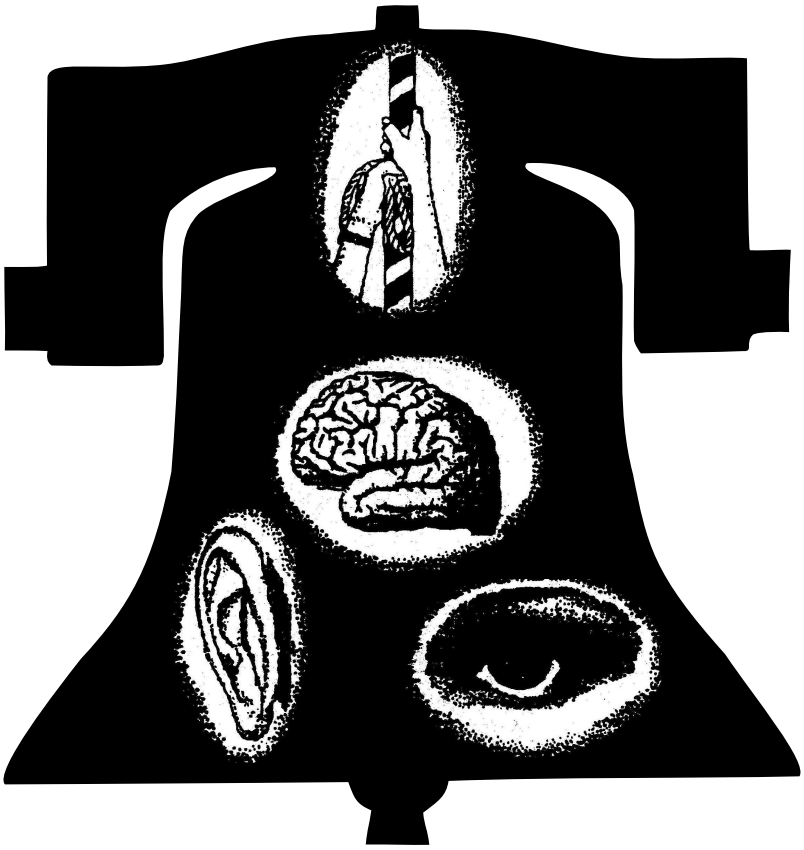
Ringing Skills



John A Harrison

I wrote *Listening Skills* in 1993 based on a series of *Ringing World* articles I had written in 1990, which arose from arguments about whether to ring by ear or by eye. I was always on the ear side of the argument, but the more I thought about the problem, the more I realised the real issues were not so black and white. The real question was about how to combine different skills.

I had long been concerned that many ringers had difficulty listening (or did not try to), and many had little confidence in their sense of rhythm. How could they be helped?

I did a lot of thinking, and observed ringers closely. I dug inside my own mind to find out what made my ringing tick. I tried to remember how I had been taught and to relate that to the much larger amount I had absorbed from experience. I drew on knowledge of other disciplines and I experimented. What emerged was a description of how a ringer can use different skills and combine them to achieve the quite amazing rhythmic precision which good ringing requires.

I wanted to help people acquire insights into the ringing process. I tried to provide the handles on concepts which would help people to look at and think about their ringing in new ways.

The articles drew favourable comment, so I felt it worth turning the ideas into a booklet, which Central Council Publications agreed to publish. I added extra material, including a short section on the mental skills used in method ringing. That went beyond the original focus on bell handling skills but I felt it would help – like adding navigation tips in a rally driving manual. I rearranged the material, and separated out advice aimed specifically at ringing teachers and mentors.

Ringing Skills sold over 1400 copies, and was still selling several dozen a year when Central Council Publications decided not to print any more and suggested making it available free to download. Because a 64 page A5 booklet isn't the most convenient format for home printing I reformatted it to 28 pages of double column A4. I also took the opportunity to revise the text, making many minor improvements.

Whether you are a ringer or a tutor, experienced or beginner, young or old, I hope you find *Ringing Skills* interesting and helpful. I have gained enormous pleasure from ringing over the years, but there is much more pleasure in good ringing than in mediocre ringing, both for the ringer and the listener. I would like as many people as possible to be able to share that pleasure.

John Harrison, Wokingham, 2014

Contents

1 Introduction 1
1.1 What Makes Ringing Special? 1
1.2 Using this Booklet 2
2 Looking 3
2.1 How Vision Works 3
2.2 Effective Looking 3
2.3 Rope-sight 4
2.4 Learning Rope-sight 4
2.5 Different Intervals 6
3 Listening 7
3.1 Listening Is Important 7
3.2 Why is Listening Difficult? 7
3.3 Learning to Listen 8
3.4 Limits to Hearing 8
4 Rhythm 9
4.1 What is Rhythm? 9
4.2 When Rhythm Goes Wrong 10
4.3 Developing a Better Rhythm 11
4.4 Style and Posture 11
4.5 Thinking Ahead – Trusting the Rhythm 12
4.6 A 'Feel' for the Different Intervals 12
4.7 A Feel for the Rhythm of the Bell 12
4.8 Working with the Bell 14
4.9 Adapting to the Other Ringers 15
5 Putting the Skills Together 15
5.1 Stability 16
5.2 Odd Struck Bells 17
5.3 Priorities 18
6 Self Help 18
6.1 Preparation 18
6.2 While Ringing Changes 19
6.3 Knowing the Method 19
6.4 Looking while Standing Out 19
6.5 Listening while Standing Out 20
6.6 Being Helped 20
7 Helping Others – Standing Behind 20
7.1 Overload and Dependence 20
7.2 How Much to Say 21
7.3 What to Say 21
7.4 Where to Stand 22
7.5 Advice and Criticism 22
8 Teaching 23
8.1 Bell Handling 23
8.2 Call Changes 23
8.3 Looking and Listening in the Tower 24
8.4 Teaching Rhythm Skills 24
8.5 Using Simulators 25
8.6 Ringing with a Simulator 25
8.7 Listening to a Simulator 25
9 In Conclusion 26
Appendix – How a Bell Works 27

1 Introduction

As ringers, we have each acquired many different skills – more than we were taught and more than we are aware of. Much of what we do becomes automatic and we are not fully aware of how we do it. If asked to describe how we ring well (or why we don't), many of us would give a very simplistic description, which missed out much of what really goes on. Some of us are more introspective and could give a fuller account, but even so there are probably big holes in our understanding.

Ringing is a bit like driving. Much of what we need to learn comes after we stop having lessons. Many ringers are taught, (not always very well), to handle a bell, and to get through basic methods. Most learn, (or fail to learn), the skills of quality ringing in an ad hoc way. Few receive active coaching. The lucky ones manage to get over the early hurdles and go from strength to strength. The more capable they become, the more opportunities they create. Many get stuck, and in the process resign themselves never to be really good ringers, but they press on anyway. By ringing less ambitious things, they have less opportunity to take part in really good ringing.

Although habits can be hard to break, it never is too late to try. Some excellent ringers have been given up as hopeless cases in former years, but persistence, or some inner breakthrough finally put them on the upward spiral.

Some people claim to ring 'by rope-sight', some 'by ear', some 'by rhythm'. Which should you try to do? Should you do what the experts say, or do what the less expert do, because it might be easier? Are there really different ways of ringing, and if so, which is best?

There are few quick answers. The different skills are not really alternatives, since they are good for different things. Good ringers use a combination of skills.

What follows will help you to understand the skills you use and to find ways to improve them. Of course, you cannot learn ringing from a book, so you must combine thinking about ringing with doing it. Observe yourself and others, and try to put your knowledge into effect.

1.1 What Makes Ringing Special?

Ringing is no ordinary pursuit. A room full of people swing large pieces of metal, weighing maybe a ton or more, on the end of ropes. They try to do this with a perfect rhythm, despite continually changing the order in which the bells swing. Ringing requires an unusual combination of mental and physical skills. Performed well, the accuracy achieved is truly remarkable. Let us look at what happens and at some of the numbers involved.

Perfect ringing would have exactly the same time interval between the blows from different bells, (with or without open leads depending on your style). In practice, the human ear cannot detect minute differences of rhythm, so there is a bit of leeway, but it is not very much. As a rough rule, mistiming by 5% (a twentieth) of the gap between bells can barely be detected, whereas errors of a quarter of the gap sound distinctly wrong.

Since an average bell takes about two seconds to swing, the resulting rhythm is a few hundred beats per minute, depending on the weight and number of bells. Putting it another way, the intervals between the bells range from a sixth to a half a second, ie 150 to 500 milliseconds. (A millisecond is a thousandth of a second).

If mis-timing by 5% of the interval can just be detected, then to be sure errors can't be detected, we would need to strike to an accuracy of a few hundredths of a second (10 to 20 milliseconds). This is many times faster than the tick of a high quality (clockwork) watch, (100 milliseconds), and even shorter than the vibration period of the bottom string of a piano, (40 milliseconds).

Perhaps more interesting, the familiar 'human reaction time', (the one you measure when you try to beat the light on a 'test your reaction' machine), is around 300 milliseconds. It may sound impossible to control the bell more accurately than the human reaction time, but ringing is not the only activity where we need such accurate timing. Think of the speed of a cricket ball and imagine the timing accuracy needed to ensure the bat hits it at just the right point of the swing to make it go in the right direction. Of course, we do not wait until the ball is in the 'right' place and then take a swing at it. We anticipate and rely on the fact that we have practiced the action many times.

The same is true in ringing. We should not just wait for the bell in front to be in the right place and then follow it. Each blow must be part of an established rhythm. We should not wait till the sally is in the right place and then 'catch it'. The arms must move rhythmically so hands and sally meet at the right place and moving at the same speed. This idea of establishing a rhythm and being guided by it is very important.

One more thing makes ringing more difficult than playing other musical instruments. The clapper swings across the bell and strikes it well over half way through the swing – as the bell slows down towards the end of the stroke. This is long after it was pulled by the ringer, and leads to a large delay between action and effect.

These difficulties put considerable demands on our skills, but there is no reason why we should not all develop our in-built skills to cope with them.

In this booklet, we will focus mainly on the physical skills of ringing – which you need to strike your bell reliably in that place, assuming you know where it ought to be. We will look in detail at the three skills of looking, listening and rhythm. The section on self help briefly considers the impact of the mental skills needed in method ringing.

Looking and listening are mainly perceptual skills. We use them to find out what is going on around us. Our sense of rhythm, and the ability to do things rhythmically, includes motor skill. We use motor skills to control things, in this case, our arms, a rope and a bell. Each skill has a different part to play.

We often take our senses for granted. They normally work so well that we are not conscious of them. We just assume that what we perceive is the same as what is there. When it is not we are surprised, for example by illusions, or when a car appears out of a blind spot when driving. Our senses work in quite remarkable ways, but they are not as perfect as we may imagine. We will look in some detail at how each works. If we understand the limitations of our senses, we can learn to use them more effectively.

To perform any complex activity well, a lot must be done subconsciously. There would not be time to think about everything. Just imagine trying to walk if you needed to control the muscles of hip, knee, ankle, toes etc separately, as well as moving the rest of your body to stay in balance. During the learning process, progressively more of our actions are built into automatic responses. Our conscious minds can then focus more on what we want to do rather than on how to do it. The trouble with unconscious skills is knowing how to get at them if they need improvement.

It takes many thousands of hours to reach absolute top performance in any skill. This represents the sort of commitment made by top sportsmen over several years, but it is more than most of us can commit to ringing. Ten thousand hours represents 3000 peals or a lifetime's service and practice ringing. The message is simple, most of us will never reach perfection, so we will always have scope for improvement. Whether we do improve our skills, or let them deteriorate, depends on us.

1.2 Using this Booklet

Chapters 2 – 4 contain descriptions of the ringing skills and how they work together. These chapters contain most of the factual information. If you are not familiar with the ideas, you may find it a lot to absorb at once. Try reading a chapter at a time, and then compare what you have learnt with what you see and experience in the tower.

Chapters 5 – 7 contain tips and advice. Which chapter you read will depend on your needs, but you ought at least to look at Chapter 5 on self help.

The appendix goes into rather more detail on the mechanics of bell control. You may find this more useful when you are familiar with the rest of the booklet.

If you are not already fairly familiar with the ideas, you will probably find you get more out of re-reading the relevant sections after a while.

Learning is a complex process. You can't fill someone up with knowledge or skills like filling a car with petrol.

Learning is also an active process. You have to try things out. For a physical skill, you try different muscle actions until you find a combination that works. For knowledge, you try new ideas against what you already know, or think you know, until you can fit them in and feel happy to believe them. What works for one person may not work for another.

Because you each start from a different point, you will approach the ideas in this booklet differently, depending on what you already know and how aware you are of how you ring. Some things may seem obvious, some may surprise you and some may even seem alien. We often feel uncomfortable when gaps in our knowledge show up, or when we confront the fact that our habitual ways of doing things may not be the best.

We need time to sort things out in our minds, especially those of us who are past our prime learning years. This is where a booklet can help. It allows you to absorb ideas at your own pace, and without anyone breathing down your neck.

2 Looking

Looking is the skill most people are aware of in ringing, and it is one many worry about. People talk about rope-sight, but rarely teach it. Developing ropesight can be easy or difficult depending on how you try to do it. Most manage to get by, but progress can be slow and painful.

It ought to be easy, and it is for those who can do it. So if you find it difficult, you worry about it. Perhaps people worry about rope-sight because looking comes so naturally in every day life. Why should ringing be different? Why should we find looking at a handful of brightly coloured sallies in a well lit room difficult?

The trouble is that people who 'have acquired rope-sight' are very often not quite sure what they actually do with their eyes, or how they do it. All they know is that it works. They assume that if they can do it, anyone else ought to be able to. "Don't worry lad, it will come with practice" they say. But how do you practice what you can't do?

2.1 How Vision Works

Vision depends on a complex chain of processes, and only the first link in that chain is concerned with getting light into the eye. There follows a string of specialised nerve structures, starting behind the retina of the eye, and ending somewhere deep in the visual cortex of the brain. Each structure detects some feature of the visual scene, like lines, edges, or movement. They allow our brains to build up a pattern which means something.

You may think of the eyeball as a camera producing a small image on the retina. but it is actually a very poor camera. Much of the field of view is not fully sensitive to colours and only a tiny portion in the middle gives anything resembling a decent image. There is even a 'hole' in our vision where we can see nothing at all. We are not conscious of this because we move our eyes around to point at things that interest us, and our brains are so good at combining all the pieces of information we don't notice it happening. We think we see everything clearly, but it is really an illusion built up by our brains. In a sense, we 'see with our brains' rather than just our eyes. Vision relies on a lot of clever processing, and if it is disrupted, the effects can be quite dramatic.

Many things can go wrong, but there are two common ones: brain overload and looking in the wrong place. Each makes the other worse, so they can combine to form a vicious spiral.

The brain can only do so much. It is remarkable how many things it can do at once, but sometimes it gets overloaded. When this happens, something has to give. The brain copes by 'switching something off'. If you listen to the radio while driving and suddenly have to concentrate on the road, you often completely miss a chunk of the programme. The sound has been entering your ears, but your brain concentrated on the higher priority. The same thing can happen to your vision. You may not have noticed it – your vision does not go blank and you maintain the illusion of seeing – but your brain fails to extract any useful information from the light entering your eyes. You might as well be ringing with your eyes shut.

Have you ever seen a wide eyed inexperienced ringer staring across the ringing room in blind panic? Think about the expression 'blind panic'. People and animals in panic often fail to see things which are quite visible. Remember, your eye is not just a camera. Your brain has to extract the information before you 'see' anything.

