The last few measurements

The end of the old bell frame

Bell Notes

Bell Shapes

Doug Hird – 19/02/2021

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Bell Note Analysis

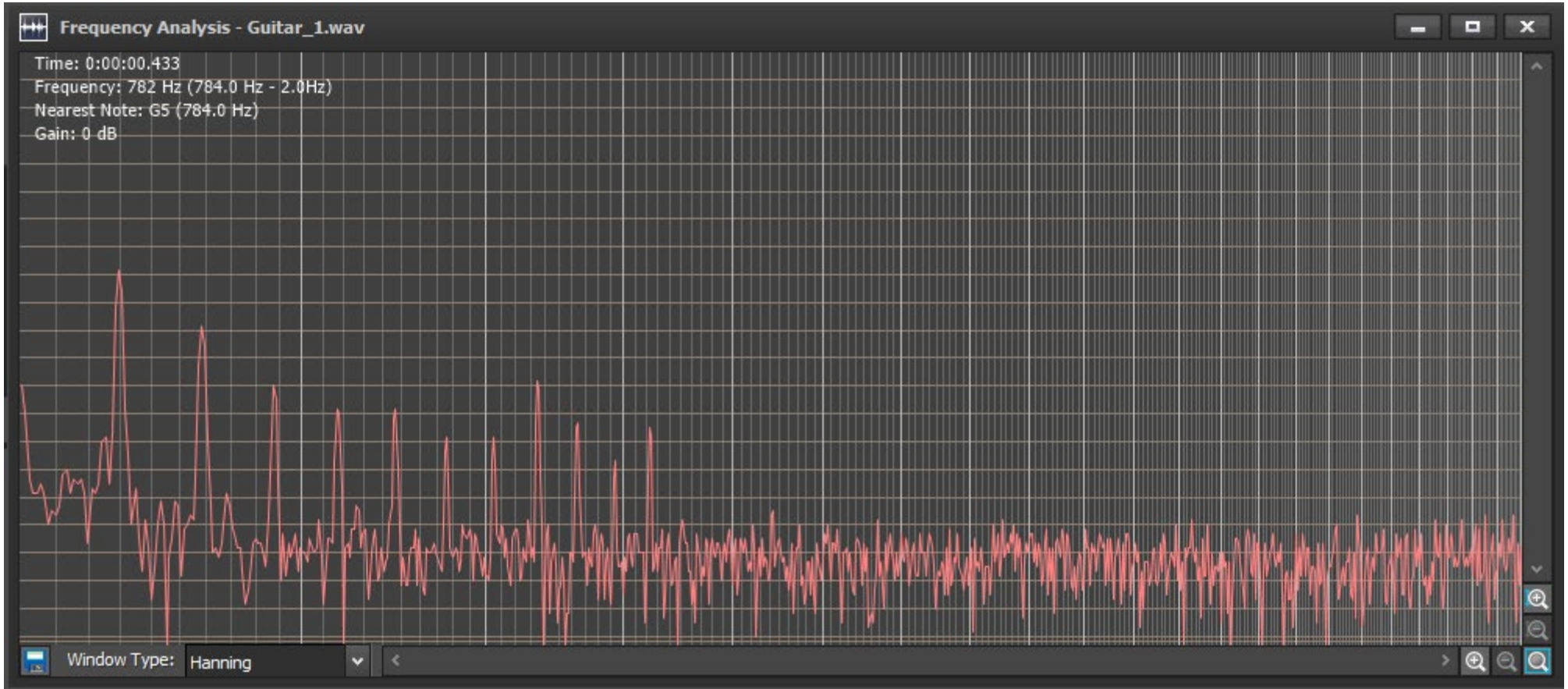
- What do you hear when you listen to a musical instrument?
- You might think you hear a particular note but they are never a pure sound. There will be extra notes, harmonics, hidden in plain sight.
- We can see this if we do a frequency analysis.

