

Tone Colour and Dynamics on the Recorder

An important aspect of my PhD research related to changes in tone colour and dynamic. For example, when the core fingering $\emptyset 123$ is altered by the addition of various right-hand fingers. The following diagrammes and charts highlight these changes. The figures for ‘Loudness in Sones’ and ‘Tone Colour Ratio’ were calculated by a method that I developed based on research into perception of loudness undertaken in the 1920s by Barkhausen (1881-1956), and Fletcher and Munson (1933), into the measurement of perceived equal loudness levels, and by Stevens in 1936 and 1955, into the perception of the loudness of sinusoidal tones relative to one another within a complex sound.

Figures 1a, and 1b, and 1c. The effect of different RH fingers to the core fingering $\emptyset 123$:

Figure 1a:
Fingering $\emptyset 12346$



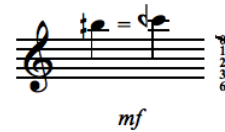
Loudness In Sones	Tone Colour Ratio (F/H)
25.56	2.57

Figure 1b:
Fingering $\emptyset 1235$

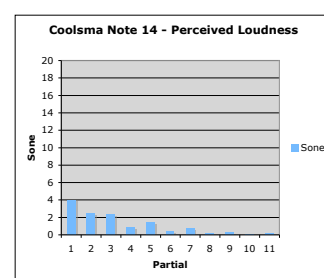
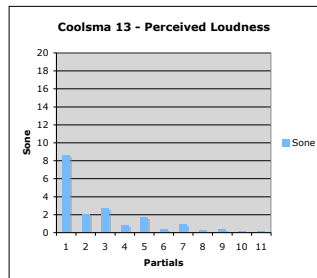
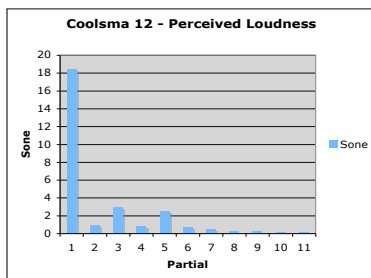


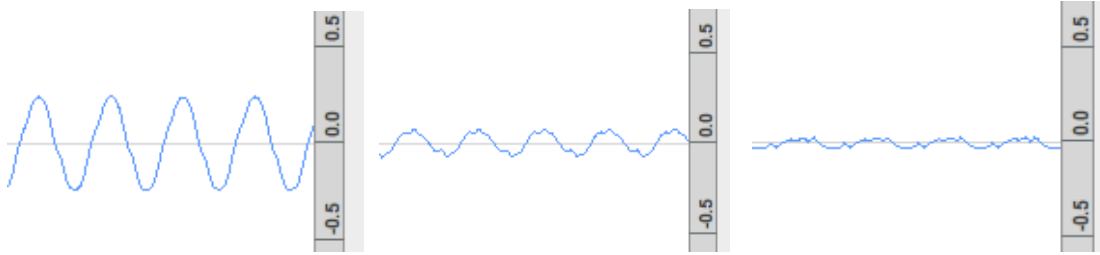
Loudness In Sones	Tone Colour Ratio(F/H)
16.60	1.08

Figure 1c:
Fingering $\emptyset 1236$



Loudness In Sones	Tone Colour Ratio (F/H)
11.80	0.51





From Figures 1a, 1b, and 1c, we clearly see the influence of different right-hand fingering patterns on the sound waves, which visually describe the different effects. Reading from left to right, the almost pure sine wave of the b-quarter-flat² indicates a sound dominated by the fundamental with little influence from the upper partials. The sound wave of the b \natural ² clearly shows the influence of the upper partials in a softer sound – both dynamically and tonally, which blends well with the diatonic notes either side of it. The sharply reduced amplitude of the sound wave of the b-quarter-sharp² is indicative of the reduced dynamic level, whilst the strong influence of the upper partials in the tone colour can be seen in the irregular shape of the wave. The tone colour ratios shown for each note highlight the tonal differences between them.