You may have heard of 'tunnel vision'. It is usually caused by stress or fatigue. The brain does enough to see the object in the centre of the visual field, the thing you are looking at, but all else around it is lost to the brain. This is one cause of road accidents.

Think what tunnel vision means in ringing terms. You can see the rope you look at, but not much else. Wherever you look, you will see a rope, and they will all be going up and down. But what does it all mean. Rope-sight is not about being able to see a rope. It is about seeing relationships between the ropes, so you must develop the ability to see more than one rope at once.

2.2 Effective Looking

Since human vision is imperfect, we must make sure we use it effectively. You should aim to have all the ropes in your vision all the time. Then you can mentally focus as you need within the overall picture. You will not be caught out looking in the wrong place at the wrong time. This ideal may take a while to achieve. You must do two things. First you must develop the habit of directing your

eyes so you can take in all the ropes. Avoid the temptation to move your head around to look at individual ropes. Secondly, you must learn to make sense of the whole pattern, rather than following an individual rope.

If you watch inexperienced ringers who are having difficulty, the most striking feature is the intensity with which their eyes are fixed. There are two groups. Some stare solidly ahead, and despite great concentration, perhaps audibly counting their places, wander through the changes in positions which bear little relation to where they should be, or even to where they say they are. Their efforts do not vary whether they are in the right place or not, and it is fairly clear they have little idea what the other bells are doing, or how their own fits in.

Very often, these ringers still have problems with their bell handling, and I suspect that it is using up a lot of brain power. If you think about it, while learning to handle a bell, there is nothing to look at, so it is easy to get into the habit of switching off the vision while concentrating on handling.

Ringers in the other group look at individual bells. They switch between them, turning their heads and looking with great intensity at each. They have obviously picked up some intuitive way of knowing which bell to look at next, and they are determined to follow it. When their intuition points them in the wrong direction, which it frequently does, they respond either by panicking or by heaving the bell around to follow the one they are looking at, despite the fact that that they could not possibly have got so far out of place in one change without making any effort.

Those in this group probably suffer from mild tunnel vision, only seeing the rope they are looking at, which shuts out awareness of the other ropes. Of course, brain overload will worsen this.

2.3 Rope-sight

The phrase 'rope-sight', like similar phrases such as 'street-wise' is much better at describing the result than how to achieve it. For the sighted ringer, ropesight is crucial for two reasons. The most obvious is that it can provide extra information about what is happening. The second is less obvious but also important. We are visual animals and expects to do things by eye.

Sighted people rely on vision for nearly everything they do. They probably trust their sight more than any other sense. When deprived of it, they are instantly apprehensive. Think about descending the belfry stairs. Most people do not look at the steps as they tread on them, they walk down confidently relying on the regular position of the steps to place their feet and looking at the wall ahead. But turn out the light and nearly everyone feels carefully for each step before treading on it. Sight of the step was not needed, but deprived of the comforting sight of the walls, our confidence in moving evaporates. This caution transfers into ringing. The sighted are addicted to seeing what they are doing.

2.4 Learning Rope-sight

New ringers are introduced to rope-sight in several ways. You may just have been told which numbers to follow, on the grounds that it would let you get started, and that somehow you will gradually pick up rope-sight and become less reliant on the numbers. Many do make the transition, but many do not, or only partly make it. Or you may have been taught to hunt up by following the bell which has just followed you.

Both of these methods are widely used but they lack an essential ingredient. Neither actually teaches a technique for 'doing' rope-sight. The first teaches a way to manage without ropesight, (other than in the trivial sense of being able to look at a rope), and the second assumes that some form of rope-sight already exists, (being able to see which bell follows you). People are often not told how to see which bell follows them, or when and where to look. This method actually doubles the work, since at each stroke you have to look first at the bell you are following, and then you have to find the one that follows you, ready for the next stroke.

Rope-sight is looking at the ropes as a whole to pick out useful information. For example, it can help you to see:

- Which bell is in front of you, or behind you
- Where the treble is
- The last bell or the lead bell.

The technique for each differs slightly, but the basic process is very similar. You have to look at more than one rope, and that is easier if you resist the temptation to look too heavily at any individual rope. I was taught to do this very early, and I have always found it helpful.

It sounds more difficult to look at half a dozen ropes from the word go, but the trouble with looking at just one is knowing which one to look at! When you look at them all, that problem disappears. You can then concentrate on interpreting the pattern of the ropes you see. Human vision is very good at seeing patterns, if given a chance.

What about people who look at no ropes, and just stare at the floor? How do they do it? There are two answers to this question. One we will talk about later, since it is to do with skills other than looking.

The simplest answer is that they are probably looking at all the other ropes and ringers. Our field of vision is quite large, as you can simply demonstrate. Hold up two fingers in front of you and then move them round to the sides. You may be surprised to find that you can still see them when they are in line with your ears. Now waggle them and you will demonstrate another feature of your visual system; it is more sensitive to movement near the edge of your vision. (If you wear glasses, this may limit your field of vision, see below.)

So you can see all the ropes in peripheral vision while staring across the centre of the floor. But why do it? Different people may have different reasons and I can't speak for them all. I find it helps me to see more. By not

looking directly at any one rope, there is less danger of an individual bell absorbing my attention and causing me to miss something else.

There are other benefits from not looking directly at each rope you follow. It reduces the natural urge to leave the same visual gap after each rope. This urge must be overcome to master odd struck bells (your own or someone else's). Effective looking means getting enough information but not being dominated by it. We need to see what is happening, but if vision takes over it can swamp the other skills. Do not let your attention stay too long on one bell. Even if you are 'ringing by eye', you can do no more once your rope is moving – lingering stops you moving on to see more useful information.

2.4.1 Seeing the Whole row

To see where you are in the row, to see where your course bell is or to see whether the treble is leading, you need a picture of all the bells. To start with, make sure you can see all the ropes at once, without turning your head. This is easier if you ring a bell in a 'corner' of the rope circle. The worst place to be is in the middle of ropes that are more or less in a line.

As the ropes rush up and down, they 'follow' one another in the same order as the bells are ringing. The sallies go up to back stroke, then down and bob up to hand stroke, one after the other. You can see this most easily in rounds. Watch the pattern until you feel you can see what is happening. Then observe how the pattern changes with simple call changes. More complex call changes, make it harder to see bells following each other, but you should be able to spot the first and last ropes reliably. This will help you to know where you are in the row, by judging your position relative to them.

When you first try to look at all the ropes in changes, they may look rather bewildering, but make yourself take in all the ropes, not just one. Try to do this without moving your head. If you can do this, you will find it easier than having to remember to keep your head on the move. (Pilots are trained to scan their instruments like this, but they have rather greater incentives to do it properly!) In fact, most of the time in normal ringing, only a few bells are important for you, so you only need to concentrate on a few at once. But if you can't see all the ropes, you will always be in danger of picking the wrong ones to concentrate on. So stick at developing the wide view.

If you wear glasses and they limit your angle of clear vision while ringing, you may find it harder to take in all the ropes. If you are aware of this, you can compensate for it. You could ring the bells with the better view of the ropes, (narrower angle), at least initially. You could remember to scan your head, (like you are taught to check your mirror when driving). You will not need to move it far, just enough to make up the shortfall. Whichever technique you adopt, being aware that things may get lost at the edge of your field of vision will make you less prone to being caught out. I used to take my glasses off when ringing twelve because seeing all ropes blurred was better than risking missing some.

2.4.2 Seeing the Bells near You

For many purposes, you only need to see the bells ringing in places close to yours; (you always change with the bell in the next place). You can do this more effectively with a slightly different technique. The description below is based on the way I was taught, which I find helpful. (It may not be exactly as I was taught, since any skill can change over a lifetime making it hard to know what was there at the start and what was added along the way).

Imagine a horizontal line at about face level and use this imaginary line as a reference. You will observe the way the ropes cross this line, and for simplicity I shall talk about 'the rope' when I mean a point on the rope where the hands are, either on the sally or the tail end. You should not look **at** your own rope, which is too close to you, but it is important to think of it in the same way. In particular, you must be conscious of when your hands cross the imaginary line.

Your rope is moving fairly slowly as it crosses the imaginary line rising towards the end of the stroke. As it does so, mentally scan along the line and you will see two other ropes at similar height, also moving slowly. One will be ahead of you, having risen above the line; the other will be behind and not yet risen to the line. All the other ropes will be moving faster and will be some way from the line.

This lets you see which bells you are between. You can stay there, or you can move a place forward or backward to swap with one or other of them. Providing the other bells are in roughly the right places, you can hunt up or down without knowing the order you meet the bells in advance. By taking a broad view, rather than focussing your attention towards individual bells, you will be able to pick out the bells next to you more easily and you will avoid the very common problem of looking at, and trying to follow, completely the wrong bell.

Now, instead of just looking when your rope crosses the line, watch the whole pattern of ropes again. There will always be some moving up and some moving down, but if you watch the sallies, they will all go high at backstroke and low at handstroke. You can watch them following each other up and then down. Notice that your rope follows that of the bell in front of you quite closely through the whole stroke. In the same way, you should be able to see the rope of the bell behind closely following your rope up and down. Because they are so close in height to yours, you should be able to scan the other ropes at any part of the stroke and pick these two out.

This is a little harder than just scanning along the original line, but when you have mastered it, you can find your next bell, hunting up or down, at any time during the stroke. So you are not dependent on spotting it at the instant you pull off. Spotting the bell in advance gives you more time. Alternatively, if you miss it, (or it is not there), you have time to sort out what has happened afterwards, before you need to think about the next stroke.

2.4.3 Seeing Your Place in the row

Whatever you are ringing, your bell should always be somewhere between first and last place in the row. If for any reason it is not, in other words if you allow your bell to 'run out of the end of the row', you will probably lose your bearings. You may recognise this disoriented feeling, which has happened to most of us at some time. It is disorienting because if you look along your imaginary line as your rope crosses it, there is no other rope anywhere near!

Seeing the first and last bells is very useful. You can use it to keep yourself right at least twice in every plain hunt, providing you have counted your place correctly. Every time you are on the front, check that you are just in front of the first of the other ropes, and when you are at the back check that you are just after the last of them. Even if you go a little astray hunting up or down, you need never go more than half a lead without being able to check that you are in roughly the right place.

If you can spot the first rope to cross the line, you could spot the first two, the first three and so on. Plain hunt was first explained to me as 'let one bell go, let two bells go, let three go, and so on'. This requires a combination of the two techniques, by seeing how many ropes are 'below the line'. Spotting several bells is not as hard as it seems, since when you 'let four bells go', three of them are the ones you let go last time, so you can concentrate on looking for the extra one. This extra one is, of course the one closest to your imaginary line when your own rope crosses it.

This method is easiest on small numbers of bells, since you do not have to count too many ropes. But you can adapt it to make higher numbers easier. On twelve, I find it much easier to see that there are three above me than eight below. In the middle, on twelve, I find letting an extra one past is easier than counting all the ones below. (Of course if you miss one, you will be a place out until you get within range of the back or front).

You may not have the fortune to ring with a perfect band. So you can not assume the other bells will all be in the right places. How can you know if someone else is wrong? It relies on more skills than just looking, but assuming that you have been ringing fairly steadily and you are in roughly the right place, you should be able to detect for example that there is no bell closely following you, because there will be no other rope 'just behind' yours.

You may not know who should be there, but knowing that a bell is missing is very useful. It means you can ring the next blow with more confidence even though there is no one to follow. You will be able to prepare yourself for a couple of blows 'hunting blind'. (We will talk about how to do this later). You will also make a mental note that there is an extra bell somewhere, and so be prepared to make allowances if you come across it a few blows later.

In fact making judgements about the adequacy of what is going on round you, (and not always assuming that anything untoward must be your fault) is the first step towards a much more advanced approach to ringing. The beginner very naturally leans on the rest of the band for support, but if we all did that, the result would be chaos. As you progress, you must not only take responsibility for the quality of your own ringing, but must develop enough stability in your ringing to stay right when others are going wrong and provide a steady framework to make it easier for them.

2.5 Different Intervals

All bells are different. Bigger bells tend to speak later than smaller ones, so to produce an even rhythm for the listener, you must swing different bells slightly differently. The bigger the difference in weight, normally the bigger the difference in timing. If you ring the treble to a twelve, when the tenor strikes over you, you will notice that its rope may be ahead of yours. On a heavy ring this effect is very noticeable.

This effect is not limited to heavy bells. Some bells strike more slowly than their weight alone would suggest. Some bells are not even consistent in themselves. Many towers have an odd struck bell or two, (indeed some seem to be full of them). When an odd struck bell swings evenly at both strokes, the hand stroke and backstroke sound at different intervals. This is very off putting. To compensate, you must swing the bell unevenly. Also, if another bell is odd struck and its ringer correctly compensates for it, you will find that its rope does not move quite as you would expect.

If striking is not in line with the rope movement, how can you cope? In theory, you can learn the individual bell errors and work out all the combinations so you can apply the corrections. In practice, this is very difficult, and it is better to rely on the other skills described later.

3 Listening

Listening is the Cinderella of ringing skills. It is one of the most important, but it is rarely taught. Some ringers never listen and many listen less than they ought. Any ringer with normal hearing should be able to develop effective listening skills, but may need some help.

3.1 Listening Is Important

Ringing is a form of music. It has a different structure, (probably closest to minimalism) but the biggest difference is in the performers. No other musician would ask why it was important to listen. An orchestral violinist would never say she finds it too difficult to hear her instrument, but many ringers say just that. Even more surprising are those who therefore never try. They may listen to the whole effect from time to time, but with no idea whether they are making it better or worse. Listening is important because:

- It is the only way to know you are striking your bell in the right place. There is no short cut. If you cannot hear what you are doing, you have little chance of doing it properly.
- Those outside cannot escape the sound we make. As players to an involuntary audience we should listen to what we inflict on our audience.
- Good ringing is very pleasing to listen to. Well rung changes have a magical sound. To know you are helping to create it, is very stimulating. How many ringers, how often, or ever, have this experience? There is no sin in enjoying the beauty of what we do. The enjoyment can inspire us to ring well more often.

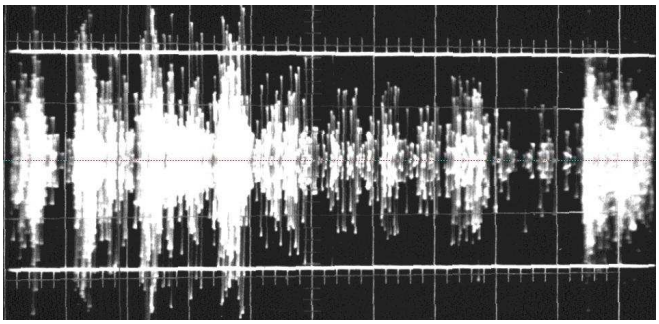
Every ringer should listen to every blow struck. There are many ways of knowing roughly where you are, but listening is the only way to know exactly. To return to the violinist, although she knows pretty well where to place her fingers to get the right note, the fine adjustment is made by ear, and if she could not hear the result, she would rapidly become less accurate at placing her fingers as well. In the same way, a really skilful ringer on familiar bells can do a lot by eye, but the only way to know whether it works is to listen to the result.

3.2 Why is Listening Difficult?

There are several reasons, some built in to us and some questions of habit. First of all, let us think about what the sound is, and how we actually hear it.

In Chapter 1, we discussed the rhythm of ringing, and how much unevenness we could tolerate before noticing it. When we talk of a rhythm, we tend to assume a series of sound pulses, with gaps in between, like the rhythm of a clock with ticks separated by silence, or a wire fence with posts separated by space in between.