- The acknowledged expert in the field is Bill Hibberts. His web site
  - at http://www.hibberts.co.uk/index.htm

  has a lot more detail than we can go through tonight.
- But we can look at the basics:

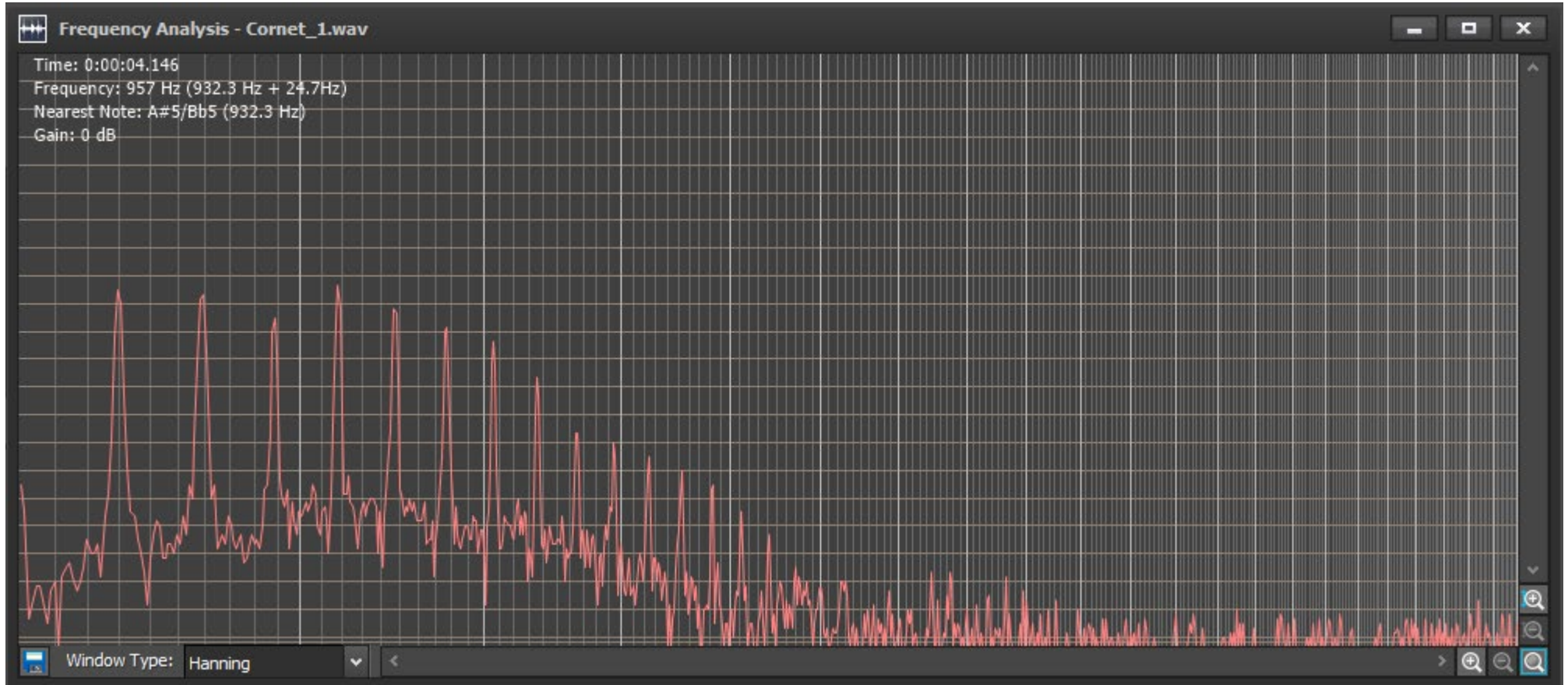
Bell Note Analysis

- Strings:
  - You mostly get evenly spaced notes in pleasant combinations as the length of the string limits how it can vibrate.



