



Why Have Theory?

There are many things in ringing that can be called “Theory” because we can enjoy ringing without bothering about them. However there are many ringers who enjoy their ringing that bit more when they understand something about “Why” as well as “How”. In many cases, knowing the theory also has a practical application such as helping you to keep your place or to learn new methods.

Follow your course bell!

Course bells are most easily seen in simple methods such as Plain Hunt and Plain Bob. If you write a lead of Plain Hunt on six bells you will see that the bells “Course” (or follow) each other to lead in the order 2-4-6-5-3-1. Look at Plain Hunt on higher numbers and you will see the same pattern; all the even numbers come to lead first in ascending order, followed by the odd numbers in descending order. This sequence is called the “Natural” coursing order and in the plain course of most regular methods the working bells course 2-4-6-5-3 (where the treble might be in any position among the other bells.)

Look at 5 and 6 in Plain Hunt:

- From rounds 5 hunts over 6.
- As 5 lays, 6 moves down to fourths place; there is one bell between 6 and 5.
- As 6 hunts down to lead 5 follows, **always with one bell in between** until, as 6 leads, 5 comes into seconds place ready to take 6 from lead.

1	2	3	4	5	6
*	*	*	*	6	5
*	*	*	6	*	5
*	*	6	*	5	*
*	6	*	5	*	*
6	*	5	*	*	*
6	5	*	*	*	*
5	6	*	*	*	*

- We say that “5 courses 6 to lead”, or that “6 is 5’s course bell”. The practical use of this is that, if you get lost coming to lead (especially on higher numbers), you can “Follow your course bell” by striking wide of it, wide enough to let one bell come between, until your course bell leads. Thus it pays to know who your course bell is.
- **Your course bell is the bell you take from lead and turn from behind.**

So, if the conductor tells you (for example) to “Follow 3 down” he is telling you to follow your course bell, in this case 3, down to lead, and to lead after 3. When first ringing on the higher numbers there is a greater chance of losing your place at the back, so being able to follow your course bell can be most helpful. With a little practice as you watch your course bell you can see, at each pull, which bell follows your course bell - and that is the bell **you** follow. This is another use of “ropesight”.



In the same way that you are coursing a bell, another bell is coursing you. This bell is called your “After bell”

- **Your after bell takes you from lead and turns you from behind.**

Knowing your course bell and after bell, you know who you will take from lead and who will take you - similarly, who you will turn from the back and who will turn you. So knowing where you will meet these two bells must be useful.

Now look at the plain course of Plain Bob minor. Better still, write it lead by lead as we discuss it. For most of the plain course 5 courses 6, much as it does in Plain Hunt. But at the second lead, as 5 makes seconds place, 5 and 6 go separate ways. For the moment, 5 has lost its regular course bell. Now as 5 comes to the back, it turns the treble and courses it down until, as 6 makes seconds place and 5 dodges 3-4 down, 5 is coursing 6 again and will do so through the rest of the plain course. So, in Plain Bob, (on any number of bells), after making seconds place the treble is your course bell until you dodge 3-4 down and meet your regular course bell again.

Next, look at the dodging in 5-6. In the plain course 5 dodges down with 3 (its after bell) and dodges up with 6 (its course bell). In Plain Bob on any number of bells all dodging at the back is either with your course bell or your after bell. This must be worth knowing - and it holds good for most regular methods, certainly for all the commonly rung ones.

Bobs and singles change the coursing order so, after any call, you might find that you have a new course bell or a new after bell - or both! In Plain Bob after a call, as you come to lead, or come to the back, whichever happens first, note who you turn - it's your new course bell, and note who turns you - it's your new after bell. (If you've run in at a bob you will turn the treble from the back, so wait until you've dodged 3-4 down to find your new course bell.)

