

Millennium turning

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Millennium—1000 thousand years! Humans conceive most easily of a lifetime, in years, decades, perhaps a century. Since a millennium covers many lifetimes, many generations, and the rise and fall of nations, it stretches our sense of time and assumes a human significance far beyond its physical and temporal significance. A millennium is indeed a time span of myths and legends.

An estimated 300 million humans were alive in the year 0, and surely none of those realized the significance that the year would have to future generations—the reckoning of the beginning of the first millennium A.D. or C.E. (or whatever is “politically correct” at the moment); 1000 years later, as the calendar changed from 999 A.D. to 1000 A.D., the population was still approximately 300 million. At the 1000 A.D. millennium turning, however, some were aware of the significance—the passage of 1000 years of human history. As the calendar changed from 1999 A.D. to 2000 A.D., six billion humans witnessed the second to third millennium turning, and a significant percentage had some comprehension of the significance. But what is the significance? Is it a true significance of substance, space and time, or is it a significance of expectations and self-perceptions? How many generations of humans have lived and died without witnessing a millennium turning? Were their lives different in any substantive way from those generations alive at the years 0, 1000, and 2000?

We experience time as the day and night cycle, the lunar cycle, and the seasonal or solar cycle, seemingly ad infinitum. There is generally nothing remarkable to distinguish the successive cycles. Humans also experience time as part of the aging process; the arrow of time always points the same direction. We grow older, unfortunately never younger. We have developed clocks and calendars to measure the cycles, and ascribe significance to the passage of time as measured by our clocks and calendars. However, both our clocks and our calendars are arbitrary in duration and beginning. When the minute turns, when the hour turns, when the century turns, and when the millennium turns, does anything really change? We truly know that nothing changes from one second to the next in the broad perspective, but our perceptions and expectations can change significantly. And actions resulting from changing perceptions and expectations do produce substantive changes.

For example, consider the expectations and perceptions of birthdays. We aren’t really different from the instant before our birth date commemoration to the instant after our birth date; however, mentally and emotionally our worldview can be dramatically different, and our legal status can be markedly different. Who would maintain that we are physically any different after the 1-s time span from 17.99999997 to 18.00000000 years of age? But legally and emotionally that one second makes a world of difference—we are suddenly reckoned as adults (for example, in the United States we are able to vote) and we begin to think of ourselves in a totally different way. When we turn 55 (or 50 or 62 depending on the setting), we suddenly find ourselves eligible for senior citizen discounts,

viewed as a blessing by some and a tremendous blow to the ego or self-image by others. Thus, birthdays can have profound effects on our psyche.

Anticipation of a millennium turning evokes radical actions by many who are susceptible to charismatic influences, mystical interpretations of significance, and apocalyptic expectations. Although there is debate about the extent of the apocalyptic expectations prior to 1000 A.D., there is certainly no debate about the apocalyptic furor prior to 2000 A.D. The last half of the 20th century saw an almost exponential increase in doom and gloom predictions of the “end times,” “antichrists” in abundance, the coming of “THE Millennium,” and forecasts of “raptures.” Apocalyptic televangelists and writers, even those claiming fiction based on truth, became millionaires. There were many end-time dates set leading up to 2000 A.D. and, of course, the grand date of the millennium turning itself. When the millennium turning came and went as any other year, the prognosticators suddenly realized their great error and pronounced loudly that it was really the turning of 2000 to 2001 A.D. that was the true date of the end! The prophets of doom and gloom now expectantly scan the horizon for new events to seize as evidence for the imminent “end of days.”

On a more positive note, anticipation of and expectations for a century or millennium turning leads to a flurry of scientific and technological activity and a flowering of art and literature that can result in profound innovations and paradigm changes in the early years of a new century or early centuries of a new millennium. Looking retrospectively at the early years of the 20th century, we see a flowering of science and technology perhaps greater than anything in human history in a similar period of time. In a short paper in *THE LEADING EDGE* in 2002 (“Flights of fantasy: a triumph of ingenuity, persistence, and the scientific method”), I discussed the marvelous achievement of the Wright brothers in making the first powered human flight in 1903. Then in December 2003, I gathered with 115 000 other folks over a six-day period to celebrate the Centennial of Flight at Kitty Hawk, North Carolina, USA. In 2005, we celebrate the World Year of Physics, commemorating the centennial of Albert Einstein’s “*annus mirabilis*.” The early years of the 20th century were truly remarkable, but the “flashes of insight” and technological breakthroughs were the result of systematic developments on many fronts during the latter half of the 19th century. It will likely only be in retrospect, decades from now, that the true significance of the early years of the 21st century and the third millennium A.D. will be realized in terms of culture, science, and technology.

A decade, century, or millennium turning has profound influence on our concept and perception of the contemporary. After a turning, we view fads, fashion, and technology of the periods just prior to the turning through a very nearsighted frame of reference. A humorous example of this nearsightedness happened to me recently. In 2002, I submitted a paper that was mainly based on work from the late 1990s to a geophysics journal. During the review process, a reviewer commented, “Are there really no references to work more recent than 1999?” Wow! Good thing I didn’t wait until 2003 to sub-

mit the paper. In the geophysics profession, what will be the perception of the early years of the 21st century to students decades from now? And what were the major advances during SEG's first 75 years that made the advances possible? Many aspects of science and technology that we truly take for granted are barely a decade old—e.g., readily available GPS navigation and positioning, geophysical systems with integrated GPS positioning, digital instruments controlled by laptop and palm computers with attendant data storage capability, readily available digital geophysical systems with “measure while moving” capability, casual use and acceptance of 4D/3-C terminology and concepts, digital (online) publishing, and many other items that would be at the top of many lists. If you are thinking that any of the items in this list and similar technological innovations are “old hat, I’ve been using that or doing it since the 1980s,” you’ve proved the point. In a slightly broader perspective, the 75 years since the founding of SEG

have been truly remarkable in terms of the technological advancements and in terms of the contributions of geophysics to the affairs of mankind (with help from the title of SEG's 2001 book *Geophysics in the Affairs of Mankind: A Personalized History of Exploration Geophysics* by L.C. Lawyer, Charles C. Bates, and Robert B. Rice).

I wrote the first few words of this short paper in 1999, planning to submit it for publication in the year 2000. I came across the file recently and decided a short commentary on the significance of epochal dates in history and in our lives would be appropriate during this society's 75th Anniversary celebration. SEG is essentially the “personification” of a profession that is still less than a century old but which has already had a profound effect on the “lifestyle” of the world and whose importance is likely to increase during its next 75 years.

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