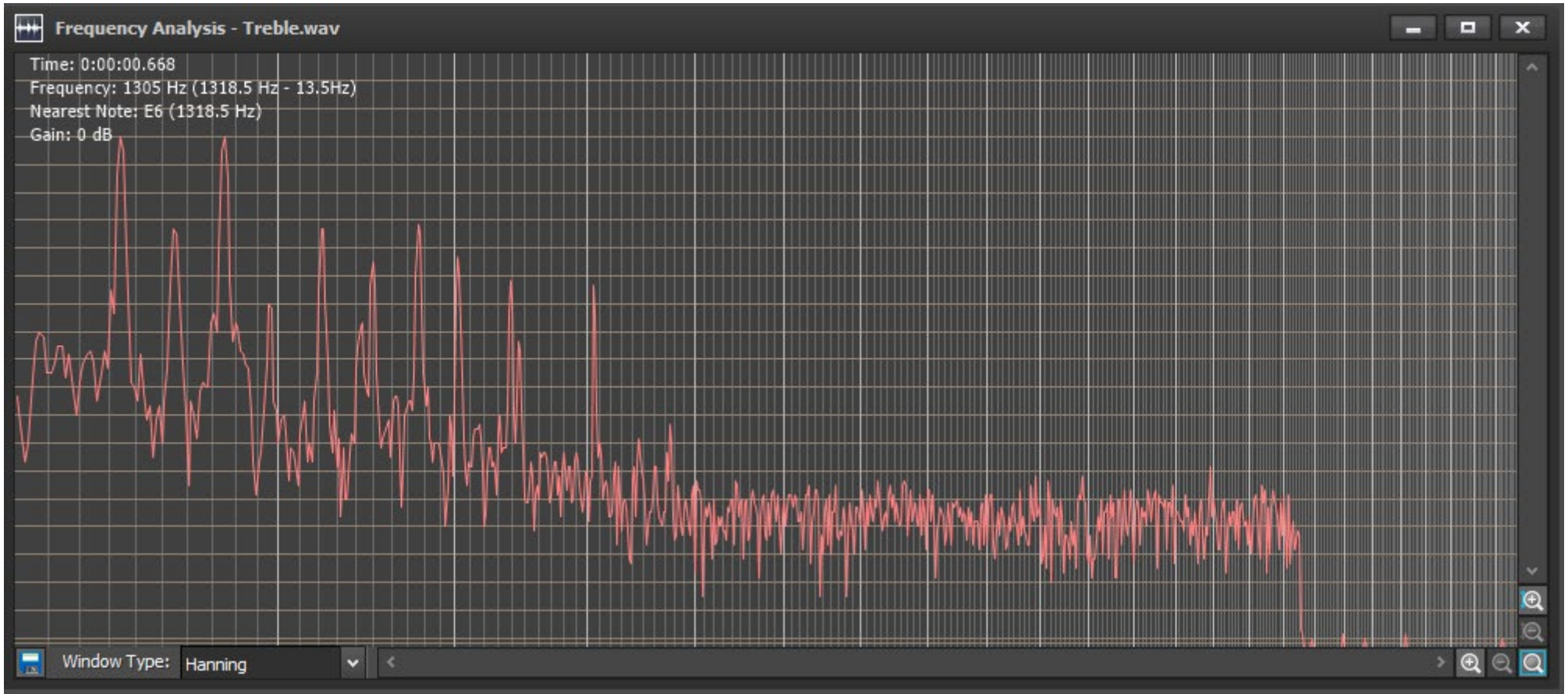
Bell Note Analysis

- Wind instruments:
  - The length of the tube of air will determine which set of frequencies can happen.



Bell Note Analysis

- A bell obeys the same basic rules:
  - Big parts of the shape vibrate at lower frequencies than small parts.
  - A bell is a complicated shape so the harmonics are not all where we expect.