In more complex methods using your course bell and after bell might not be as simple as in Plain Bob but they are still very useful because you meet them in set positions. Part of really knowing a method is knowing where you meet, pass or dodge with your course bell and your after bell; these are “landmarks” that can guide your ringing in the same way as knowing where you pass the treble. Examples are:

- Double Oxford minor: **All dodging on front and back** is with your course bell or after bell.
- Kent Treble Bob on any number: **All dodging at the back** is with your course bell or after bell unless one of them is in the Slow, when you dodge with the treble instead. You will see that this dodging with the treble happens just before and just after you are in the Slow. You also pass your course bell and after bell in 2-3, not at lead, because of the Slow. (In Oxford Treble Bob the Oxford places break up the coursing order either side of your being in the Slow, so you can't rely on this in the same way, but you do dodge with the treble at the back just the same.)
- Cambridge on any number: **All dodging at the back** is with your course bell or after bell and, during the backwork, with the treble. It's also worth looking at where you meet your course bell and after bell in the Places, either dodging or “Running through”.



As with most things in ringing, there can be snags; your course bell or after bell might get lost but, if you know where they should be, you can count your places as if they were there and carry on. (Or - you might be able to put them right!)

“Conducting” the ringing (as opposed to calling bobs and hoping for the best) relies heavily on coursing orders and how these change when calls are made. Various books on conducting give further information.

Place Bells.

Place bells shouldn't be thought of as theory - the concept of place bells is a very real practical help as you progress in ringing. There's nothing complicated about place bells; it's just a shorter way of saying “Where each bell starts from rounds”. Thus, if you are “Fourths place bell” in any method you should be ringing as four starts from rounds!

An important thing to know is which place bell you become next. Using the Diagrams book or the RW Diary, look at the plain course of Cambridge minor; 2 is the blue-line bell. As it is in seconds place in rounds it is “Seconds place bell” for the first lead, that is, until the treble leads again. Follow the blue line through to the treble's backstroke lead, the row under the dividing line. In this row 2 is in sixths place so it is now “Sixths place bell” for the next lead and will ring the work of 6 starting from rounds. This is shown by the “6” in a circle on the right of this row. The blue line from here is showing the work of Sixths place bell, or the work of 6 starting from rounds. Following the blue line, after Sixths place bell you become Thirds place bell, Fourths place bell and Fifths place bell. Then, as rounds comes up, you become seconds place bell again.

Thus the place bell sequence for Cambridge minor is, 2-6-3-4-5. Think of this as a circle and you can start from any one of five places depending on which bell you are ringing but, except at calls, you always follow the same sequence of place bells. Different methods have different place bell sequences, for instance London and Norwich minor both have the sequence 2-3-5-6-4, York and Carlisle have the reverse, 2-4-6-5-3. You can find the place bell sequence for any method by following the ringed figures in the Diagrams. (And always think of place bell sequences as a circle.)

But it's not only in the more complex methods that place bells are useful. When calls are made (in any method), knowing which place bell you become at the call you can ring as that bell starts from rounds. For instance, in a “Plain Bob” type bob:

- If you **run in** you become **seconds place bell**.
- If you **run out** you become **thirds place bell**.
- If you **make the bob** you become **fourths place bell**.

So, provided you know the starts for each bell from rounds, you will know what to do after each call - and working by place bells is so much simpler than learning a lot of rules of “What to do after a bob” (or a single) for different methods.

Methods can be learnt “by place bells”, meaning that you learn the method one lead at a time, in place bell sequence; learning a method this way has distinct advantages. If the



ringing has become a bit critical the conductor might tell you that “You are thirds place bell”, which is useful **if** you know what thirds place bell should be doing. Also, place bells are essential when ringing “Spliced”. If for example you are ringing Cambridge, and are about to become Sixth place bell, and “London” is called then you know that you must ring Sixth place bell for London - and also remember that the place bell sequence is now different!

Hunting, plain or otherwise.

Plain hunting is usually the first thing we are taught about change ringing. To be precise it should be called “Forward” hunting because there is also “Backward” or “Reverse” hunting, where each bell leads backstroke/handstroke.

Forward hunting.

1 2 3 4
 2 1 4 3
 2 4 1 3
 4 2 3 1
 4 3 2 1
 3 4 1 2
 3 1 4 2
 1 3 2 4
1 2 3 4

Backward hunting.

