RESEARCH YOUR TOPIC SPEECH

To be delivered Wednesday, March 30, 2016

Little-Known Facts About the Gregorian Calendar

Mr./Madame Toastmaster, fellow Toastmasters, and esteemed guests:

Thirty days has September, April, June, and November. All the rest have thirty-one, except for February, which has twenty-eight and sometimes twenty-nine.

I'm sure all of you have heard this rhyme before. But have you ever wondered what's up with the whole February twenty-eight or twenty-nine thing? Or more generally, what gives rise to the dates listed in your almanac, like Easter Sunday? To get to the bottom of these things, we need to understand… (*pause*) …*the Gregorian calendar*. Specifically, today we are going to look at three questions:

1) Who was Greg and why did he care about a calendar?
2) How is the date of Easter calculated?
3) What day is it and how do we know?

Let's take it from the top. Greg, also known as Pope Gregory XIII, was the leader of the Catholic Church from 1572 until 1585. He was known for his simplicity, integrity, and brilliance. Now, being a wise leader, he listened to what the best scientists of the day, namely Aloysius Lilius and Christopher Clavius, were telling him about their work. Specifically, those astronomers realized that the length of a year was actually 365 days, 5 hours, and 49 minutes, rather than the 365 days and 6 hours that the current Julian calendar supposed. Those 11 minutes may not seem like much, but over the last few *centuries,* the alignment of the seasons to the months had slipped by about 11 days, which started to turn heads. Lilius and Clavius proposed some modifications to the Julian calendar that would correct this slippage, but they needed Greg's help to make it official. Now, it may not seem that a pope would care all that much about astronomy and calendars, but remember that Greg was both smart and agreeable, unlike his eventual successor Pope Urban VIII who put Galileo Galilei on trial in 1616 for his heliocentric universe theory.

Anyhow, Greg noticed that the date of Easter was now falling around March 10, whereas traditionally it had been closer to March 21. Since Easter is the most important event in the Christian calendar, it was in Greg's best interest to work with Lilius and Clavius to rethink how its date was calculated. The process of calculating Easter's date is actually not simple at all, and it is known as "Computus", which is Latin for "computation". In principle, Easter falls on the first Sunday following the first full moon that follows the northern spring equinox. The problem is, the equinox is actually fixed at March 21, and the full moon is determined by the lunar calendar rather than by astronomical observation. In particular, the lunar year is about 354 days long whereas the solar year consists of 365 days, which amounts to an 11-day difference. I'll spare you the tedious math (which was published in the journal Nature in 1876) for the precise calculation of Easter's date, save to

say that Lilius and Clavius recommended changes to the way that the lunar and solar calendars are synchronized and to the frequency of leap years. So Greg could sleep well at night knowing that Easter was happening when it should (late March or early April), and the scientists saved the day (or, perhaps it was the month or the year or the century?). The official switch from the Julain to the Gregorian calendar was made on Thursday October 4 1582, when the next day was taken to be not Friday October 5 but rather Friday October 15. Interestingly enough, the new calendar idea was met with disdain; for instance, the peasants were worried about being cheated out of a week and a half's worth of rent. Indeed, while Spain and Italy adopted the calendar immediately, England delayed until 1752 and Greece (true to their name) continued to let dates slip until it was the last European country to adopt the Gregorian calendar in 1923!

This bring up an interesting point regarding calendars, however, in that specifying the correct date and time is somewhat of an arbitrary process. Let's consider the case of February. In the old Roman calendar, February was the last month of the year. A Roman emperor named Numa Pompilius wanted to fit the 12 lunar cycles comprising 354 days into 12 months that each had an odd number of days (even numbers were considered bad luck), so he short-changed the last month (February) in order to make that happen. Even when the Julian calendar (from emperor Julius Caeser) reorganized the calendar to 365 days and December was reset to be the last month, February was still deprived and so it made the most sense to just tack leap year days onto it in order to keep time.

Well that was a bit of whirlwind tour, so let's summarize. Greg put together the Gregorian calendar with some scientists' help in order to make sure that Easter falls where it's meant to. The date of Easter is actually quite complicated to calculate because it depends on both lunar and solar information, but fortunately with Greg's modifications it at least stays in approximately the right location. And finally, dates and times are in some ways just arbitrary, which is why the Romans thought it was alright to give February the shaft and then astronomers figured they could push and pull it as needed to make the math work out well. So, four years on the 29th day of the second month, pat yourself on the back for understanding just a few little-known facts about the Gregorian calendar.

Mr./Madame Toastmaster.