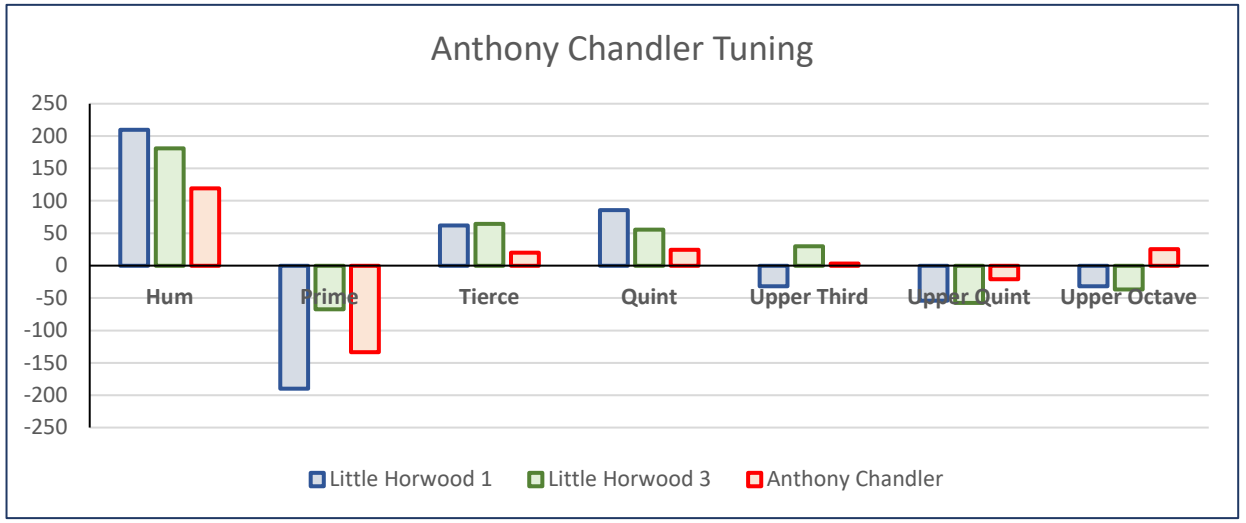


Bell Note Analysis

- Where these harmonics are, and how strong each one is will depend on the shape of the bell. The shape is determined by the bell founder and may have developed for a combination of reasons.
  - Cost
  - Easy to ring
  - Habit
  - Training
  - Musical preference
- So it is possible to identify the work of some bell founders just by listening. In theory!

Bell Note Analysis

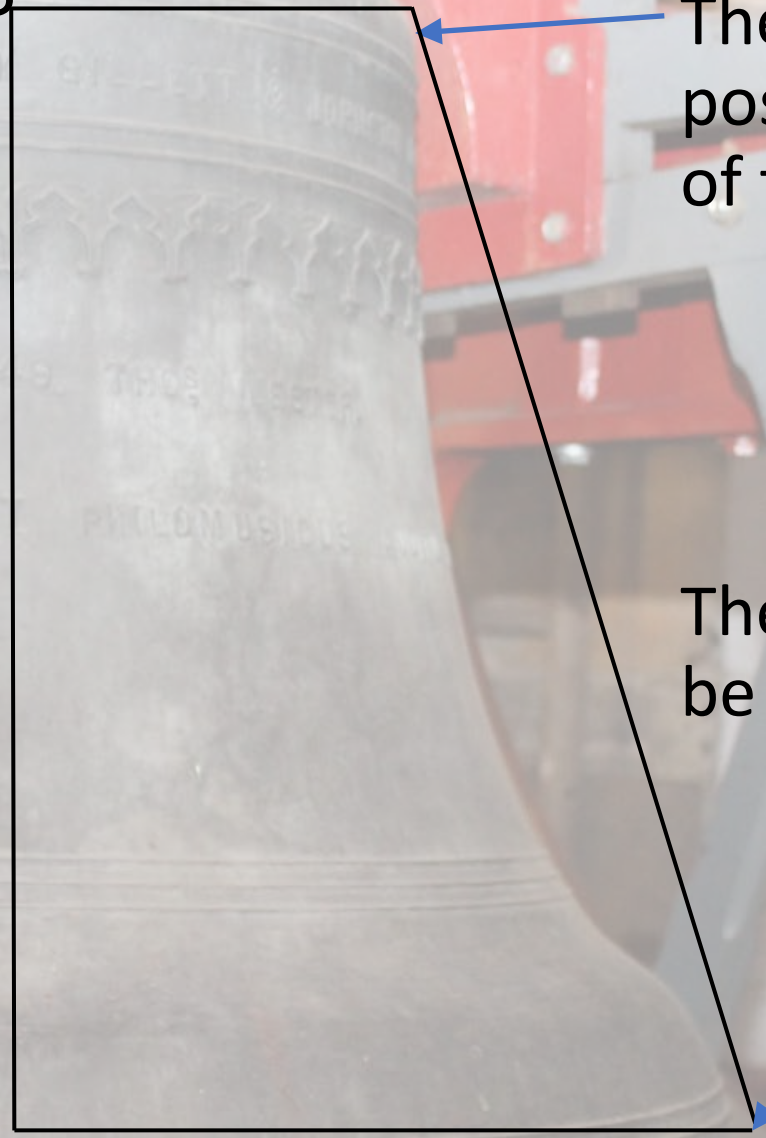
- Are the Chandler bells at Little Horwood typical examples?