1 2 3 4
 1 3 2 4
 3 1 4 2
 3 4 1 2
 4 3 2 1
 4 2 3 1
 2 4 1 3
 2 1 4 3
1 2 3 4

Backward hunting occurs in some of the more complicated methods such as Stedman and London. In practice you need to know when you are going to lead “wrong”, that is, backstroke/handstroke. In this situation you need to strike close on the backstroke as you come to lead, then hold up on the handstroke to keep the striking correct. Also in London and similar methods you often lay wrong. Whenever the blue line contains “Points” or “Fishtails” the method will contain some backward hunting.

The main (practical) thing about backward hunting is that you will lead wrong, so remember to “check” the backstroke to keep the lead close.



Lead Ends - or are they?

Possibly one of the most misused terms in ringing is “Lead ends”, not that many people worry about it because it makes no difference to the ringing in a practical sense. But, to be technically correct, a **Lead End** is the row which contains the treble’s handstroke lead - it is the **end** of that lead. The next row, the treble’s backstroke lead, is the **Lead Head** - it is the **head** of the new lead. Rounds is a lead head (except in certain odd-bell methods!).

If you study methods as printed in the Diagrams book or in the RW Diary you will see that dividing lines are drawn between these two rows, between the lead end and the lead head:

$$\begin{array}{cccccc} \underline{1} & 3 & 2 & 5 & 4 & 6 \\ 1 & 3 & 5 & 2 & 6 & 4 \end{array}$$

The lead end is the row above the line; the lead head is the row below the line. (Some odd-bell methods such as Grandsire are exceptions; this is explained later.)

Drawing the lines in this position divides the blue line into symmetrical blocks; symmetry in a method will be discussed later. Confusion can arise over this because when we first learn to write plain hunt or plain bob it is customary to start by writing rounds and drawing a line under that first row, then to draw line under each treble backstroke lead until we reach rounds again. This is perhaps convenient at this stage of learning - but in theory it is incorrect!

As with lead ends and lead heads, so it is with course ends and course heads. Strictly speaking each course end occurs at the treble’s handstroke lead; its backstroke lead is the **head** of a new course.

Transposition.

In the RW Diary, and elsewhere, touches are often “Notated” (written out) by lead heads. It is useful to be able to construct (“Transpose”) lead heads in this way and thus avoid having to write out every row. (Although writing row by row is still possibly the best way to learn methods - and to see what happens at calls.)

Studying the plain course of Bob minor, from rounds the first treble backstroke lead is 1 3 5 2 6 4. Disregard the treble (because it is always at lead here) and we have 3 5 2 6 4.

So,	2 3 4 5 6	
has become	3 5 2 6 4	
Thirds place bell has become	seconds place bell.	(“3rds to 2nds”)
Fifths place bell has become	thirds place bell.	(“5ths to 3rds”)
Seconds place bell has become	fourths place bell.	(“2nds to 4ths”)
Sixths place bell has become	fifths place bell.	(“6ths to 5ths”)
Fourths place bell has become	sixths place bell.	(“4ths to 6ths”)

Always work by places. So, at the next lead, because 5 was thirds place bell it will now move to seconds place, and so on:

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2 3 4 5 6 changes to:
3 5 2 6 4 which changes to:
5 6 3 4 2 which changes to:
6 4 5 2 3 and so on:
4 2 6 3 5
2 3 4 5 6

We have now written a plain course of Bob minor “By the lead heads”.

To write touches in this way we also need to look at what happens at bobs and singles:

	Plain Lead	Bob lead	Single lead
From:	2 3 4 5 6	2 3 4 5 6	2 3 4 5 6
We get	3 5 2 6 4	2 3 5 6 4	3 2 5 6 4

At this bob, 2 runs in, 3 runs out, so they keep the same places. 5 makes the bob, bells 4 and 6 (above fourths place) are not affected.