Certainly this is what we think we hear. (Those who have difficulty listening to the bells may disagree and describe the sound as a jumble!) The truth is somewhere between the two extremes. If you look at the sound of bell ringing on an oscilloscope trace, you may describe it as 'bursts of jumble' running into each other. It is the start of the bursts which the brain responds to, (though in the example below, you can see they are not always very clear).



• • • • • • • • • • • • •

(The dots show where I think the bells struck.)

Ringing can sound like a continuous jumble because each bell carries on sounding long after the next one has rung, and it is still humming when it strikes again. So some sound is coming from all the bells all the time but at any instant there is a louder contribution from the one that has just struck. (Some times, it may not be louder than the cumulative sound of the others!)

When we listen to the bells, our brains 'tune in' to the important parts of the sound and reject much of the rest. Our hearing is particularly responsive to change, so the brain can suppress the clamour and focus on the strikes. What we 'hear' is a cleaned up result. This is a good example of what perceptual psychologists call the 'cocktail party effect'. By knowing the characteristics of the sound we are listening to, we can pick it out and make sense of it, even in conditions where a simple acoustic measurement would tell us that it was swamped by much louder interfering noise.

Unfortunately this requires effort. In marginal situations, the brain may stop trying to decipher the sound unless we concentrate on it. This too is like a cocktail party, where our ability to hear what is said doesn't gradually reduce as the clamour gets worse, it quickly flips from understanding to confusion. At a noisy cocktail party, you cannot casually listen to a conversation. Either you concentrate on it, or you can make little sense of it.

So we don't have to be ashamed if we find it difficult to hear what is going on in the tower, any more than we need to be ashamed if we can't pick out all the conversations at a cocktail party. But we do have to make the effort, since for most of us the skill of listening accurately has to be learnt. It requires concentration and can be improved with practice.

There is one further snag. Remember the ringer staring across the ringing room in 'blind panic'. If an overloaded brain stopped him seeing what went into his eyes, it is

even more likely that his listening will be switched off too. To some extent, all of us suffer from this during moments of intense concentration on some other problem. You must develop the habit of switching your listening on again as soon as possible when this happens.

3.3 Learning to Listen

Some ringers instinctively develop the habit of listening to their bells and then acting on what they hear. Many do not. So how do you learn to listen effectively? Is it one of those things that you either can or can't do, like people who can hear perfect pitch?

Listening properly to ringing isn't as difficult as you might think. It doesn't need perfect pitch. You could listen to the rhythm of ringing without hearing the pitch at all. If the bells all had the same note it would still be possible to tell how good the striking was. (But the ringing would be very boring!).

If you can hear the bells you should be able to learn to listen more effectively to them. If you have developed listening skills from other areas this may help, (for example from music or from diagnosing faults in machinery). Effective listening requires three things, all of which can be developed:

- Hearing whether the overall rhythm is even or not
- Picking out your bell as it moves through the changes
- Making judgements about how accurately it strikes.

If you have not already done so, try to hear some really good striking. It will give you an idea of what can be achieved. Even if your local band cannot provide this, you can buy recordings of ringing, or you can listen to a ringing simulator.

Start listening to the bells while not ringing. That will let you concentrate on listening, without needing to worry about your handling at the same time. There is one snag though. Following an individual bell by ear is easier when you are on the end of its rope, since then you (should) know when your bell will strike. If you are not ringing it, you lose the physical contact, so you must stand where you can see the bell you are listening to.

Some bells are easier to hear than others, so choose one of the easy ones. The treble is the highest and normally sharpest sound, while the tenor is the lowest and often loudest or richest. In rounds, they are both easy to pick out because of their position (first or last) but in changes you have to rely more on the sound.

In rounds, the bells nearest the front or the back are easiest to hear. Your brain is less likely to 'lose them somewhere in the middle of the row'. If you listen to the bell in seventh place out of eight, say, you will find it much easier to listen to it as the next to last, rather than counting seventh from the front. You can listen to any bell in rounds, (and changes if you know what it's supposed to be doing), by counting each place, but if you lose it you may find it hard to pick up again.

Listening aimlessly is very boring and will not achieve much. Your mind will wander to the peal boards, flaking paint, plans for the weekend and many other things if you are not careful. Give yourself a goal. Try to spot each blow which is not quite in place. Is it too late, or too early? Choose someone who rings reasonably steadily. You will learn more from detecting the occasional blow out of place, than merely detecting that the ringing is a mess. It is much easier to hear what is going on when the ringing has a reasonable rhythm.

First try to lock your hearing onto your chosen bell. Do this during rounds to 'get your ear in' before the listening gets more complicated as the bells go into changes. Listen carefully to the rhythm just around 'your' bell. Is it the same as the rhythm of the other bells? Is it even or not? If you decide it is uneven, is it your bell out of place, or the bell in front, or the one behind? This is a crucial distinction you need to make when it is your turn to ring.

Of course, you won't catch every blow. If your concentration lapses, don't worry, just concentrate on the next blow. Don't try to 'catch the one that got away'. You will probably miss the next one, so it's not worth it. There are other ways you can practice your listening skills, with a simulator, as described in Chapter 8.

When listening to your own bell, it is invaluable to know the position in the stroke where it strikes. The sooner you can develop this the better, and ideally long before you need it to help pick out your bell from the others.

3.4 Limits to Hearing

We cannot detect timing errors below a certain size. Good human hearing can detect timing errors of 20 milliseconds about 70% of the time, whereas it takes some 50 milliseconds to identify a note. These figures tie in fairly well with experiments that suggest a practical limit for many ringers is about a tenth of the bell spacing. Some people can detect errors smaller than this, though not all the time. From my own limited observations, those who can hear errors of 5% of the interval are generally good strikers. A few ringers fail to detect even quite large errors, even under good conditions.

These figures all relate to ideal conditions, far easier than real ringing. However, the fact that ringers can detect quite small errors suggests that our hearing mechanism is adequate, so any shortcomings in the tower must lie in how we use it (or fail to use it) while ringing. This is encouraging. It suggests that the latent skill is there to be developed in most of us, even in those who have so far failed to master the art of good striking.

So what happens below the limits of detection? If you can't identify the mis-timing of your bell, you can't correct it. So we can be fairly sure there will be small random errors. Interestingly, I have found that most people could detect the presence of small errors before they could correctly identify them. Often they said 'something was wrong', and even knew which part of the row it was in, but could not say which bell was out of place. Often they did not know whether the faulty blow was late or early.

The brain seems to group the sounds using slight gaps as dividers. This somehow masks information about the adjacent interval that would allow the distinction between say a slow third and a quick second. Obviously, in the tower such mis-perceptions would mean the wrong bell being 'corrected' and another error added.

Over the years, the argument has raged whether there are any meaningful measures of ringing quality other than fault counts. I have long held the view that faults are like pot holes in the road. The fact that you can't see pot holes, does not prevent you from feeling the difference between a smooth road and a rough one. Some people find relentless regularity unnerving, and claim that human ringing sounds 'more natural' anyway. But if they cannot hear faults, how can they tell? Perhaps we can draw an analogy with a line drawn in pencil. It is straight and therefore free of defect, but we find the texture pleasing. If we magnified it, we would find that the texture was in fact a roughness of the edge too fine to resolve, but clearly not too fine to perceive.

Our brains probably hear things in terms of 'clips' (intervals closer than the norm), 'gaps' (wider than the norm) and 'runs' (several blows roughly evenly spaced). Our brains would then interpret a gap in front and a clip behind as a late blow. That is fine for an isolated error, but in real ringing, there are many slight variations, some of which are audible and some of which are too small to hear. So how does the brain interpret a gap in front and no clip behind?

Our vision system interprets brightness in a similar way and artists have known for centuries that they can create an illusion stimulated by changes in brightness at edges of objects. With hearing there is a difference because time flows one way, and we tend to associate a fault with the bell after the clip or gap, even if the ones in front of it are in fact wrong.

The table below shows how different combinations of the before and after gaps may affect our judgement of what is wrong. The entries with ?? are ambiguous and the result shown could be illusory.

Gap before / Gap after	Smaller	Same	Larger
Smaller	OK??	Late??	Late
Same	Early??	OK	OK??
Larger	Early	OK??	OK??

Remember that illusions seem real, as you will know from optical illusions, so you cannot stop your brain responding to the misleading clues that cause them. But if you are aware of the effects that they have you can at least recognise the conditions when what you hear may be illusory, and you can develop ways to compensate for it. Probably the most important trap to beware of is the assumption that the bell behind the break in the rhythm you can hear is responsible for it. It might be the cumulative effect of two or three bells in front, each with an error too small to detect on its own.

4 Rhythm

The third ringing skill, rhythm, differs from the other two. Looking and listening are both perceptual skills – they inform us about what is happening around us. Rhythm plays a part in the listening skill, but rhythm really comes into its own is as a 'doing' skill.

Having perceived what the correct rhythm should be, we must control the movement of our arms and bells to conform to the rhythm. In doing so, we help to create a collective rhythm that can be perceived by everyone else.

The requirement is impressive. Swinging a few hundredweight of metal on the end of a piece of rope to a precision of a few hundredths of a second – more accurate than one tick of a quality Swiss watch!

Experiments have shown that good ringers can reliably do this to an accuracy of better than 20 milliseconds – a fiftieth of a second. Some people have been recorded achieving average errors three times smaller than this over the duration of a few dozen changes.

4.1 What is Rhythm?

The dictionary defines rhythm in terms of the duration of notes in music. In this sense, ringing rhythm should be completely even. The dictionary does not help us with 'a sense of rhythm'. In ringing terms, it has three components concerned with: discerning what the rhythm is, holding on to it and being able to use it effectively.

No real ringing (or singing or playing) is completely even. Good ringing comes close, with tiny variations in the timing of each blow. The fluctuations may be small, but they are there. So by 'extracting the essential rhythm', we mean responding to the underlying evenness and ignoring the small fluctuations.

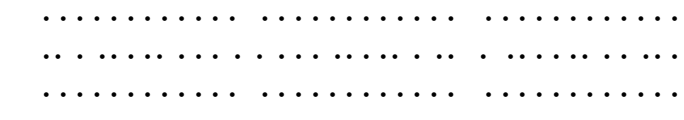
It is easy to describe it in this way, but to pin down exactly what our brains must do to achieve it is quite hard. For example, the speed, and therefore the rhythm, can change over a period. Obviously you must respond to this, but how do you draw the line between perceiving bells getting wider and the speed getting slower?

When conditions are very even, the distinction is fairly easy because speed changes will be very slow, and bells out of place will be in a minority. But as the rhythm deteriorates, most bells will be a little out of place, and the speed may change more rapidly. Then it is much harder to decide. As an example, look at the string of dots below. It represents about ten seconds of six bell ringing with the rhythm represented by the spacing. There are twelve striking errors, each one about a quarter of a blow late or early.

Which dots are in the wrong places?

I suspect it will take longer than ten seconds to work them out. It is hard to locate the leads and some of the errors were in first and last place, as they are in real life.

It is much easier if we add some perfect rhythm above and below it for comparison.



This example helps to illustrate the difficulty of making judgements about individual errors without a clear reference against which to judge them. Fortunately, our brains can derive a rhythm from a string of sounds and use it to detect small errors, but this latent capability has to be developed by practice.

There is another important message. You can imagine that if more errors were added to our example, the problem would have been impossible to solve. You would not be able to deduce the underlying rhythm. There has to be a degree of order before the concept that a certain instant corresponds to a particular place, has a valid meaning.

The second aspect of rhythmic skill is to be able to maintain it and to fit your actions to it. By maintaining a rhythm, I mean being able to keep it going, and not being disrupted by unevenness and interruptions around you. One of the most important things a rhythm allows you to do is to predict. If you know when previous blows were struck, then from the rhythm you know when the next blows should strike. This principle is much used in engineering. You may be aware that in a car engine, it takes about a millisecond for the flame to spread through the fuel mixture after being ignited by the spark. To give it time to do this the spark fires 'before top dead centre'. This used to be arranged mechanically, but with computerised engine control it is done by time. There is no way of measuring negative time and what it actually does is to measure from the previous cycle, relying on the rhythm of the engine turning to ensure the next stroke occurs at the predicted time.

In summary, there are three aspects to the rhythm skill:

- Detecting what the rhythm is
- Being able to maintain it, in the face of disturbances
- Being able to synchronise your actions to it.

4.2 When Rhythm Goes Wrong

If you have difficulty achieving a good rhythm, it may be caused by:

- Poor handling style or posture
- Distraction, or trying to do the wrong things
- Lack of confidence
- Little rhythm around you

These all interact, and any one of them can make the others worse. Poor handling leads to jerks, slackness and general unevenness, all of which make smooth regular ringing more difficult. Distractions (like trying to follow bells which are in the wrong places) or continual method mistakes disrupt attempts to ring evenly. A steady rhythm requires the confidence not to be led astray by short term, blow-to-blow disturbances and distractions. Finally, if the other ringers do not ring rhythmically, things are harder. Fitting in with a well established rhythm is a lot easier than trying to create a good rhythm to help others along. But you can't always expect to have it easy. If the other ringers are not doing too well, they need your help to try to even things out, so don't just join in the chaos.

Strangely enough, trying too hard can spoil your rhythm. Ask a sports coach about the effect of being too tense when trying to swing a golf club. Ask a craftsman about the proper way to swing a hammer. Ask a driving instructor about 'white knuckle drivers'. All these physical skills share the need for the right balance between relaxation and alertness to obtain a smooth, confident and accurate action. Ringing is the same.

Our bodies are complex mechanical structures. Each joint has many different muscles performing slightly different tasks, some to pull this way, some that, some to hold the joint together, others to stop it twisting, and so on. What to us seems a simple unified action like pulling the rope actually involves a complex orchestration of many muscles contracting and relaxing in a controlled sequence.

To give an obvious example of the interactions which take place, let your arm hang down floppily and shake it about. Now clench your fist and try to let the rest of your arm hang loosely at the same time. You can't do it, because some of the muscles which control your fingers run up to the elbow. In any case, your body has evolved in a world where the only reason for gripping things hard is to pull them or hold them, so when the brain sends a message to grip, a lot of other detailed actions are bundled up with it. Life would be too complicated if we had to control each muscle separately.

Muscles which are left too loose (a common handling problem) take longer to respond when needed since there is a small delay while the slack is taken up. Muscles which are too tense become fatigued and less able to respond accurately. In fact tenseness normally involves different muscles pulling against each other. Trying to change what one of them is doing upsets this balance and can lead to instability. If you have indulged in rock climbing or similar activities which involve supporting your weight on the tips of your boots you may have met this instability in the form of leg tremor.

While on the subject of muscles, think about the difference between your arms and hands. Your arms have big muscles and are fairly heavy, while your hands are much lighter with smaller muscles. Both factors combine to make the arms slower to respond to mental commands. If rather late in the hand stroke rise, you

decide you ought to let the bell swing rather higher than your arms are currently doing, what do you do? Ideally you would stretch up higher, but there just is not time for all the big muscles to make the necessary changes to what they are already doing. All you can do quickly is relax the grip of your fingers and let the sally slide through. Many people do this habitually, but they pay a high price, since while the rope is slipping they have little control over it. The answer, of course, is to avoid getting into such a spot by ringing with long strokes which give plenty of warning about what is going to happen, so you have time to respond with the bigger, stronger arm muscles.

