2020-04-25 Ringing Theory Notes

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Introduction

Plain Bob Major - Coursing order…

(87)53246

Convention — When discussing coursing order and compositions, the convention is to keep the back 2 bells — (87) in Plain Bob Major — at the front unchanged, and think through changes with other bells. Then we don’t even need to write out the (87) because it is implied.

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Bobs — What happens to the coursing order when a Bob is called?

— 3 bells rotate in coursing order. The 1st bell shifts back 2 spots and the 2nd and 3rd bells slide forward by one spot, and the other bells are unchanged from their coursing order.

Make Out In

\ / /

Bobs 53246

Would have done… at location… becomes…

78 up W (wrong) \ / / | |

56 down M (middle) | | \ / /

78 down H (home) | \ / / |

Out B (behind) \ \ \ \ / <— This is the case where you consider that (87) are still together but at the \*back\* of the coursing order, and it is the 687 that are rotating, which means (87) still are next to each other.

— Thus if you call 3 bobs in the same location (e.g. H H H), you will return to the original coursing order, and it will come back to rounds.

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Singles — What happens to the coursing order when a Single is called?

— 3 bells are impacted, and notice that the coursing order only changes for 2 of the bells where the 1st and 3rd bells affected will swap in the coursing order, and the rest remain the same.

4ths 2nds 3rds

\ | /

53246

sH (single at Home) 54236

— Thus if you call sH and then sH again, you will return to the original coursing order, and it will come back to rounds.

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Now for some MATH… :D :D

Q: How can we compose a touch that is TRUE?

Reminder: TRUE means that no changes (or rows) repeat during the touch.

Exercise:

* Let’s look at Plain Bob Minor.
* The plain course is TRUE.
* If there are rows that repeat, that means the 187 bells would be in the same position in the change.
* Can you find 2 changes where the 18 are in the same positions? …. ANDER HELP EXPLAIN THIS PLEASE>>>BETTER LEAD IN>>>

FACT: In Plain Bob, the only way 2 courses are FALSE against each other is if the coursing order (“c.o.”) are backwards.

>>> Look at the part that is written out in a box, this is the changes (not coursing order) at rounds if you are getting back to rounds, or starting at rounds. COMPARE the row above rounds, to the row 2 after rounds, notice that (21) are the same, but all the other pairs afterwards are simply swapped…

—> What does this mean for the coursing order of going backwards?

—> You can figure this out by looking at the original rounds order

21436587 —> is to coursing order 2468753 —> rotate 8753246

21345678 —> is to coursing order 2357864 —> rotate 6423578

—> see the circle/donut thing.

[[[[ ANDER PLEASE CHECK  — So as long as you keep the (87) unchanged in the front, then you cannot get the coursing order backwards, which means in turn that you can make any combination of the remaining numbers and the touch will be TRUE. — This is one easy way to do compositions, and why people often think of compositions with the back 2 bells (87) unchanged. — However, let’s calculate the full range of possibilities, where we only keep 8 at the front.]]]

How many possible coursing order combinations are there? If we go through all possible coursing orders, we will have completed an EXTENT.

6! <— 6 numbers in the coursing order (minus the 8)

/2 <— to exclude all the reversals

= 360 different coursing orders

How many changes are there in an EXTENT?

6! <— from before x8 x2 (number of changes in a lead = treble going from 1 to 8, then 8 back to 1) x7 (the number of leads)

/2

===> the 2 cancels out = 8 x 7 x 6! = 8! = 40,320 <— In practice no one does an EXTENT of 8 because it’s too long. :)

Let’s apply this to PB6:

* # different coursing orders 4!/2 = 12
* # changes in EXTENT 4!/2 x 6 x 2 x 5 = 6! = 720

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Plain Bob Minor — Composing Touches

What happens at H (home) and W (wrong)?

Bobs

Were doing… at position… instead do…

56 down H (home) | \ / /

56 up W (wrong) \ / / |

Singles

56 down sH (home) | \ | /

56 up sW (wrong) \ | / |

Now let’s compose an EXTENT…

Plain Bob Minor Coursing order: 65324

H H H rotates 3 bells in the same spot, and takes you back to the original coursing order and eventually back to rounds… which gives you 3 of 12 possible coursing orders.

5 324

H 5 243

H 5 432

H 5 324

— Another way to visualize this is that you have the 3 —> 2 —> 4 circle and you are just starting at a different number each time, going clockwise.

H H sH, H H sH now before going all the way back to original coursing order, if you call sH instead of H, you swap the 24 bells and then rotate again… which gives you 6 of 12 possible coursing orders.

5 324

H 5 243

H 5 432

sH 5 234

—

H 5 342

H 5 423

sH 5 324

— Another way to visualize this is that you have the 3 —> 2 —> 4 circle and in the first 3 c.o.s you are starting with a different number going clockwise, and in the second 3 c.o.s you are starting with a different number but going counter-clockwise. Remember, this is TRUE because the (65) at the front have not moved.

Now how do we get the remaining 6 of 12 c.o.s? Right now the 5 is always in the first spot of the c.o. If we move the 5 to any other position, and then do the same permutations, we will get the remaining c.o.s.

One easy way to do this is to call SINGLE affecting the 5. For instance sW will affect the first 3 bells in the c.o., which means the 5 will go to the first spot to the third spot in the c.o.

Now remember when you call 2 singles in a row at the same spot, it goes back to the original order… so what would happen if we call sW sW?

5 324

sW 235 4

sW 532 4 <— notice this is the same coursing order before sW sW was called… This is still TRUE because we didn’t repeat the \*same changes\* before calling sW sW vs after calling sW sW.

Written out another way… This also helps visualize that this touch is TRUE by showing which part of the method we are repeating vs not repeating…

W H

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s  <— “s” denotes single in this notation

s - <— “-“ denotes “bob” in this notation

s

s -

s

s -

————————

x2 <— “x2” denotes that you should do the above a total of 2 times

Yet another longer way to write this out is:

W H

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5324 s 2354

2354 s 5324 -

5243 … etc…

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Various Composition Notations

Composers want to have compact notation… just because…

Other notation when people want to make things compact…

W M H

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- 3 <— this means W H H H

- 3

- 3

…which is the condensed version of:

W M H

————————

- -

-

-

- -

-

-

- -

-

-

Or sometimes people denote substitutions like this:

W H

————————

- 3\*

…

————————

3\* = - - s

…which is the condensed version of:

W H

————————

- -

-

-

s

…

Or this as a composition of Cambridge 8 (5400 changes):

>>> ANDER PLEASE CHECK, should this be 5600? 5 lengths x 5 x (32 changes/lead) \* 7 leads/length = 5600

M W H

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2 2 3

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x5 <— do this a total of 5 times

…which is the condensed version of:

M W H

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- -

- -

-

-

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x5