

# The Art and Science of Change Ringing

Change ringing is many things: a physical exercise, a team sport, a musical concert, a mathematical discipline, and a social activity. Broadly, change ringing can be said to follow from two facts about bells. First, the larger a bell is, the richer it sounds. Second, a bell that swings full circle sounds louder than a bell that remains at rest.

## ***1. How do you ring large bells that swing?***

Change-ringing bells, made of bronze, can weigh more than a ton. Such large bells are often hung in a tower “belfry” in a “ring” of 8, 10, or 12 bells. Each bell is attached to a vertical wheel on which the bell can swing full circle. Around each wheel, there is a rope that runs down from the belfry into a “ringing room” below. There, a group or “band” of ringers stands in a circle, one ringer per rope. They ring the bells by pulling the ropes. The ropes and wheels permit ringers to control when the bells swing, and thus when the bells sound. This control is essential to ringing “changes.”

## ***2. What does it mean to ring “changes”?***

Large bells that swing are too unwieldy to play tunes. So instead, change ringers play cascading sequences of sound. The ringers ring each bell once, to create a row. Then the ringers ring a new row, but they ring the bells in a different order. And so on. Row follows row; and with each new row, the order of the bells changes.

The changes unfold according to dance-like patterns or “methods.” There are thousands of methods, but they share a few basic rules: (i) each bell sounds once per row; (ii) at a change, a bell can move only one “place” in the row; and (iii) no row is repeated. Using these rules, methods can extend to 200 rows or more. Eventually, a method ends and re-starts; but to avoid repetition, a variation is made. This is done by a “call” from a ringer who acts as the “conductor.” The rest of the band follows the call, which shifts the order of a few of the bells, so that the same method creates new permutations. Thus does change ringing seek to explore and awaken all of the music inherent in a ring of bells.

Using methods and calls, it is possible to ring without repetition for a long time. This is so because a ring of 12 bells has 12! (12 factorial, or 479,001,600) different rows. Even a ring of 8 bells has 40,320 possible rows; but to ring them all could take 24 hours. So a common stretch of ringing is a “quarter peal” of at least 1,250 changes, which takes about 45 minutes to ring. A full “peal” of at least 5,000 changes takes about 3 hours. Many ringers do not ring full peals at all; but a few people have rung thousands of them.

## ***3. Why does ringing have such appeal?***

Like jogging, ringing is a physical exercise. Just how strenuous ringing can be depends on how big the bell is, and how long it is rung. To ring a large bell takes energy. To ring any bell for three hours is a test of endurance, both physical and mental.

The chief musical challenge of change ringing is rhythmic, and is known as “good striking”: the art of placing a bell precisely in each new change, so that the method is followed and an even, steady rhythm is kept. (A video of superb striking is online at

<<http://www.youtube.com/watch?v=9uXKGW-KCBM>>.) But note that a tower bell sounds more than a second after a ringer begins to pull the rope. So ringers keep rhythm, watch other ropes in the circle as they are pulled, listen to the sound of the bells, and judge when to pull for the next change. Each change takes about two seconds, so these inputs have to be processed, and the judgment made, quickly and often. Focus is vital, and the result is close concentration that lasts many minutes—a true and natural high.

Because ringers ring better by watching each other, they do not use sheet music. Instead, ringers must learn their methods, no matter how many or how complex, by heart. In this way, ringing builds memory and mental agility, and it leads to lifelong learning.

Ringing also teaches lessons in leadership, followership, and group dynamics. Like dance or crew, change ringing involves a team moving together according to a plan. Unlike crew, ringers stand in a circle, and much nonverbal communication takes place. To confirm that they are ringing correctly, ringers will nod or smile at each other. But if a ringer gets off track, other ringers will give verbal advice. In fact, because an error can easily multiply, mutual support is the norm. A band of ringers can only succeed together.

Ringing creates community, so it is a highly social activity. After practice, a band often heads out to a local watering hole to share food and drink. Ringing also has a culture of hospitality. Because each ringer is a valued resource, visiting ringers are made welcome at almost any tower across the globe. Some ringers travel around the world, just to ring at different towers. This makes ringing an international fellowship.

#### ***4. Who rings bells in this challenging way?***

Ringers range in age from 9 to 90. Physically, all that a ringer needs is freedom of movement in two arms, along with some ability to hear. Other than that, it just takes willingness to learn and to practice. After practice, it helps to be fond of beer.

Ringers come from all walks of life. But aptitude for ringing may correlate with interest in math or science. Change ringing may also appeal strongly to people who work with code, such as lawyers and programmers; people who care about order and pattern, such as librarians and musicians; and people who think about structure, such as engineers and architects. In sum, if you enjoy the unity of logic and beauty, you will like ringing.

#### ***5. Where can I hear change ringing, or try it myself?***

Change ringing began, and change-ringing towers are easy to find, in England. All told, there are more than 5,000 change-ringing towers in Great Britain and in Ireland. There also are towers in South Africa, Zimbabwe, New Zealand, and Australia.

In the U.S. and Canada, there are about 45 change-ringing towers. These include Old North Church in Boston (where Paul Revere rang), Trinity Wall Street in New York, and the National Cathedral and the Old Post Office in Washington DC. Change-ringing bells have recently been installed in Seattle, Washington, and in Orleans, Massachusetts.

To locate a tower in the U.S. or Canada, and to find out its practice hours, go to [www.nagcr.org](http://www.nagcr.org). This is the website of the North American Guild of Change Ringers—a group of people who thrill to the challenges of ringing large bells that swing.