You probably know some people who heave and strain in a constant battle with their bells, a battle they progressively lose as they tire. The battle, of course, is with the person who pulled the previous stroke! (Perhaps this habit has its roots in the common practice of first learning to ring a bell at one stroke only with an instructor on the other stroke to absorb whatever you do. Perhaps those who move quickly to ringing both strokes learn to live with the consequences of their previous stroke at a more formative stage).

At the other extreme, are those who become so relaxed that they are not in full control of what the bell does. They are frequently taken by surprise when the bell does not perform as expected but by the time they have realised what is happening, the stroke is nearly over and even a great effort fails to put the bell in the right place. So the next stroke gets off on the wrong foot as well, and then the next, and so on.

Neither of these styles is conducive to developing a good rhythm. Do you suffer from either?

4.3 Developing a Better Rhythm

Anyone with normal physical coordination should be able to develop a better rhythm. Most of us have some rhythmic ability. The problems lie more with failure to use and develop it. In ringing, we have the added advantage that the bell itself has its own rhythm. But we must learn how to harness it.

Rhythm is tied in with bell handling. Many people have inhibitions about the physical aspects of ringing. When a learner is being trained, criticising his or her handling is accepted and expected, though even then ringers other than the tutor are often reticent for fear of offending. But as soon as the fledgling ringer gains enough proficiency for routine ringing, the social barriers to criticism rise. After a while criticism is non existent. People are quietly allowed to develop habits which make it harder, or impossible, for them to ring well and nobody tells them.

Do not fall into this trap. Golfers are happy to seek advice about their swing, so why shouldn't ringers? If you have any doubts about your handling, ask someone you trust for honest and friendly advice. It is never too late to make improvements, but the longer you let a habit develop, the harder it will be to change.

So how do you develop a better rhythm? It is easier to answer this in the tower than on paper, for obvious reasons, but we'll look at different aspects.

4.4 Style and Posture

We have already touched on the problems caused by trying too hard, but it is worth emphasising. A balanced style means a lot more than having your weight comfortably spread between both feet. Far more important is the balance of the arms and upper body, the balance between hand stroke and back stroke and the length of the active part of the stroke. This is the time when the rope is taut. It is the only part of the stroke when you are really connected to the bell.

Many people think that the main purpose of the rope is to pull the bell. It is not. The most important use of the rope is to allow you to feel what the bell is doing. The more effectively you do that, the less you will need to pull it, and the more your pulling will be steady and measured and effective, rather than hasty and unprepared and inaccurate. A long stroke means fewer surprises.

Sadly, a combination of long ropes in towers, and natural laziness, causes many people to ring with too much rope. This leads to a short active stroke, rung mostly with bent arms. There is less time to feel what the bell is doing, and hence more scope for surprises.

Bent arms also reduce the effective leverage of the muscles on the rope, and the shorter pull means it must be harder than a long one to achieve the same effect. Both lead to more muscle tension. The lower position of the arms and their increased rigidity lead to a forward throw rather than a downwards pull. This makes the rope fly out and adds extra distraction. It encourages grabbing the sally instead of a smooth movement with hands closing gently round it as they move upwards.

If you think this description is exaggerated, look closely at the ringing of half a dozen ringers chosen at random.

Many ringers, especially inexperienced ones, do not achieve a balance between handstroke and backstroke. This may stem from early habits developed when they are still unsure of their rope handling. At back stroke, they have a secure hold on the rope. It is a good stroke for pulling, whereas the hand stroke is complicated by the need to catch and release the sally, and the hands are fuller. The bell naturally rises nearer the balance at hand stroke, so it is a good stroke for holding up and controlling the bell. The resulting tendency to pull only at back stroke and control the bell only at hand stroke leads to quick back-strokes and slower hand-strokes. Mistakes also take twice as long to correct. Ringers who learn to raise and lower a bell early in their training seem to suffer less from this problem. Raising a bell in peal, especially the last third of the way, is a good test of whether you are using both strokes effectively!

I have also seen the opposite effect, where the rope is too long so the bell goes over the balance at back stroke, making every one slow. Each hand stroke, on the other

hand, is snatched, partly to make up for the slow back stroke, and partly out of fear of the bell going too far over the balance at hand stroke.

This is not a treatise on bell handling – look elsewhere for that – but I hope I have demonstrated the crucial effect which bell handling has on your ability to achieve a good rhythm. Trying to ring well with a bad handling style is like trying to play snooker wearing a heavy coat and motor cycle gloves. Some people may be able to do it, but it is an unnecessary handicap not to be advised.

4.5 Thinking Ahead – Trusting the Rhythm

Rhythm allows you to predict where your next blow should be. Like good investment, a good rhythm requires a long term view, although in this case the long term is less than a minute. Also like investment, this long term view requires confidence in what you are doing. Things happen quickly. Some bells may not strike in the right place and you too may make mistakes. But you must not let these unsettle your hold on the rhythm. If you do, you will take some time to settle down again. By that time, you may have helped to disrupt someone else and the whole rhythm may collapse.

When ringing a heavy bell, it is even more important to think ahead. You must do more than place the next blow correctly. The bell must swing to the right height so the move to the following blow can be made without too much effort. Thinking more than two blows ahead requires confidence in the rhythm and in your ability to exploit the bell's natural rhythm effectively.

Your confidence in your rhythm will be most tested when your listening and looking let you down and you have to ring a few blows without any comforting feed back that you are right. We all know that sudden blank feeling. When it happens many people just hold up. This may be uncertainty, or it may be a legacy of the idea that ringing is about following the rope in front. Whatever the temptation, don't do it. If you stop you will definitely be wrong, and you will break your rhythm. If you trust your rhythm and keep going, there is a very good chance you will be in the right place or very close to it, and you will still have a rhythm to guide the following blows.

Rhythm is important on any number of bells, but the more there are, and the closer the gaps between them, the more indispensable it becomes. On ten or twelve, by the time you have waited to see the bell in front pull off, you are probably too late. Indeed, on a heavier bell following a light bell, your rope may have to move first because of the difference in strike time. You have to trust your rhythm to make any useful progress.

Your rhythm is within you, so you need never be cut off from it, but because it is internal and less tangible than things you can see like the ropes, you have to learn to trust it. It's a bit like walking across a flat empty playing field. It is quite safe to walk at a brisk pace for fifty yards or so in a straight line with your eyes shut – but it takes more confidence than you might think to do it.

4.6 A 'Feel' for the Different Intervals

We are all taught (I hope) that there are three distinct speeds when ringing. Normal, slow and quick correspond to making places, hunting up and hunting down. (In fact this is not quite true; the open handstroke makes all hand strokes a little slower and all back strokes a little quicker as well). We are also told, or at any rate we rapidly realise, that quick and slow on five or six bells are very different from normal, whereas on ten or twelve, the speed change is much less. (Sometimes on twelve, just thinking about moving seems to be enough!)

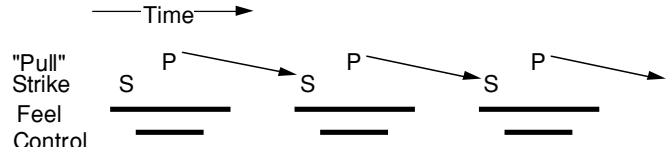
How do we know what these speeds are? To become good at repeating the same period of swing is one thing, but how are we to know what 5/6ths of that period feels like, or 7/6ths, or 11/12ths? I have to admit that I do not have a ready scientific answer. I know it can be done, because many people regularly do it. For some, it may be trial and error, and the fact that the rhythm often staggers a little when going into changes suggests this may be the case.

But an experienced band will rarely have a problem and will smoothly make the transition from rounds to changes, so there must be some other factor at work. Our listening works in a rhythm of 'six in a bar', 'eight in a bar', or however many bells there are, whereas our arms work 'one in a bar'. My guess is that the parts of our brains responsible for physical coordination, are in fact working to both rhythms. If this is so, then going faster or slower involves fitting one fewer or one extra beat in the bar. Perhaps it is just as well that the rules of change ringing only allow a bell to move one place at a time!

One further insight comes from ringers on high numbers of bells, particularly hand-bell ringers. They find the rhythm much easier with an even number, 12, 14, 16 etc than with an odd number, because in their heads they can break the rhythm down into pairs. This may be a natural human trait. Do you remember the sound of the bells in The Nine Taylors? 'tin tan din dan bim bam bom bo'. The words used to describe the sounds clearly break the row into four pairs of sounds.

4.7 A Feel for the Rhythm of the Bell

So far, we have only considered each stroke as a complete unit. We have looked at the rhythm of many blows following one another. Now we turn the magnifying glass on the stroke itself, and look at the rhythm within a stroke. The diagram below shows schematically when different things occur within the stroke. Time moves to the right, and for continuity, three strokes are shown.



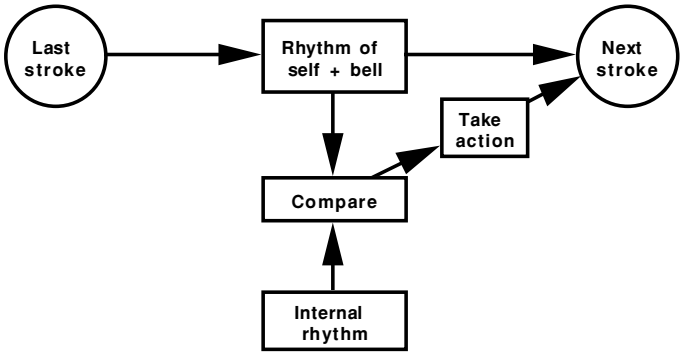
In the diagram, P shows the start of each pull. Each of these leads to a strike S fairly late in the stroke. The long

bars represent the part of the stroke where you can feel what the bell is doing. Between them, the rope is slack. The bars are drawn long to indicate a good long stroke. The shorter bars show when the bell can usefully be controlled. However good your handling, you will not be able to exert much influence at the bottom of the strokes since the rope moves very quickly.

To control a bell, we must do three things:

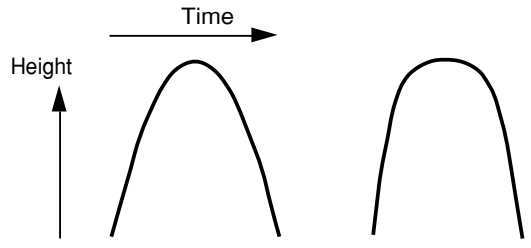
- Monitor what it is doing
- Compare this with what it ought to be doing
- Take action to correct any discrepancies.

In the diagram above, the first and last of these were shown as feeling and controlling. You can do both with the rope, but knowing what the correct rhythm should be has to come from within yourself. You have to build up an internal rhythm so you know what the bell should be doing. The process looks something like this.



The rhythm is more than the tick of a metronome. The movement of the bell is a continuous one not a discrete one, and at the point we normally think of as the 'start' of the stroke, the bell is moving very slowly, so it is less precise than a metronome's tick.

Think about the difficulty many people have co-ordinating the speed at which their hands rise and fall to match the speed of the rope during the early stages of learning to handle a bell. They either try to move too fast at one part of the stroke (making the rope slack) or too slowly at another (making the bell drop). With practice, they become more fluent, and it is tempting to take this for granted as a general smoothing of jerky actions. But it is a crucial step. They have learned the 'shape' of the rope movement. We can think of this as a bit like the shape of an arch, the rope rises quickly at first, moves more slowly through the top of the stroke and then accelerates progressively downwards.



The bells represented by these two curves would feel very different to ring. If you were used to ringing the one on the left, you would find the one on the right rushed up initially, but then seemed to take a long while getting up to the balance.

The hand stroke is basically the same movement as the back stroke, but it is cut off short when the garter hole passes the pulley block and takes the rope up again. The curve will look something like that below. The exact shape of the bottom will depend on how the bell is hung. The closer the pulley is to the wheel, the sharper will be the turn round.

The ability to learn what the rope movement feels like is quite clearly demonstrated when a ringer who has become used to one or two similar bells tries to ring a much heavier one. One might expect no great difficulty in rounds, providing the bell is well behaved, apart from perhaps more effort in pulling off, but very often the result is far worse. The inexperienced ringer tries to impose the familiar 'shape' of the rope movement onto the new bell, but it moves differently. Often, he will stop the rope too soon, not allowing for the fairly slow but extended upper part of the swing of a heavier bell. This is more marked at hand stroke, because of the greater variability caused by the location of the pulley block.

You should develop the ability to adapt to the way a bell swings, by feeling what it is doing and responding to it. Move round the tower, go to different towers. By learning to re-shape your internal rhythm to match the way different bells behave, you will become more versatile.

When you have developed this skill, and you know what movement to expect, you can continuously compare what the bell is actually doing with your internal view of what you expect it to do. Of course, you can only do this while the rope is taught enough to feel the bell movement, which is why a long stroke is so important.

Early during the rise of the rope, you can predict if it will not arrive at the top 'on schedule' and you can apply a small correction by modifying the force you exert on the way up to the balance. This greatly increases your control over the bell and eliminates the surprise inexperienced ringers often get when their bell does not rise as they intended, or unexpectedly goes a long way over the balance.

Can we really react so quickly, within less than half a stroke? At 30 changes per minute, the bell rises from mouth down to the balance in a second. As the lower, uncontrolled part of the swing is much faster, we could guess perhaps two thirds of a second from frame height to the balance. This is over twice the human reaction time (the test-your-reaction machine again) so there is time to make corrections. But remember that reaction times are much faster when anticipating the need for a response. You have time for a habitual check, and maybe small correction, but you may not have time to

correct 'surprises', especially late in the stroke. The message is simple – avoid surprises by keeping close touch with what the bell is doing. Doing that needs a little tension on the rope, for as long as possible.

Watching a skilful ringer, you will find it hard to observe these small corrections since they are done smoothly, but if you watch an experienced ringer who is unsure of the method, you will often see mid stroke adjustments corresponding to last minute changes of intent. One of the reasons experienced ringers are more reliable, even when in difficulty, is that they are better at correcting their mistakes, very often correcting them in mid stroke before too much harm is done, or anyone else has noticed. A good sense of rhythm makes this possible.

4.8 Working with the Bell

You can fight it or you can work with it. This is particularly true of bell rhythm. Successfully exploited, the bell rhythm is a powerful aid, but if ignored, you will do more work to achieve a worse result.

Left to itself, the bell will swing with a particular period. If it can be kept swinging at the same height, the period will be the same. When the bell is fully up, near the balance, the period can vary quite a lot. A small increase in height gives a large increase in period, and of course once the bell swings over the balance it can be held indefinitely. Normally the heavy bells, which naturally swing more slowly, tend to be rung just below the balance while the trebles have to be taken beyond the balance to achieve the same speed. The two situations present quite different problems when ringing.

The tenors can be swung with their natural rhythm, and since they are relatively heavy, that rhythm is fairly stable against disturbances like the weight of your arms on the rope. In most cases, it is fairly easy to relax and 'let the bell do the work' when ringing rounds. There is a price of course – you need rather more effort to vary the pace. To exploit the bell's natural rhythm, put in just enough effort to keep the bell up and to keep the rope taught so you can feel what the bell is doing, with a small margin for error. The bell will do the rest. Too often people grab at the sally, dropping the bell in the process. Then they have to pull hard to get it up again. This breaks the rhythm completely.

Practice reducing the force that you apply in rounds, while still maintaining adequate control. Blend your arm movements exactly to that of the bell, so there is no conflict. The less effort you use to control the bell in rounds, the more you will have available to control it in changes and the more you will be able to feel and make use of its natural rhythm.