The single has the effect of reversing the bells in second and third places compared to a bob. 5 still makes the “bob”, bells 4 and 6 (above fourths place) are again unaffected. (Remember to work by places!) So a touch of 108 changes can be shown as below. (“-” denotes a bob, “S” would denote a single.)

108 Bob Minor.

2 3 4 5 6
- 2 3 5 6 4
- 2 3 6 4 5
3 4 2 5 6
- 3 4 5 6 2
- 3 4 6 2 5
4 2 3 5 6
- 4 2 5 6 3
- 4 2 6 3 5
2 3 4 5 6

Being able to write touches in this way enables us to construct our own touches - or to find out “What happens if I call a bob here?” - without writing out everything row by row. The only snag is that different methods have different transposition patterns. For instance, in Cambridge minor the first plain lead from rounds gives 5 6 3 4 2. When you want to transpose a method you must first learn its lead head pattern.

Probably the quickest way to find the transposition pattern for any method is to look at the first lead head of the method in the Diagrams book.



Pivot points and Symmetry.

All regular methods have two “Pivot points” in the blue line where the work of a bell reverses itself. One of these points will occur as the treble leads; the other point will occur at a half-lead, that is, as the treble is laying full.

Taking Cambridge minor as an example. One pivot point of the blue line is the seconds place over the treble, in the middle of the front work, where fifths place bell becomes seconds place bell. The second pivot point is the fifths place under the treble in the middle of the backwork which is two and a half leads later - halfway through the course. Look at the work of fifths place bell, leading up to the pivot point where it becomes seconds place bell, then look at the work of seconds place bell. **The work of seconds place bell is exactly the reverse of fifths place bell.** Similarly, the work of fourths place bell is the reverse of sixths place bell - and the work of thirds place bell reverses itself halfway through. Many ringers find that this helps when learning methods.

Now look at Norwich minor, which is a “Sixths place method”. Sixths place is made as the treble leads; this is a pivot point - where fifths place bell becomes sixths place bell. The second pivot point must be two and a half leads later, which is the lead in the middle of the frontwork, the work of seconds place bell. We can see that in Norwich the work of sixths place bell is the reverse of fifths place bell, the work of fourths place bell is the reverse of thirds place bell and the work of seconds place bell reverses itself at the halfway point, the pivot.

All regular methods have this symmetry and it holds good for the higher numbers, where it can be even more useful when learning methods.

Look at “Double” methods, Double Oxford minor for example. One obvious feature of Double methods is that any work done at the front is repeated at the back. Looking at the blue line, the two pivot points are when making seconds place over the treble and fifths place under the treble, rather like Cambridge. Follow the blue line from rounds through the work of seconds place bell and thirds place bell up to the point where the treble runs through the “Places up”. At this “Reflection point” the blue line is reversal of itself, changing the work from front to back up to the next pivot point. And the same thing happens from this pivot point to the middle of the “Places down” which is another reflection point, and so back to rounds. So a true Double method has two pivot points and two reflection points, which means that the blue line can be defined in a quarter of its length - it has a four-way symmetry.

Methods with a second hunt bell have a different sort of symmetry which can be explained by taking the treble and hunt bell as a combined unit. Pivot points now occur as the hunt bell takes the treble from lead and turns it from the back. In Grandsire the pivot points in the blue line are making thirds place, where fifths place bell becomes thirds place bell, and as sixths place bell leads, between the 6-7 down and 6-7 up dodges. This explains why in the Grandsire Diagrams, the dividing line is drawn under the treble’s backstroke lead, not handstroke lead - the pivot points, and thus the symmetry of the method, occur after the treble’s backstroke lead.



Place Notation.

This is a shorthand way of defining a method. Look at any method in the RW Diary and you will see a column of figures and x's down the left hand side for the first half-lead, spaced between the rows of the method. The x's mean "All bells change in pairs", the figures show which places are made. Given these figures for half a lead we can construct any regular method. Take Cambridge minor for an example. Follow this row by row.

