



ECHOES BY
 ASRAR CHOWDHURY

A HISTORY OF ACCURATE TIME KEEPING



From where are you reading today's 'Echoes'? You must be laughing. You take out your smart device. Connect to the web. Google Map or another app tells you, your exact location. This question seems like asking the obvious, but finding the location of an object with precision took centuries to reach the state where today we take it for granted.

People have had a sense of time centuries before clocks appeared, and before anybody knew that the earth rotates around the sun. This sense came from planetary motion. With the changing faces of the moon, came the notion of a (lunar) month. The movement of the sun during the day gave the concepts of AM, noon and PM.

If mid-day is the point of reference for timing, then mid-day depends on from where you observe the sun. In Chittagong, mid-day is five minutes before Dhaka because Chittagong is to the east of Dhaka. Once clocks appeared, people noted down their times according to their location. This meant Chittagong time and Dhaka time were different. That wouldn't have been a problem if people decided not to travel. Such was the situation in ancient and pre-historic times. People would never venture too far from where they lived. Things changed fast after the industrial revolution in Britain. From Britain we get the notion of unified or standard timing.

During the industrial revolution in Britain, the steam engine gave birth to the railway. It was possible to travel from London to Edinburgh within one day. The distance between London and Edinburgh

is 665 km. The sun reaches mid-day in London 12 minutes before it does in Edinburgh. Before the railways, towns fixed time according to their local mid-day. Each town had its own local time. Trains were travelling between cities faster than horse carriages. This created confusion and raised the possibility of collision. Train employees had to know when the London or Edinburgh train would reach Nottingham, a major junction, because tracks needed to be changed. Soon, the British agreed on one central time that was based on mid-day at the Greenwich observatory in London. Mid-day at Greenwich would be mid-day across the UK. This is how GMT came to be.

Accurate timing is needed in navigation. In 1656 a Dutchman, Christiaan Huygens, developed the first pendulum clock. By observing the angle of the sun, sailors at sea could calculate their latitude, the position in the north-south direction. But their longitude, the position in the east-west direction had to be guessed. A wrong guess would mean a ship landing miles away from its destination. With Huygen's clock, if you knew mid-day at say Greenwich or any other reference point, you could observe the sun and calculate the time difference and work out the distance. Unfortunately, Huygen's clock was losing up to 15 seconds a day. This was a problem when a ship was at high sea and away for weeks on end.

The problem was solved by an Englishman, John Harrison. Around 1728, he developed a clock that lost a maximum of 2 seconds a day. This discovery led to

what we now know as UTC (Universal Time Coordinated) that divides the world into different time-zones with Greenwich as the reference point. Bangladesh is thus 6 hours+ of GMT.

Today we don't need to measure the angle of the sun to know where we are. We have GPS (global positioning system). Our smartphones receive signals from satellites that calculate our location, speed and time. GPS has revolutionised sailing, aviation, trekking, and hiking. A plane always finds its destination just as our smartphones tell us where we are. However, to do that, the satellites need to agree on the time and timing of the signals they send. Fortunately, they do.

Nature usually always has the last say. No matter how good GPS has become, powered by atomic clocks, signals sent by satellites can be distorted through the atmosphere and miss the location by a metre. But then, the beauty of science lies in its self-correctness. There's always scope for further improvement. Our generation wonders at what you take for granted. You'll do the same when the next generation tells you "this is elementary, dear Watson".

Source: BBC World Service: 50 Things That Made the Modern Economy. Episode 16: The Clock. First Broadcast Feb 18, 2017.

Asrar Chowdhury teaches economic theory and game theory in the classroom. Outside he listens to music and BBC Radio; follows Test Cricket; and plays the flute. He can be reached at: asrar.chowdhury@facebook.com