At the other end of the scale, a small treble being rung well above the balance, begins and ends its swing entirely in your hands. The overall rhythm depends much more on how you handle every stroke. You can't just 'let the bell do the work'. You have to provide the rhythm. While it is swinging it has a natural rhythm but its lightness makes it more susceptible to disturbance by any uneven handling. This all adds to the difficulty.

So how do you provide the rhythm for a small bell? First you should realise that there are many different ways of swinging the bell to achieve the same period. If you work it hard, it will swing quickly through the stroke, leaving you to hold it longer over the balance. Rung more gently the stroke will last a little longer, leaving you with a shorter gap to fill, but as you are using less force, you will need to be much more careful with your rope handling. Even while it is over the balance, you can achieve the same time delay by stopping it just beyond the balance, or by letting it move further (providing the stay is not too close) so it spends less time stationary.

Ideally, it is better to keep the bell and your arms moving, even if only slowly, since the rhythm of a moving stroke is more reliable than stopping and starting with a wait in between. But the bell and the ringing speed will impose constraints on this, so the optimum is a compromise. Keep your handling as light as possible to exploit the bell's rhythm, but not so light that you have nothing in hand to feel what it is doing and to cater for any disturbances.

Practice ringing as evenly and smoothly as possible to ensure that your own handling does not introduce irregularities. Concentrate on building an even rhythm, and not just following the bell in front. You should ask yourself "if the other ringers vanished for ten seconds and I kept ringing, would I still be in the right place when they reappeared?". You can't perform the experiment to find out, but the question is still worth asking.

If you ring with a simulator, with a volume control, you could ask someone else to turn it down for a few seconds to see how steady your rhythm is. Ringing with a simulator makes you rely much more on rhythm anyway, since there are no ropes to look at.

In summary, ringing well round the back relies much more on exploiting the natural rhythm of the bell, and disturbing it no more than necessary, whereas ringing well round the front relies more on a self imposed rhythm with the swing of the bell playing a less dominant part. Failure to realise this distinction makes many ringers only effective on middle weight bells, and even then, less effective than they could be.

4.9 Adapting to the Other Ringers

If you have rung with a simulator, you will know that the other bells carry on with an immaculate rhythm, completely oblivious of you. Real ringers are not like that. Quite apart from the bands where everyone suddenly holds up when something goes wrong, the speed of even a good band varies over a period. Umpires often describe speed changes due to uneasiness, anticipation, tiredness and other such causes. All bands are prone to this long term drift, but good ringers do not vary their speed in response to short term effects like trips. Less experienced ringers do, so you must be able to adapt your rhythm when necessary.

How much to adapt is a question of judgement. If you can help maintain the rhythm when the ringing goes through a period of uncertainty, it will help the rest of the band. On the other hand, there is no point in being permanently out of step with everyone else. But do not change your rhythm suddenly, or you will help to fuel the chaos. Take several strokes.

Do not confuse this advice with making corrections to strike in the right position. If you are in the wrong place, you should get back on track as quickly as possible, ideally within a blow. What we are talking about here is your perception of where the correct position actually is, – how you impose an idealised rhythm in your head onto the slightly uneven sound being made by the bells.

5 Putting the Skills Together

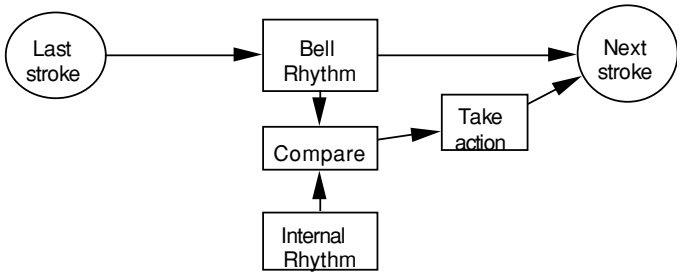
Good ringing is like a three legged stool with the three skills as the legs. If you take away any of the legs, the stool falls over. In ringing, the legs are not evenly spaced. The leg for looking sticks out more than the others. That makes it the most obvious. The legs for listening and rhythm are rather closer to the centre. Whilst this makes them less visible, it does also make it possible with care to balance the stool on these two legs alone and stay upright. We can ring by rhythm and sound alone, given concentration and a stable environment. It is impossible to ring accurately and reliably by looking alone.

There is another aspect to the metaphor. The three legged stool can sit firmly on an uneven surface. That is precisely what you need to do when ringing with other ringers. You must learn to cope with ringing that is less steady than your own. (We can't all ring with bands better than we are!).

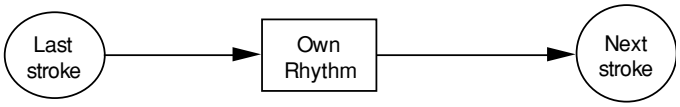
Each skill has its place. Each is best for different purposes, and they complement each other as we shall now see.

In ringing all you have to do is get accurately from one stroke to the next, and the principle means of doing so must be your own sense of rhythm. It is available all the time, not just after the bell has struck, and it does not depend on the vagaries of other ringers. You should aim to build your ringing on the bed rock of a steady rhythm. If you can ring reliably at a constant speed then you have a good basis for varying it to ring methods, to adapt to other ringers or to handle odd struck bells.

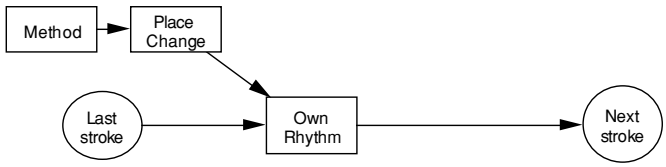
The diagrams below show different ways in which you can combine the skills to perform the basic task of getting from one stroke to the next. The arrows show how each factor affects the next one. In the first diagram, you can see how ringing at constant speed relies on comparing the bell's actual rhythm with your internal expectation of what it ought to be, and then taking action to correct any difference.



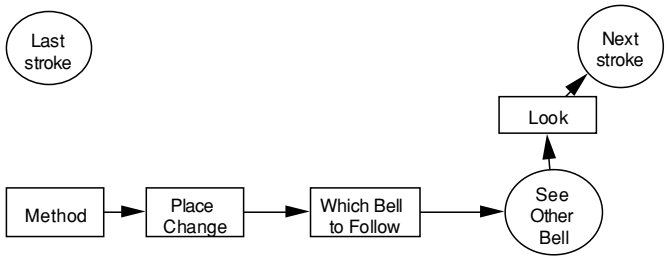
This happens every stroke, and to make the diagrams less cluttered, we will simplify it as shown below. Here 'own rhythm' assumes that you continue to apply the above process.



Changing places, in call changes or to ring a method, is very similar except that you must alter the rhythm. Your knowledge of the method should therefore drive your blow by blow rhythm.



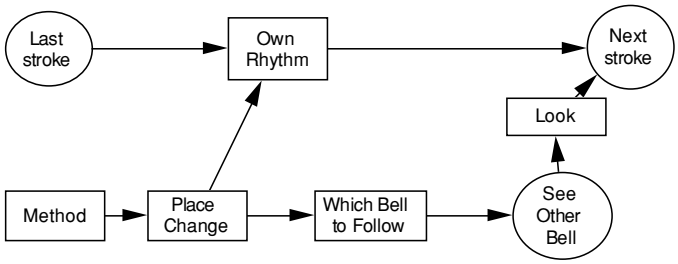
To ring with other bells, you need feedback on how you are fitting in with them. Some people just look at the other ropes, decide which bell they should be following, (by whatever means), and then attempt to follow it by eye. You may have been taught this way, and it works after a fashion, on small, easy, evenly struck bells, providing nothing goes wrong. The diagram below shows the weakness of this approach.



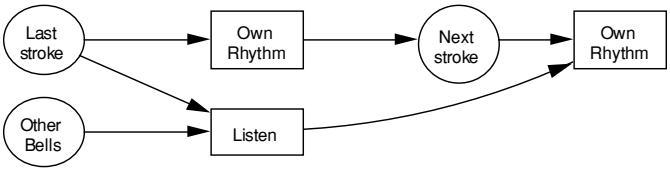
You can only see the other rope's position fairly late in the swing, (since the other bell is changing places as well), so relying on that as the main source of information tends to suppress your sense of rhythm. Of course, your bell still has a rhythm, but it is not really used. The two strokes become isolated events leading to less steady ringing. If anyone makes a trip, the resulting disturbance spreads through the row like a line of dominoes falling over.

Some people use rhythm as the main process, with rope-sight as a fine adjustment. This is a better way of using rope-sight than relying on it entirely. It can lead to

steady ringing which is moderately tolerant of others' mistakes.



There is still a major snag, though. The rope movement is only a rough guide to when the bells strike. Many bells are slightly odd struck, and in any case, some bells strike a little earlier or later depending on how they are handled. To know when the bells really strike in relation to each other you must listen to them.

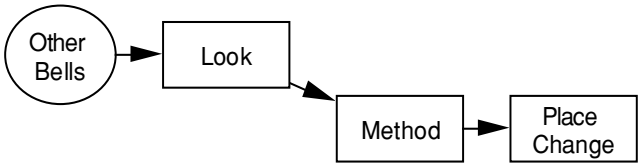


Listening produces information even later in the cycle than looking. Listening can never tell you when to strike, only whether you struck correctly. So rhythm needs to complement listening. Perhaps this puts people off trusting their ears. They prefer something to follow.

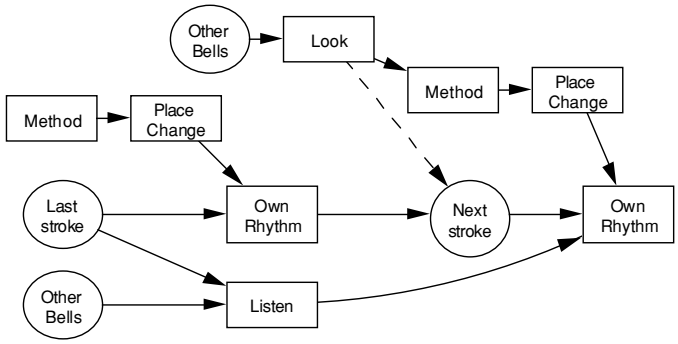
Rope-sight may not be so good for striking, but it has its place. You can see the ropes all the time, and your brain is better at interpreting complex patterns by eye than by ear. When the ringing is messy, your ears can soon become confused and your eyes will have a better chance of sorting out what is happening. If you make a method mistake and lose your place, you can pick up clues to help you get right by looking, whereas all your hearing will tell you is that something is horribly wrong.

Rope-sight is not as accurate as listening, but it is more versatile, providing you remember that it is not just about the bell you follow, but about seeing the relationships between all the bells, for example your course bells, where the treble is and generally whether what the other bells are doing fits in with what you expect.

If your knowledge of the method is confined to the blue line and where you pass the treble, then 'fitting in' will mean seeing that someone passes you in each place as you are hunting, that there is someone to dodge with when you dodge, that you meet the treble in the right places, that all the bells are in front of you when you are at the back, and so on. With a more detailed knowledge of the method structure, you will be able to take in more. You may be able to detect when other people go wrong and help to put them right. The information gained by looking confirms that you are still ringing the method correctly. It gives you confidence, and so it helps your rhythm. We can show this in another diagram.



We now have all the pieces, so we can put together the whole picture. You progress from stroke to stroke by rhythm, using your knowledge of the method to tell you whether to ring fast or slow strokes. You listen to each blow to check that it is correctly placed, and if not you feed small corrections into your rhythm for successive strokes. Meanwhile you use rope-sight to help navigate your way through the method, check what else is happening and give you confidence that all is well.



One final feature is shown on this last diagram, and that is the dashed arrow from looking to the next stroke. We have seen that this is too unreliable to be used for accurate striking, but if we have gone wrong, it may provide a quicker way of getting back into roughly the right place. In any case, most of us are happier when we are looking where we are going, (remember the belfry stairs and the playing field?). Providing you do not let this disrupt what your sense of rhythm and your ears are telling you, then seeing which bells you are passing can give you added confidence

5.1 Stability

Good ringing depends on the whole band ringing well, but that does not happen by magic. You can only expect to ring with other ringers better than you while you are learning – then you can lean on their ability. During most of your ringing life, you must help make the running with ringers who are no better than you, and possibly less so.

When there is uncertainty in the band, you must not allow yourself to be put off by it. Use all your senses to give you an overall picture of the ringing and you are less likely to be led astray by individual moments or confusion. Rely heavily on your sense of rhythm, and you will be much more immune to other ringers being careless.

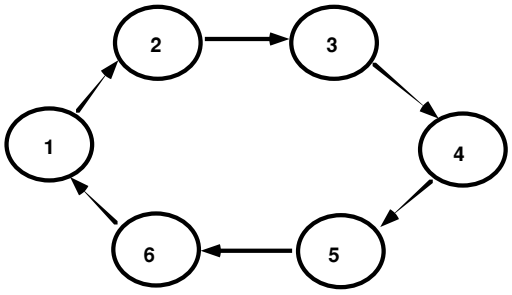
If the other bells become so jumbled that you are confused about who to follow, the best you can do is to keep going 'on auto-pilot'. Use both ears and eyes where possible. Try to respond to whatever is left of the rhythm, check when you are at the back and front, listen to the lead gaps, (if there are any). If your arms are

going up and down at the same sort of speed as other people, you must be ringing at about the right speed. This may not sound very inspired, but it is better than holding up for several blows in the hope of seeing who to follow, as so many ringers do, or floating aimlessly hoping someone will come to the rescue. These are sure ways of making things worse, not better.

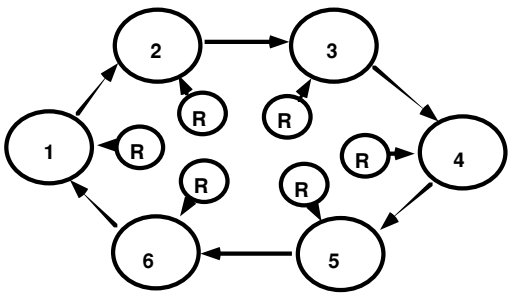
If you make a mistake or get lost, then say so unless you know you can put yourself right. This may take courage, since most of us hate to admit we are wrong. If you are lucky, someone may give you a hint, but in any case, the conductor will be in a better position to decide what to do. It is very annoying when a lot of people are crashing around, not to know who has gone wrong (and could therefore be helped), and who is just ringing badly (and may be offended and ring worse if given advice).

In common parlance, we say something is stable if it is not easily shaken. In engineering and the sciences, stability is more precisely defined. The stability of a system is determined by its response to a small disturbance. If it returns to its previous state it is stable, but if the disturbance grows it is unstable. A system can be very stable, or only just stable depending on how quickly disturbances die out. One of the main factors which determine stability is the nature of the feedback between different processes.

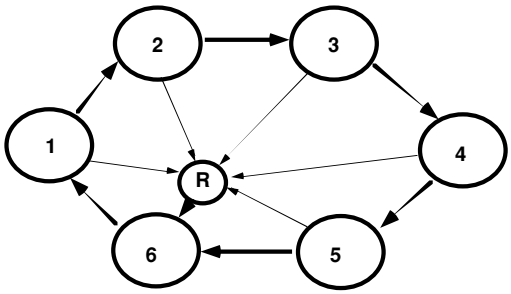
A band of ringers is a dynamic system. If each ringer responds to disturbances caused by the one in front, the effect propagates round the loop. Each ringer adds a slight delay, and may over react. The resulting waves of speeding up or slowing down are similar to what you see when driving on a congested motorway. The effects go round and round. The ringing sounds rough and lumpy.



If each ringer tempers his response by relying more on his internal rhythm, the effect is much reduced. There are still disturbances, but in most cases they are smoothed out and not passed round. Overall there is far less disturbance. The system, shown below, is more stable. 'R' represents reach ringer's own rhythm.