From rounds:		1 2 3 4 5 6
x	All bells change in pairs.	
		2 1 4 3 6 5
36	Thirds place and sixths places are made.	
		1 2 4 6 3 5
x	All bells change in pairs.	
		2 1 6 4 5 3
14	First (Leading) and fourths places are made.	
		2 6 1 4 3 5
x	All bells change in pairs.	
		6 2 4 1 5 3
12	First and seconds places are made.	
		6 2 1 4 3 5
x	All bells change in pairs.	
		2 6 4 1 5 3
36	Thirds and sixths places are made.	
		6 2 4 5 1 3
x	All bells change in pairs.	
		2 6 5 4 3 1
14	First and fourths places are made.	
		2 5 6 4 1 3
x	All bells change in pairs.	
		5 2 4 6 3 1
56	Fifths and sixths places are made.	
		2 5 6 4 3 1

The half-lead is a pivot point so, by reversing the place notation here (do not repeat the 56 places) to give x14x36x12x14x36x, we come to the first lead end where, in Cambridge, seconds place is made to give the lead head. (Shown in the Diary as 12 at the first treble lead.) Thus Cambridge minor can be defined in a single row of figures:

x36x14x12x36x14x56 lh2nds.

("lh2nds" is shorthand for "seconds place at the treble's lead".)

Using the same place notation but finishing with "lh6ths" gives Primrose Surprise minor; Primrose is often called "Sixth place Cambridge".



Looking at the place notation for Cambridge, every other row is “x”. This indicates that there are no “wrong” leads; all the hunting is “forward”. In all methods where this is so:

- Odd places (thirds, fifths, etc.) cause dodges **below** that place.
- Even places cause dodging **above** that place.

London minor commences with 36 instead of an x, also sometimes places are made in consecutive rows. Both these features indicate that the method contains backward hunting, thus there will be wrong places and/or wrong leading.

Odd? - or Even?

Why can we have a 120 of Bob doubles with bobs only, but to get a 120 of Grandsire doubles we must have singles as well? The answer is in the “Nature of the rows”. Each row of figures might be “Even” or “Odd”, sometimes shown as “+” or “-”.

In any extent, such as a 120, there are equal numbers of odd rows and even rows.

- Rounds is always taken as an even row. (+)
- Bells change in pairs. In Doubles one pair or two pairs might change from one row to the next. On higher numbers more pairs might change. The important thing is whether an odd or even number of pairs change.
- If one (or an odd number) pair of bells is changed (say 21345) the row is now odd (-).
- But if an even number of pairs are changed (say 21435) the row remains even (+).

Put another way:

Changing an odd number of pairs changes the nature of the row. (Or, if you prefer, changes its sign.)

Changing an even number of pairs does not change the nature of the row. (Does not change its sign.)

Now write a lead of Bob doubles and you will see that, every row until the treble’s backstroke lead, you change two pairs so, starting from rounds (+) every row is even or (+). But at the treble’s lead only one pair is changed so the treble’s backstroke lead is odd or (-). Now as two pairs change at each row, each row is (-) until the next treble lead. So as alternate leads are (+) and (-) we get equal numbers of even (+) and odd (-) rows.

Next, look at a bob. Only one pair of bells changes so the signs are the same as if it were a plain lead; we still have alternate leads of (+) and (-) rows. Every possible row can be created using bobs, so nothing more is needed to create a 120.

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In Grandsire doubles each row changes two pairs of bells, **including when a bob is made!** (Write it out and check it for yourself - every new row has changed two pairs of bells.) This means that, using bobs only, we cannot have a 120 because we cannot create the 60 odd (-) rows. This is when the single is needed; study it and you will see that only one pair of bells changes when the single is made. At a single even rows change to odd, or odd rows change to even and this makes the 120 possible.

Listen for Queens (an odd row) in Grandsire doubles and you will find that it occurs only after an odd number of singles, whatever calling is used.

Stedman doubles follows a similar pattern of rows; the singles are needed to change the sign.

These notes have only scratched the surface of the theory behind change ringing. If you wish to study the subject further there are several books available. "Change Ringing" by Wilfrid Wilson, is a mine of information on all aspects of change ringing.