- Yes – it looks like they are, considering that he probably only tried to get 2 or 3 harmonics about right.

Bell Shape Analysis

- We can compare the shapes of bells by measuring a few key points and then re-scaling them until all bells have the same diameter at the base.
  - This is a concept developed by George Elphick and described in his books, *The Craft of the Bellfounder* and *Sussex Bells & Belfries*.

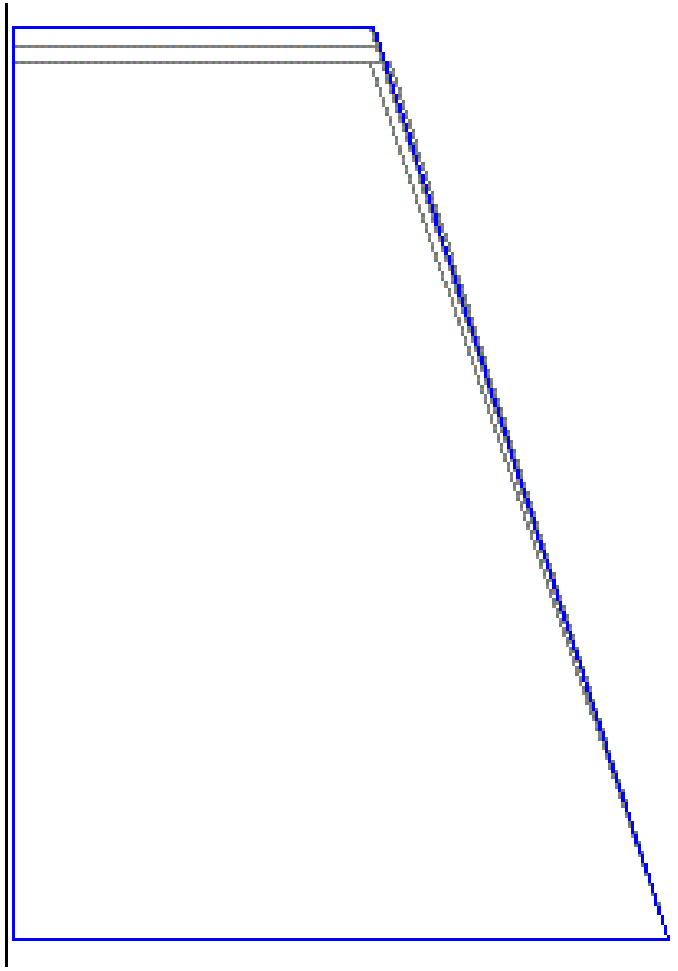


The variable point is the position of the shoulder of the bell.

The width at the base will be the same for all bells.

Bell Shape Analysis

- By superimposing these trapezoids we can compare groups of bells.
- The possibilities are:
  - Bigger bells are taller, or shorter
  - Bigger bells are wider, or narrower – or both
  - Bigger bells are exactly the same shape as smaller bells
  - A founder changed the design at some point
- Although Little Horwood's bells are by different founders, the profiles are fairly consistent.



Bell Shape Analysis

- Here I have removed the lines.
  - Bigger blobs are bigger bells.
- It looks like Anthony had two profile types
  - Although this might just be a gap in the data and this is just normal inconsistency
- Smaller bells look a little taller and very slightly wider.
- Little Horwood's bells are in the lower cluster and so are fairly typical Anthony Chandler examples.