What drives the internal rhythms and keeps them in step? Each ringer must adjust to fit the overall tempo of the ringing. This means listening to, (and possibly looking at), all the bells. For simplicity, the diagram below shows the influences on the internal rhythm of only one ringer..



There is a good analogy for this process. A fly wheel can turn at any speed, but cannot change speed quickly. If connected to a machine which tries to move jerkily, it helps smooth out the movement. We should all consider ourselves as flywheels, and aim to add stability to the ringing we take part in, however good or bad it would be without us. We should certainly ensure that we do not make it less stable.

5.2 Odd Struck Bells

Up to a point, anyone applying all three skills as described, should be able to handle odd struck bells without difficulty. Indeed, an experienced ringer may ring a slightly odd struck bell without realising it. Minor odd struck-ness can be thought of as just needing more or less open leads, and you can adjust for it automatically during the initial period of rounds.

Badly odd struck bells are more of a problem. The principles are still the same, but your sense of rhythm now needs to include very different versions of slow, normal and quick for the hand stroke and back stroke. You therefore have a conflict with what should have become your built in desire to ring evenly.

Rope-sight is misleading with odd struck bells. You will need great will power to overcome the temptation to deflect from your intended rhythm when the rope you are following makes you appear to be in the 'wrong' place

There is another twist when ringing an odd struck bell. Assume you have developed a suitably one sided rhythm to compensate for the bell and all is going smoothly. Now your concentration lapses for a blow and you hear your bell strike wide. Feeling somewhat ashamed, you smartly correct it by ringing quicker on the next stroke ... which of course is the worst thing to do because the bell rings close at that stroke anyway.

This need to correct striking faults after two blows rather than after one, is perhaps the most irritating feature of ringing badly odd struck bells. It is worse when the bell strikes quick at back stroke, since ringing with open leads conditions us to keeping our back strokes in.

5.3 Priorities

Should you try to master rope-sight before worrying about listening and the finer points of rhythm? At the risk of offending some orthodox views, I have to say an emphatic no. The first three skills you need are, in order:

- Able to ring at a **constant** speed un-aided, (with or without other bells)
- Able to ring at the three speeds (normal, hunting up and hunting down) **reliably** on demand, also un-aided
- Able to maintain your rhythm for at least a few blows in the face of disturbances, (eg if the bell in front goes wrong or if you're not sure who to follow).

If you are lucky, you will have practiced the first two before ringing with other ringers (though not many do). They are at the core of ringing. If you have mastered them, the third is only a matter of confidence, and all the rest of ringing skills can then be added on. If you have not mastered these basics, you will be constantly struggling against your own shortcomings.

Someone who learnt late in life and made little progress for years summed this up. His breakthrough was: "realising I could ring without seeing who to follow".

Conventional teaching puts great emphasis on seeing who to follow, and assumes that the ability to move the bell around at the right speed will follow by some un-described process. In many cases it does, but in many it does not. Indeed the act of heaving the bell around at short notice to follow other bells, masks much of the feeling you need for a good rhythm, and for making accurate changes of rhythm. This is demonstrated by many semi-experienced, (and some experienced), ringers when they first ring with a simulator. They do not move their bells far enough between places, despite in some cases having hunted more or less successfully many times before. This suggests that they continually rely seeing the bell they will follow before making the effort to move to the next place. (Small wonder such people go wrong when others make mistakes.)

Having mastered your own bell (and body), you can focus more effectively on listening and rope-sight.

6 Self Help

Most of us are long past the stage of 'being taught'. To learn anything fresh we must make it happen and motivate ourselves to stick at it and progress. There are many things you can do.

Ringing on bells of different weight and style will help you become more responsive to the bell. You may ring occasionally at other towers on outings but limit yourself to easy methods on easy bells in deference to the locals. This will give you only limited help. You need to push yourself a little harder and more often. Visiting another tower's practice night will help more. Even if you can only go every few weeks that is a lot better than once a year. Most tower captains welcome regular visitors and are happy to give you the opportunity to get something out of it yourself in return for swelling their numbers.

When you are being taught, your tutor provides criticism. Constructive criticism is a valuable stimulant for any developing skill, but as a 'self improver' you will not get this individual attention. Constructive criticism is worth seeking out, as is the opportunity to discuss things you find difficult. Most experienced ringers would be flattered that you value their opinion (but pick someone who seems to have mastered his or her own skills).

If you have a serious problem, say a handling habit that has become ingrained, you should find someone willing to spend individual time with you on a bell. One particularly helpful technique, if you can find the opportunity, is to see a video recording of yourself ringing. This helps you to see things you do unconsciously, and cannot hope to see while ringing, because they happen so quickly.

6.1 Preparation

Take a few seconds before you catch hold to think about what you hope to achieve. Of course only you know whether a sensible achievement is 'perfectly' or 'a bit better than last time'. You can't do everything at once, so set some priorities. Ask yourself 'what am I going to try to get out of this touch?'. With a steady band and a method you are happy with you can focus on listening and accurate striking. With a less steady band, you could concentrate on maintaining a good rhythm and not being put off in the face of inevitable disturbances. With a more demanding method, you may just accept your current physical skill level, and concentrate on the method, especially spotting the checks and sign posts which will help you to correct your mistakes. Remember, small steps are better than no progress at all.

Make the best use of the opening rounds. Adjust your personal rhythm to that of the other ringers. Decide whether your bell is odd struck, and if it is make sure that you learn the feel of the correction needed. You cannot ring an odd struck bell properly without this and it is much harder to work out how much correction you need once the changes start.

Having built a good rhythm in rounds, don't throw it away in the first blow of the method. Some ringers seem to be taken by surprise when 'go' is called. The biggest risk comes if you go in. Make sure you do go in a whole place on the first blow, so those following have no excuse to slow down the rhythm. Even if the bell in front of you hesitates, keep going. You may make the difference between a running start and a faltering start for the whole band.

6.2 While Ringing Changes

Some people panic when things go wrong, because they do not feel in control. But you can retain more control than you think. Vision and hearing may partly shut off under stress. But you can use your sense of rhythm to ring a few changes without external information. It may not be perfect, but if you keep calm, you will be somewhere near the right place, certainly much nearer than if you panic.

Extending the point slightly, if you make a method mistake and ring in the wrong place, you may not know what place you should be in. But as long as you know what position you are actually in, then when you do work out what to do, or when someone tells you, you will know which direction to move in. If you lose track of where you really are you will be much harder to help.

Correcting a mistake means taking rapid, unplanned action. It breaks your immediate rhythm. It is very easy for this to upset your striking for the following blows as well but this need not happen. The underlying rhythm is still there, and you should make a conscious effort to drop back into it, not just mentally but physically as well. You will find your muscles have become extra tense and responsive to cope with the disturbance, so you must help them to revert to the balanced, confident movement that you had established before the trip.

6.3 Knowing the Method

Method ringing uses mental skills we are not covering here, but struggling with the method will use up valuable concentration. Also method mistakes will disrupt your other efforts. Try to do two things:

- Don't go wrong (if at all possible).
- Put yourself right as quickly as possible when you do.

The first is the ideal, but in a practical sense the second may prove more valuable for most of us. Both involve knowing methods more thoroughly than many people learn them. Struggling with the method will use up valuable concentration which you could otherwise devote to striking and bell control. (Of course the reverse is true as well.) The resulting mistakes and disturbances will disrupt your own and other people's rhythm. You can't expect to know a method perfectly the first time, and even the best of us makes occasional mistakes when we do know the method, but there are many ways you can help yourself.

Remember that knowing a method means being able to play it out 'in real time', at the speed you have to ring it. You can't stop and ponder over the difficult bits. Many people revise a method by looking repeatedly at the blue line. This is not the best way. After the initial learning, work through it in your mind without the blue line. That checks what you know not what you can read. If while doing this, you also try to check mentally whether it is fitting together (for example is there enough work between the leads, are the place bells in the right order) not only will you be pretty sure whether you have got it right, but you will be much more closely reproducing reality when ringing with your head full of other things. If you are unsure, then look at the book and do it again.

If you have learnt most methods from the diary, or a hastily drawn blue line, you may never have thought about how to learn a method. There is no single 'right' way but the best approaches use a lot more information than just the blue line. All I can do here is hint at some of the information locked away in the method structure which can be useful to you if you look at it.

You probably know where you pass the treble, but do you know where the treble is at other times, for example when you do various different 'work'? Do you know where the half leads come? You may be aware that in many methods your course and after bells precede and follow you at the back, but do you know where else you meet them? Do you know about the coursing order and where it appears in the method? Have you discovered that whenever you do some form of work 'with' another bell, there is another place where you are together again, but with complementary roles? Do you know whether your leads and places are made hand and back or vice versa? Do you know the names of the work in the method? (If not, telling you to do them will not achieve much).

There are many more useful snippets of information, often relating to specific methods. They give you many more ways to check whether you are right, and if you have a momentary lapse of memory to pick up the threads and carry on without major disruption. By being more aware of what is happening around you, you can also get earlier warning if you are about to go wrong. The earlier you can spot trouble, the more smoothly you can correct or avoid it. Experienced ringers probably make more momentary slips than anyone realises because they can rapidly correct themselves. They rely on their rhythm during the split second while sorting their minds out, and no one knows there was a mental slip at all. If you can achieve this, you will be a much more reliable member of any band.

6.4 Looking while Standing Out

There are many things you can do in the tower while not ringing. Your hands are free of the responsibility for keeping a bell in the right place, so you can devote all your attention to listening and looking, either separately or together. No one will mind if you get it wrong. No one will know!

You have probably been told to stand and watch someone else before, but may not have been told the best way to do it. Remember that the purpose of looking is to see how the movement of the rope you are watching relates to that of the others.

When ringing, you can feel what your rope is doing, but when standing out, you are deprived of the feel so you must stand where you can see the rope of your chosen bell against the background of the others. The best

place to do this is behind the ringer, not next to him. If you are small, this may mean standing on something. The worst position is sitting down at the side, looking up, because that forces you to choose between watching your chosen rope and watching the others.

Watching another bell can get boring and you may lose concentration after a short while. Staring passively at anything gets boring, so take a more active interest. Count the places and watch each bell passed. When at the back, check that all bells are in front of 'your' bell, and when at the front that they are all behind it. Try to make judgements about the other bells passed. Try to see which ones are jumping around and which ringing steadily. (If you were ringing, you would need to decide how much notice to take of them.)

If you can't concentrate all the time, have a rest and try again later. Don't just give up and not bother. You can learn a lot by watching people. The more you watch, the more you will see.

6.5 Listening while Standing Out

You can listen to other bells anywhere – in the street, on the radio every Sunday morning if you wake up early enough, on disc or tape. These are all worth doing. Listen carefully and try to judge how even the ringing is. Try to lock on to the basic rhythm. Many people find they involuntarily nod their heads or tap their fingers to the rhythm. Try it if it helps but remember the extra beat for the open lead. You may find it easier to tap 'up-down-up-down...' rather than just tapping 'down-down-down...' which makes the hand move twice as fast.

At first, you may only be able to distinguish between extremes, but as you practice, you should find you can tell good and less good parts of average ringing as well. You don't have to get to striking competition standard to be an effective listener, so don't concentrate so hard that you forget to enjoy the good ringing.

Following an individual bell by ear is very difficult without a visual prompt (unless you have perfect pitch, which most of us don't) so practice in the tower. Make sure you can see the rope of your selected bell. It is also easier if there is a cover bell, since it makes it easier to hear where the end of the row is if the leading is not quite perfect.

Listen to rounds or call changes until you know where in the stroke the bell sounds. When listening to changes, always use the initial rounds to become familiar with the sound of your chosen bell. Count initially, but you may find it harder to keep counting the place in changes. In any case, you should not need to if you have learnt where in the stroke it strikes. At first, using this method, you may not be confident which blow is your bell's, but you should know roughly. Focus on this bit of the row. As the method progresses, it will be a different part. After a while, you will realise that one of the bell sounds keeps recurring in the bits you are listening to. This is your bell.

Once you can follow the bell sound through the changes, concentrate more on how accurately it strikes. Again, take it in stages. First just try to decide whether there is any unevenness near your bell's sound. Later try to decide whether you chosen bell is well placed, or late or early. In doing so, you inevitably also decide whether the ones adjacent to it are in the right place.

This may take some time, but you can go at your own pace and do it as often (or not) as you like. If you can get access to a striking simulator, this will help. It will provide some variety and allow you to measure your progress.

One of the biggest snags of practicing listening, (apart from using a striking simulator), is that no one else knows how you are doing. It all goes on in your head. Only you know how well you are doing. It can get lonely, especially when those who can do it already expect you to do it perfectly and those that never listen wonder why you are bothering. You will need persistence but it is well worth the effort. The more you listen, the easier it will become.

6.6 Being Helped

Do not be afraid to ask someone to stand behind you. Make sure you each know what help you want, and what you don't, (see the section on standing behind). It is better to have someone you don't need most of the time than to make a mess of a touch. Don't wait to be asked. Choose someone you find helpful. If you get too much, too little or the wrong sort of advice, then say so (politely). That should be effective, but if not, ask someone else next time.

7 Helping Others – Standing Behind

All of us at some time are called on to help other ringers, most frequently by 'standing behind', but sometimes as a conductor. Most of this chapter is about how much to say and what sort of advice to give in this role.

7.1 Overload and Dependence

Remember that all you say is extra information to be processed. The brain can only do so much, and it switches something off if overloaded. When a super-conductor pours a string of detailed instructions across the ringing chamber towards some poor individual who can't take it in, no wonder the recipient fails to respond. Such feats of dictation are impressive but seldom helpful.

Also, too much advice can do harm by encouraging the student to wait to be told, rather than thinking for himself. Someone once told me he rang plain bob by plain hunting until someone yelled at him, and then he dodged!

Talking someone through every blow may help get to the end of a touch, but may hinder learning and encourage laziness. What you say, and when, can disrupt a ringer's own thought patterns and displace them. She will become wholly dependent on you, and be too busy doing what she is told to think about what she should be doing, like a copy typist, who concentrates on transcribing the letters and words, but is unaware of the meaning.

7.2 How Much to Say

The most demanding aspect of 'standing behind' another ringer is knowing how much to say and when to say it.

Before the touch you should agree any particular advice your protege wants, and what he or she would prefer to try to manage without.

After the touch, ask your protege what, if anything, seemed to cause problems, and answer those questions first. Then add points you think will help, but which you did not want to disrupt the ringing at the time.

During the touch, you have several things to do:

- Keep track of what your protege should be doing. (You cannot afford to relax – that will be when the mistake comes.)
- Ensure that the other bells around are behaving as expected. (You may need to reassure your protege that a disturbance is being caused by someone else and should be ignored).
- Observe any pattern in your protege's ringing. (eg wide at back, looking in the wrong place, too close over the big bells, doesn't stop going down at lead, dodges on the wrong stroke. Only by detecting a pattern or cause, can you give useful feedback)
- Quietly give the odd hint or reminder (as agreed beforehand).
- Detect when your protege is about to go wrong. (If you wait until it happens, you waste thinking time.)
- Determine whether he is likely to be able to correct the problem un-aided (if so, do not interfere.)
- Determine whether the fault would be catastrophic if not corrected. (If so, give quick, decisive instructions to put the fault right before it escalates.)

Saying nothing during the touch is a good starting point, and it will keep your mind on judging the situation rather than on pouring out words. As long as things are going roughly alright, this will encourage your protege to get on with it without distraction.

