

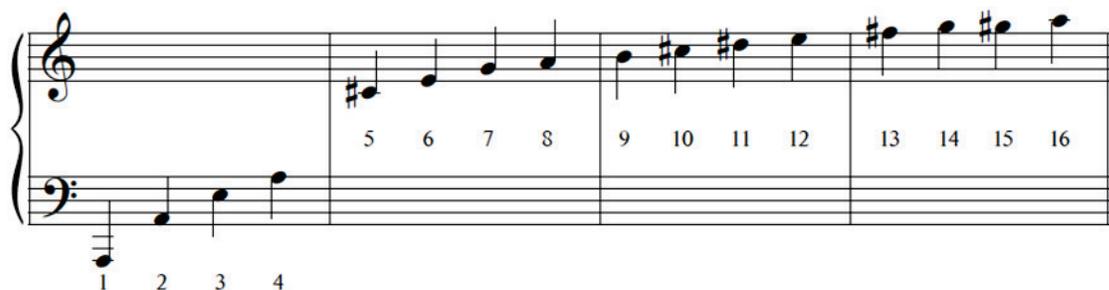
MUSIC THEORY.aargh@

The Overtone Series-3 (Session 18) “Overtones in Handbells”

By Dr. Ona Pinsonneault

The construction of musical instruments and the manner in which sound is generated on the instrument determines the overtones that will be audible on the instrument. Musical instruments that can create sustained pitched notes have overtones.

The construction of the handbell allows the clapper to strike the fundamental pitch (number 1 in the chart below). The next prominent pitch in the sound, an overtone, is the interval of the 12th, or the 3rd partial in the overtone series (pitches A² and E⁴ below or partial numbers 1 and 3.) Other odd-numbered partials (5, 7, 9, etc.) are also part of the timbre (tone color) of the handbell, but are almost inaudible. The handbell overtone is audible when the mouth of the bell is slightly dampened after striking the tone. The bells in the lower octaves have more audible overtones.



Overtones are part of every bell, but being able to demonstrate the sound of the overtone is diminished as one moves up the range of the handbell choir. Notice how quickly the overtones move up the staff. If the clapper strikes bell A⁴, the first overtone in the sound would be E⁶, and when striking A⁶ the first overtone in the sound would be E⁸. (The other factor to remember is that the sound of the bell is an octave higher than their notated pitch.)

Deborah Gill in her article “The Acoustics of Campaniforms” (published in *Overtones (Journal of the American Guild of English Handbell Ringers)* 22, no. 4 (July-August 1976): p. 4-7, states another interesting phenomena about the acoustics of English handbells. She says; “Experimenting with my own handbells I found that I could hear the strike tone very easily, and the twelfth by lightly damping the mouth of the bell. I also noted that the twelfth of one bell would excite the bell that is pitched one-twelfth above the first and vice versa causing sympathetic ringing.” This indicates that when A² is struck the 12th will sound (E⁴) but also the sound of E⁴ will excite A². If you experiment with this make certain that the bells in question are in an undamped position (upright, off the table). This will allow them to sound under “exciting” circumstances.

Until next time,

Dr. P

Ona.Pinsonneault@normandale.edu

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