The most difficult balance is between giving or not giving advice. It is made more acute by the need to give advice early if you decide you do have to give it.

Wherever possible let your protege correct his/her own mistakes. Your presence will be reassuring, and not interfering is a vote of confidence in what she is doing. It can be very irritating if you tell her something she has already realised and begun to correct.

But if you judge a mistake to be either unrecoverable, or so severe as to destabilise and confuse the ringing, you must try to get your protege to correct it as quickly as possible. Your interference will cause some distraction, so you should act as quickly as possible to minimise the effect of the mistake. This is more true of method ringing than call changes, since things happen more quickly.

We can draw an analogy between the person who stands behind when learning to ring, and extra wheels when learning to ride a bike. The stabiliser wheels are off the ground most of the time, and so do not impeded the normal sensations of riding a bike and being in control of it. However if there is a major wobble, the stabilisers will catch it before the rider falls off, and allow him to regain control without undue disturbance or injury. But if the extra wheels were permanently on the ground, like a tricycle, the child would never experience balancing on two wheels, and never learn to do it.

7.3 What to Say

Saying the right thing is as important as saying the right amount. The best advice puts the finger directly on the cause of the problem. Doing this requires a degree of intelligent guess work, but there are often clues.

Many people always say which bell to follow but this may not be the most helpful. Consider an example.

Your protege looks at the wrong bell, assumes she is in the wrong place and makes a drastic correction into a position where everything else looks wrong.

If you can spot the misguided look and the intention to do something drastic before it happens, then pointing out the correct bell would indeed be both helpful and sufficient, but if you miss that opportunity the biggest problem is being in the wrong place. Rattling off a list of bell numbers is not the best way to recover the situation.

Before the mistake, the victim may have been valiantly counting places and trying to think what came next. Rope-sight was probably (and desirably) giving a picture not numbers. To be told the numbers of bells to follow distracts the numerical part of the brain, and kills the place counting. It gives no idea of whether to hunt up or down next.

You could say 'you're too high', which describes the actual problem, without needing any visual input. 'Not so high' is more direct, but saying 'down' could be construed as a directive about the method. Being told to hunt down is very different from being told you are higher than you should be. This simple piece of information may be enough for her to find her own feet again.

You could say 'over Fred' (Fred ringing the next bell she ought to follow not the one she has just followed). There is still the danger that the downward correction towards Fred will destroy her belief that she was hunting up, so she will give up and believe she does not know what she should be doing. This is less likely if she knows what the root cause of the problem was.

Saying '5ths place' in a case like this is unlikely to be the most important, since she may well be correctly thinking that any way. However, it may have slipped her mind in the confusion, and a reminder of the correct place tacked quietly on the end of the main advice can remind her to carry on counting. (She is on her own again now you have helped her through the difficult spot).

When the crisis is past you may offer advice on the cause of the problem if you think it will help avoid it happening again, In this example (and often in my experience) the problem was gluing attention onto one bell at a time rather than keeping a broad view. If you have seen her several times looking fixedly at a single bell it may be helpful to remind her to look more widely. But you must judge whether to wait until afterwards.

Now suppose she has made a method mistake. If she misses a dodge, everything will suddenly look wrong. Simply saying 'you've just missed your dodge', again points directly to the cause, without taking over her thought processes. This may be enough if she realises she has to hold back a couple of places from where she had got to. It causes minimum disruption to the mental processes she was already using. Telling her what place she is in would be quite useful, since she will be counting the wrong one. If she does not correct herself quickly, you can easily follow up with ' pass Fred now', but don't offer it unless it is needed.

Some common mistakes can be dealt with very briefly once recognised. A common one is trying to dodge 'the wrong way up', (ie dodging over on the wrong stroke). All you need say is 'other way', providing she understands the term. If not, 'over at back' is nearly as short.

As a rule, give 'doing advice' rather than 'looking advice' because there is more inertia on the doing end of things. Also looking is a lot easier if the doing has got the bell into roughly the right place first. This is true in many other activities. If you are following a faint footpath, you may find it impossible to see if you stray away from it a few yards, leaving you with little idea of how to get back. Following a faint path and seeing your place in ringing both rely on the brain integrating a lot of small pieces of information in an otherwise confusing mass of randomness. Probably the most useful instant advice is 'quicker' (to counteract the 'holding up' instinct) since ringing at the wrong speed must be corrected speedily.

You may notice that in the examples above, I deliberately used names of ringers rather than numbers of bells. This avoids confusion between fourth bell and fourth place, which may disrupt place counting. It is even worth reenforcing the count by saying 'fourths place over Fred'. If she does not know the ringers names, you can point. This has two direct advantages. It cuts down on talking, and it guides her eye in the right direction. In fact, very often, you can wave your hand in the direction of the next couple of bells to be followed if they are near each other. Again, this gives more information with less fuss and encourages her to keep looking for herself rather than leaning too heavily on your advice.

The point of this whole approach is to tailor the advice to your protege's problem, to reduce the amount of speaking needed, and to allow him or her to remain in control by avoiding brain over load. This is not the easiest approach for you, but it is not for your benefit.

Some people say standing behind is more strenuous than ringing. Often it is because of the mental tension involved in being ready to give advice instantly, but keeping the lid it on until it is clear it is needed. When ringing your own bell, you have the luxury of knowing what you intend to do and being able to feel what the bell is going to do. When standing behind, you have to do all this by observation and deduction.

7.4 Where to Stand

As a stander behind, you are much more dependent on looking than when you ring. You can't feel what the bell is doing, and you don't know what is coming next because you cannot read the mind of your protege. Things are more likely to go wrong, and there are very few excuses for a stander behind who goes wrong as well as her protege.

'Standing behind' is actually best close by the side, providing you do not impede your protege's movement or view. This allows you a partial view of the expression on his face, and you should be able to see all the ropes as well if you choose the best side.

Some people stand in front. This gives a better view of the face, but seeing all the other ropes is difficult unless ringing say the front six of a ten. The greater distance makes advice more public, and therefore more intimidating. On the few occasions I have done this, usually supervising several people in rounds, I have found myself drawn forward into the circle, so I could talk to the individual more quietly, rather than broadcast comments. On balance, I would not recommend standing in front.

7.5 Advice and Criticism

Should you give advice to a ringer who is no longer a 'learner'? Most ringers would not do so unless asked, and even then would feel uncomfortable. Giving advice seems to imply criticism and most shy away from it. We are inhibited by modesty and a fear of rebuff. We know some ringers think they need no advice and would be offended by it, so we play safe.

But giving advice is a much more charitable act than watching someone doing something in an ineffective way, possibly unaware of why it is ineffective. We are not afraid to tell someone who misses a dodge or gets lost what to do, but bell handling is a bit like driving. It is surrounded by strange taboos.

It may be very British to behave like this, but it helps no one. Try to find ways to help people without giving offence. Doing nothing may avoid ever being blamed for anything, but it will also ensure you never contribute anything to the development of your fellow ringers.

8 Teaching

I have written mainly for those who want to help themselves. But since much of what we have discussed in this booklet is not routinely taught, I will conclude with some suggestions for ringing tutors. You will have to adapt them to individual cases, and blend them in with your other teaching.

8.1 Bell Handling

The way bell handling is taught, and the teaching followed up as the new ringer gains experience, can have a big effect on whether the full range of rhythm and coordination skills is acquired. In the sections above, I raised some questions about the effect on later skill development of the approach to initial training. These are worth bearing in mind. Any handling problem which makes ringing untidy is an obstacle to rhythmic ringing, but two particular problems are important.

Some ringers have difficulty getting 'over the hump' and coming to terms with the bell. They continue to burn up a lot of effort fighting their bells. After a while they accept that ringing is hard work, confine themselves to medium-to-light bells to ease the symptoms, and do not progress very far. Encourage them to develop a better feel for what the bell is doing so they can work with it and not against it. Ringing with a simulator can be helpful since it removes the urge to force every blow in place after the bell in front and encourages rhythm.

Once they are 'over the hump' and develop increasing ability to exert control over their bells, ringers can go two ways. The successful ones reduce the effort they need, but maintain sufficient contact with what the bell is doing to be in control at all times, even with a difficult bell.

Some go the other way. They realise they can keep the bell in more or less the right place with negligible effort, and develop a rather lax style, usually with too long a rope. The shorter stroke means they are less in contact with the bell, so it often does not go where they expect it. They correct the problem by exerting themselves, but usually too late to avoid a crunch, and sowing the seeds for another problem a few blows later.

These ringers appear capable, though they never seem to realise their potential. They fare badly on difficult bells and tend to avoid ringing outside their comfortable weight range. When they are persuaded to ring a heavier bell, they heave it around making hard work for them, and it is not very inspiring for the rest of the band. After a while they are left on the middle bells, not doing very well but not ringing badly enough to provoke any action.

Encourage these ringers to understand the difference between economy of effort and laziness. They will not see it this way of course, since the continual need to jerk the bell back into place probably convinces them that they are not being lazy. These ringers are harder to approach than those who know they are having difficulty. You need to get over two facts :

- Their approach does not produce the desired result (which is unfair on the rest of the band).
- Improving the handling, particularly the stroke length, will not increase the effort, but will give far greater control.

Tall ringers are more prone to this problem. They have to choose between the tail end flapping in their faces or ringing with bent arms. Encourage figure of eight knots, or keep the ropes short with boxes for shorter ringers.

Encouraging progression to heavier bells earlier during teaching is one way to discourage the lazy style before it becomes too ingrained. This provides increasing bell handling challenges, so that as economy of effort develops it means achieving more with the same effort, rather than being content to achieve the same limited results with less effort.

The best time to start listening to your own bell is when learning to handle, but not many people do. The tied bell tradition means bell handling is learnt in silence. It may be good for the neighbours, but it means that after the trainee has put together all the basic skills which appear to make up 'ringing a bell', he must then graft on an extra element which has so far been hidden. Not only must he learn a feel for the link between the swing of the bell and when it speaks, but he must unlearn the notion that the most important moment in the stroke is 'pulling it off'.

Ideally, ringing should be a total experience of pulling and listening from the word go. If you have sound control, a ringing simulator or an isolated tower you can do this. If not, you could use the 'car tyre' style of double muffle which deadens the sound while still allowing something to be heard.

8.2 Call Changes

Most tower captains move their trainees on to call changes as soon as they can manage rounds passably. While this helps to provide extra interest, there are dangers. The habits that form now will probably persist for a long time. These early stages are when your trainees learn to adapt to other ringers, when they weld together the different ringing skills. If at this stage they never listen they will find it hard to develop the habit later on. If they develop the habit of yanking each blow into place by eye with no thought for the next one it will be hard to develop a sense of rhythm later.

Do all you can not only to advise and encourage them but to ensure the ringing they take part in allows them to develop all three skills. There must be some semblance of a rhythm, and it must be possible to discern one bell from another by ear most of the time, otherwise, there is no opportunity to develop a rhythmic style and nothing to be gained by listening. This is not easy with several

learners competing for rope time, but the problem will not go away by being ignored. Insist on getting the rounds correct before calling changes and then wait until each row is being struck correctly before moving on.

This may seem a counsel of perfection and it will mean some sessions do not progress through many changes. But no one will learn anything except bad habits from crashing through changes so uneven that no one knows whether he or she is striking correctly or not. It would be better for all concerned to ring rounds and get them right.

Set the band a good example. Listen to every row to see whether it is right. Any errors which persist are a clear sign that help is needed. Listen to see who is having problems, observe them to find out the cause and then advise them. Some common faults, with their visible and audible characteristic symptoms are:

- Ringing erratically with no pattern to the errors
  Poor handling, too short or too long a rope, not concentrating
- Repeating the same fault consistently on most blows
  Not listening, and therefore failing to correct some other problem
- Ringing persistently slow or quick at all strokes
  Ringing by eye alone
- Ringing close over some bells but wide over others
  Ringing by eye alone
- Ringing frequently close or wide at one stroke
  Ringing an odd struck bell without compensating, following an odd struck bell by eye, wrong rope length, handling style not balanced between hand and back.
- Ringing late then early then late in a regular cycle
  Over correcting errors or inadequate bell control
- Following the errors of the bell in front
  Ringing by eye alone, disregarding the natural rhythm
- Holding up whenever affected by a call
  Waiting for someone to follow instead of moving first.

With practice, you will find you can spot these problems fairly easily, especially when you become aware of individual tendencies. If you are not confident of your own listening skills this is excellent practice. You do not have to diagnose every problem, but each one you do will help one of your band.

For most ringers, call changes are the bridge between rounds and method ringing, but they can create habits that do not help later on, mainly because of the emphasis on following a bell rather than ringing in a position. The way changes are called does this. 'four to six' only gives direct information about who one bell should follow, and even then, depending on whether 'calling up' or 'calling down' it could mean holding up or pulling in.

It is better just to call which pair change places, ie 'two and five'. Those bells know they must move and therefore everyone else stays put. Also, by seeing which way round they currently are, both the affected bells know which way to go. One of them will still have to work out who to follow, but they should be encouraged to hold up or pull in a place at the appropriate time, whether or not they have worked out who to follow. It is easier to see which bell to follow when you are already in the right place, and it is important to move your place because you know you have to, rather than waiting for someone else to follow. The sooner this is learnt, the better.

Encourage your trainees to think ahead. If they work out what place they are in, who they are following and who the bell in front is following while they have the time they will be prepared for a change if it comes. Ask them these questions while they are ringing. It will help them develop the habit of working it out.

8.3 Looking and Listening in the Tower

Inexperienced ringers frequently spend more time in the tower sitting out than ringing. Encourage them to use this valuable time. They can practice looking and listening skills while not on the end of a bell rope. It is better to begin in this way, though the prospect must seem quite daunting to the novice. Your encouragement will probably determine whether they do any such practising, or whether they just switch off until told to ring again. Don't just exhort them to watch or listen to someone, try to show an interest in the result. Just asking whether they managed to follow it all the way through provides encouragement. If they did not, you can discuss what they found hard, and perhaps suggest a different approach next time.

In most towers trainees will be exposed to ringing of different qualities. They should learn to tell the difference. Ask their opinions about what they have heard, and don't take an embarrassed shrug or giggle for an answer. They may feel nervous about criticising others' ringing, but if encouraged to listen closely enough to be able to do so, they should begin to get the idea that the quality matters. After all, people learn by example, so it is important that striking should be mentioned as often as whether someone did well in a new method.

8.4 Teaching Rhythm Skills

We have discussed how the physical rhythm skills can be developed through bell handling. Teaching the mental rhythm skills is more difficult, but you can encourage activities which will help it develop. With a ringing simulator, you can assess progress directly, but otherwise, you can only infer it from the overall appearance and sound of the trainee's ringing.

Beyond ringing rounds, the trainee must learn to switch at will between any of the three speeds corresponding to hunting up, down and making places. It is best to do this before entering the maelstrom of plain hunting. Most ringers are subjected to a jump from leisurely call changes to hunting on four or five bells. You can provide smaller steps which also give you and the trainee a much clearer indication of the progress being made.

In call changes, insist on accurate place changing on the correct stroke. Progress to calling changes every whole

pull. (Anyone who cannot do this accurately is not ready to attempt changes). Then introduce dodging.

Learning to dodge accurately requires similar rhythm skills to hunting, but without the complication of being in more than two places or following more than two bells. It is also an important step since there is no normal blow between the fast and slow ones. It is far easier for the person dodging to hear, (and see) whether he or she is in the correct place every blow. It is a little more strenuous than hunting, but you can stop or start it at will. Treat it as an extension to call changes and you can provide dodging in both directions with a number of different bells all in one session. You can allow a trainee to dodge for service ringing much earlier than you could plain hunt, so you can give more practice and more interest. [1]

8.5 Using Simulators

Simulators do not yet feature in every tower's kit of teaching aids but they are readily available and anyone can obtain one. A 'ringing simulator' connected to a tied bell or dumbbell, rings all bells perfectly, with one missing for you to ring by ear and rhythm. It helps development of physical and mental rhythm as well as listening skills. Ideally all towers should have one.

A 'striking simulator' is also possible. It generates the sound of all bells and can generate small striking errors, for you to detect by ear. This helps to develop mental rhythm and listening skills. This is type of simulator is less common, but equally valuable.

8.6 Ringing with a Simulator

Some ringers have rung their first blows with a simulator, quite successfully. This is ideal, since it implants the importance of rhythm and listening at the formative stage. Looking skills can easily be added afterwards. Those who use this approach in early training find it valuable. It has the benefit that there are no other ringers to cloud the issue. The trainee must use both rhythm and hearing to keep the bell in the right place.

My own experiences using a simulator have found no one incapable of performing acceptably, though one person expressed difficulty in hearing anything. However, she managed to hear enough to keep ringing in the right place, and the following week, announced that she could hear her bell in the tower better after having used the simulator. Those who perform least well have often been ringing for some time. Either they have difficulty relaxing in the strange setting or they have developed ingrained non-listening ringing habits. Such ringers should be given the opportunity for a more prolonged session with time to relax.

If it does nothing else, ringing successfully on a simulator proves that even people who believed they could never hear their bells, can in fact do so. That may give them the confidence to try to listen more in the tower.

If you only have one simulator then limit the number of trainees for a session to two or three , which allows reasonable rest periods without too much sitting around. A better solution is to have more than one simulator in the tower, which with current technology costs very little more than having one. That way several people can each ring at the same time (in a different simulated 'tower' on headphones). The ideal way to use the simulator(s) on a regular basis, perhaps before the main practice.

8.7 Listening to a Simulator

Using a striking simulator provides a slightly artificial situation but it has two virtues. It allows you to focus solely on the listening skill and it is controllable. Like a normal ringing simulator it is capable of perfect rounds, but you can introduce controlled errors into the striking, (eg 3rd slow at hand stroke). Unlike most real ringing, the errors are exactly repeated so the trainees can concentrate on them rather than trying to catch everything on the fly and probably missing most.

Start with small errors which hardly anyone will hear, and gradually make them larger. As soon as the trainees can detect there is an error, ask them what is wrong. You (and they) may be surprised how often they diagnose the wrong error (eg third close instead of second wide). With a mixed group, keep increasing the error until everyone can hear it, otherwise the less skilful will feel left out and stop trying. I find performance varies significantly between different ringers. Among experienced ringers, it correlates fairly well with ringing ability.

If you want to measure progress over a period, or to compare different ringers, you could record the results. This may indicate their ultimate striking capability.

You can mix use of a striking simulator with other listening exercises to give variety.

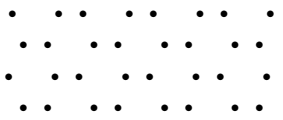
You can use a 'conventional' ringing simulator with all the bells ringing changes, and ask the trainees to try to follow the path of an individual bell by ear (usually the tenor). Slightly less natural, but easier to hear is to follow a 'gap', (ie the gap the simulator leaves for one bell when connected in the tower). If your simulator can generate errors in one bell and ring changes, you can ask them to follow the path of the bell that is ringing slightly wide, say. They do this by marking on columns of squared paper as used by striking competition judges. After several goes, I find most can produce some recognisable paths. If you want to stretch your own skills at the same time as the trainee's, they can do this exercise while you ring a bell with the simulator, and ring it slightly wide. (You will probably find ringing consistently half a blow wide is much harder than ringing in the right place.)

Finally, you can play some recordings of real ringing and ask the trainees to detect the misplaced blows. Start with ringing that is fairly slow with a steady rhythm and a

[1] After the original publication of *Ringing Skills* these ideas were developed in *Kaleidoscope Ringing* (2004 CC Publications)

few isolated faults.[2] The results will probably differ quite a bit between individuals, so treat it as a light hearted exercise. You may find it interesting to see whether your trainees perform any better on this test after an extended period of listening development.

You could conclude a listening session by playing recordings of some of your recent practice nights. Apart from providing entertainment, you will probably have some 'local weaknesses' which it would be instructive for your trainees to hear. When I did this, the prize exhibit was the dotted rhythm caused by hunting up close and down wide.



9 In Conclusion

The 'Standard' view of learning to ring concentrates mostly on bell handling and then on basic method ringing, with rope-sight seen as a desirable thing to acquire somehow. Beyond that, little is 'taught'. The things taught are the 'unavoidable' things in the sense that if someone was not taught to handle a bell he would 'not be able to ring' and if he learnt no methods he would 'not be able to ring methods'. The skills we have been discussing are 'avoidable' in this sense. If someone does not handle or strike well, it is not seen as a 'failure', just a matter of degree.

And yet, is it not a failure of both teacher and student if a ringer of normal physique and intelligence is never able to master an odd struck bell, never able to turn in a moderately heavy bell, never able to strike really well, and never able to enjoy hearing him or her self do so?

These achievements should not be the preserve of an elite. Most of us are physically equipped to attain them. The reason why so many never do is that we fail to use all of our skills and do not develop them fully.

Many who learn to ring drop out before they become fully fledged ringers. There are many reasons, but could it be that the failure to achieve real confidence-boosting success is one of them? Nothing succeeds like success. Many of us have seen the dramatic improvement in morale and effort when a ringer who had been making little progress suddenly starts to achieve, becomes much more enthusiastic and starts to make great strides. How many of those who fall by the wayside might still be ringing if the challenge and satisfaction of mastering basic bell handling had continued through the succeeding months and years, if they had continued to make, and to know they were making, real progress in developing their skills as ringers?

[2] The CDs *Listen to Ringing* and *Listen to Ringing- Live* (1995, 1996 CC Publications) provide lots of examples.

Appendix – How a Bell Works

Some people do things better if they know what happens 'inside the engine'. This appendix is for those who like to know why the bells behave as they do.

A bell is a form of pendulum. In school physics you were probably limited to studying pendulums that only swing through ten degrees or so like a clock pendulum. You may remember that the period of swing is constant for each pendulum. Bells are not like that. By swinging them through 360 degrees and more we can make them swing with different periods, which means we can control the timing when ringing together, and especially when ringing changes. The bells still have a natural period, but it varies with the height of swing – the higher they swing, the slower they swing.

So much for the bell on its own. Another problem we never study in school physics is what happens to a pendulum that is not free swinging. A bell with a ringer on its rope is continually subjected to extra forces, all of which affect its swing. Calculating what happens is very complicated (perhaps that is why such problems are avoided in school) but we can illustrate roughly what happens with the help of diagrams.

All the diagrams are drawn in the same way. Time runs towards the right, and the swing of the bell is represented by moving from the top of the diagram (backstroke) to the bottom (handstroke) and back again. The mid level in the diagram corresponds to the mouth down position. The small bell pictures show this graphically. If the curve crosses the line at the top or bottom, the bell goes over the balance at back or hand stroke respectively. Rapid movement is shown by a steep slope and slow movement by a shallow slope. The bell is stationary when the curve is horizontal. Several swings of a bell are shown. These curves are the same as those drawn in Chapter 4, but the hand-strokes are drawn downwards for simplicity, rather than being 'folded up', as they would be in real life. The black dots show where the bell strikes.

The only time that the ringer can apply any useful force to the bell is when it is near the balance. At other times the rope is moving too fast. This is shown in the diagrams with small arrows. Notice that the 'check' is shown pointing backwards, since applying force as the bell rises retards it, whereas the 'pull' is shown pointing forwards as applying force to the bell on the way down accelerates it. All of these are shown in Figure 1 with a bell ringing just below the balance at both strokes.

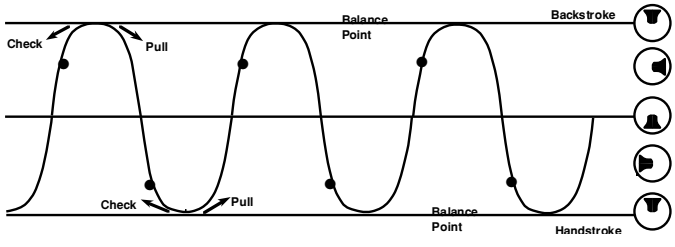


Figure 1

Figure 2 shows the relationship between height and period of swing. Three identical bells start swinging together, but they are rung to different heights. The thick curve shows a bell being rung just up to the balance, while the thin lines show the bells being rung just below and just above the balance. After a few strokes, the three curves are quite separate, with the higher and lower swinging bells striking significantly later and earlier than the other one (shown by the separation of the dots).

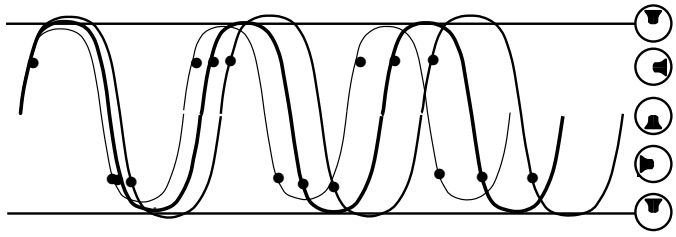


Figure 2

Figure 3 shows what happens when ringing open leads. The bell rises further at hand stroke (in this case just to the balance) than it does at back stroke. This is achieved by applying most of the effort at back stroke. The bell is checked slightly to stop it rising so far, and then pulled down from the balance to replace the energy lost in checking it. At hand stroke it is allowed to rise freely without checking and so it rises higher. The net effect is to speed up the back stroke and delay the hand stroke slightly. (The diagram shows no force at hand stroke, but in practice, there must always be enough to feel what the bell is doing.)

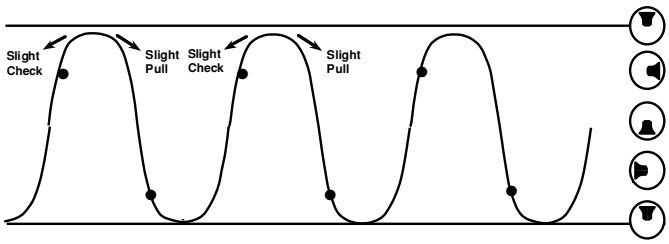


Figure 3

Dodging is similar to ringing open leads, but more so. If the two are combined (as they must be when dodging in open lead ringing) the net effect depends on whether the two support or oppose each other. For example, dodging in 3-4 up in Plain Bob or 4-5 down in Grandsire, involves ringing under (ie quick) at backstroke. This adds to the effect of the open lead, to give a bigger overall effect than dodging the other way, where holding up at back stroke means ringing more slowly and is partly cancelled out by the inherent quickness of an open lead back stroke.

The extent to which this cancelling occurs depends on how open the leads really are (many bands ring with less than a whole blow gap) and on how much of the quickening at back stroke is done automatically by the weight of the rope. Light bells, a long draft and wet ropes produce the most marked effect. If the bell is odd struck,

this introduces yet another factor. There are some bells where dodging one way requires no effort at all. The penalty is that they need twice as much effort when dodging the other way!

To sustain ringing at a steady speed, all pulling must be balanced somewhere by an equal amount of checking, (apart from any necessary to overcome friction or frame movement). The example above shows this.

If you check more than you pull (or in the extreme, only check) you will progressively bring the bell down, as shown in Figure 4.

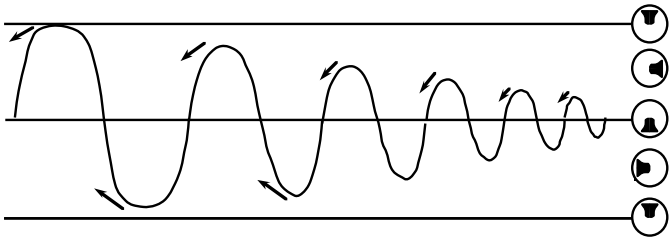


Figure 4

Likewise, if you only pull, you will raise it again. (Of course if you continue to pull a bell when it is already up you will send it over the balance where it would either bounce off the stay or break it.)

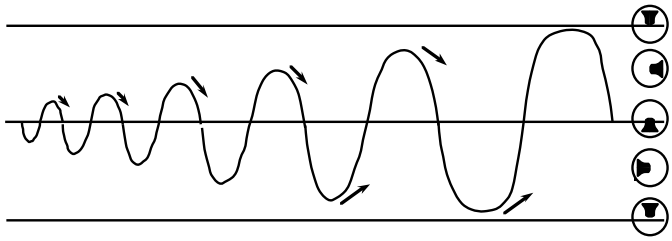


Figure 5

In normal ringing, checking and pulling must balance out overall, but in the short term by playing one off against the other you can control the bell from blow to blow.

Some people put a lot more effort than a 'slight pull' into their bell, and they do it at every stroke. Figure 7 shows what happens in this case. There are two curves. The more rounded one on the 'inside' shows a bell being ring normally, as above. The other curve shows a bell being 'over pulled', ie heavily checked and pulled at every stroke. Both bells are striking at the same rate, and so keep in step, but notice the differences in the two curves. The over pulled bell swings more rapidly between strokes (steep slope), which is offset by spending slightly longer at the end of each stroke (flatter top). Between these two the bell has to accelerate and decelerate sharply (tighter curves).

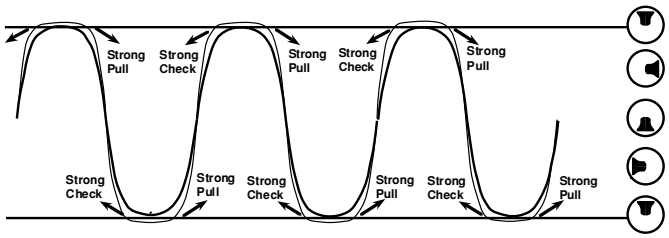


Figure 6

On a drawing, these differences look tiny but that is deceptive. Making a bell which weighs many hundredweights depart from its natural swing requires a lot of effort. Doing it twice every stroke is a recipe for hard work.

So much for the swing of the bell, what about the clapper? It too is a pendulum and so has a natural period of swing. However, since it is hanging from a moving pivot its behaviour is far from simple. It does not swing smoothly, as the bell does, but flips very rapidly from one side of the bell to the other. This is triggered at the point in the swing when the clapper would naturally be swinging faster than the bell. Up to that point, it has been pushed forward by the trailing edge of the bell, but when it breaks free, it swings fairly quickly across the bell to strike the leading edge, where it stays for the rest of the stroke, unable to go further than the bell will allow it.

You can't control the clapper directly like you can the bell, but in some circumstances, it is possible to delay the strike very slightly. The time when the clapper breaks away from the bell depends on how fast the bell is pushing it forward. If you accelerate the bell hard through the downward stroke, the increase in the bell's speed prevents the clapper from breaking away quite so soon, thus delaying the strike slightly.

This can enable you to correct what would otherwise be a quick blow if you pull over the balance too soon, or if you are ringing below the balance and have let your bell drop to the point where you have no margin for holding up It is not an effect you should rely on, since it is carelessness and lack of foresight to be in the situation in the first place, but we all make mistakes and being able to minimise their effect is sensible. In any case, it is less practical on a heavier bell. The bigger wheel makes the stroke longer and harder to sustain. By increasing the rope speed, it makes it harder to apply so much force, and of course the swing of a heavier bell is harder to change anyway.

