

The Unknown Origin of Counting 1

It's unlikely that we will ever know where, when, or how we humans first developed the actual process of counting. We have probably always had some number sense, or at least some way of recognizing more and less when objects were added to or taken from a small group. It's likely that prehistoric humans employed the principle of one-to-one correspondence in their earliest counting methods. For example, to keep a count of sheep, shepherds may have put pebbles into one-to-one correspondence with each member of their flocks.

Any pebbles used for record keeping are lost to us now, but there is speculation that certain twentieth-century archaeological finds represent some of the earliest records of counting. The notches on a 25,000-year-old fossilized bone found in Zaire may have represented phases of the moon, and a centuries-old wolf bone discovered in Eastern Europe contains notches that may have been marks used to tally. Carved in two series—twenty-five in the first, thirty in the second—the notches on the wolf bone are arranged in groups of five, the way we still tally today.

Aside from tally marks, the earliest written evidence of counting comes from ancient Mesopotamian cuneiform, Egyptian hieroglyphics, and Chinese ideograms. The modern decimal system much of the world uses today derives from the early Egyptian and Chinese number systems, which were based on 10. In turn, these systems probably derived from the fact that humans have ten fingers with which to count. By contrast, Babylonia's number system was based on 60, possibly because the number 60 is evenly divisible by many smaller integers. This system is still used all over the world in units of angle measurement and time.

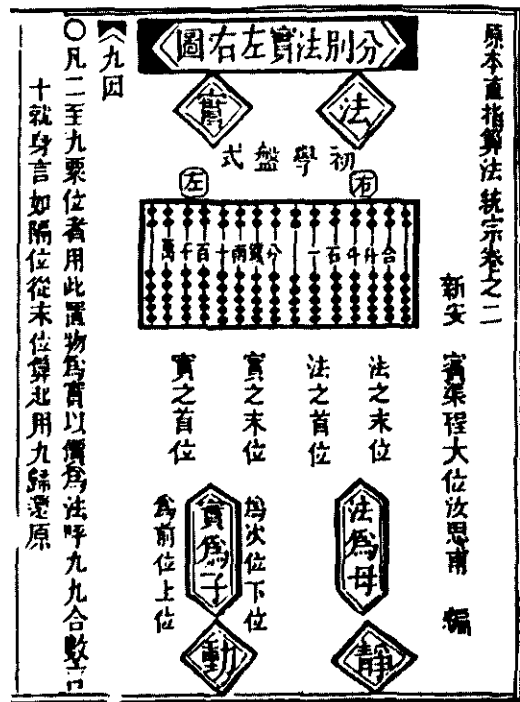
How did early humans deal with *large* number concepts? The oldest tangible evidence we have showing that early societies were familiar with large numbers dates back to 3500 B.C. An Egyptian royal mace records the capture of 120,000 human prisoners, 400,000 oxen, and 1,422,000 goats. These massive numbers suggest that royal tally keepers had methods to count or to estimate large collections of items, such as counting objects in a sample and multiplying by a guessed number of samples.

There is little doubt that numbers and number concepts were important and useful in early societies. However, we don't know whether early humans asked themselves what a number is or speculated how numbers came into being. This will probably forever remain a mystery.

For more on counting and number systems, see vignettes 21, 32, 59, 83, and 84. ★



Egyptian hieroglyphics shown on the funeral papyrus of Queen Makara.

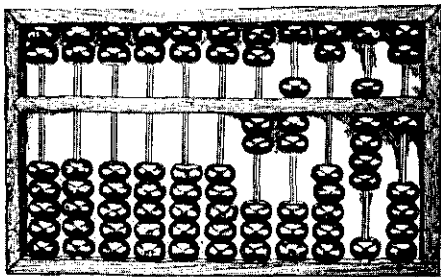


Sixteenth-century illustration of an abacus.

Activities

1. Demonstrate how early people may have used the concept of one-to-one correspondence to account for their possessions. How do you think they counted large quantities of possessions, such as a herd of cattle?
2. Some early societies expressed numbers with various positions of the fingers and the hands. Research how "finger numbers" were represented and how people used them to perform simple computations.
3. Comment on the quote by **James Boswell** (1740–1795) given below.

Sir, allow me to ask you one question. If the church should say to you, "Two and three make ten," what would you do? "Sir," said he, "I would believe in it, and I would count like this: one, two, three, four, ten." I was now fully satisfied.



4. The earliest known computing device is the abacus, which is still used in much of Asia. There are many types of abaci, one of which is shown at left. Demonstrate how to perform computations with an abacus.

Related Reading

Bell, E.T. *The Last Problem*. Washington, DC: Mathematical Association of America, 1990.

———. *The Magic of Numbers*. New York: McGraw-Hill, 1946.

Eves, Howard. *An Introduction to the History of Mathematics*. New York: Holt, Rinehart and Winston, 1990.

Friberg, J. "Numbers and Measures in the Earliest Written Records." *Scientific American* (Feb 1984) 78–85.

Joseph, George G. *The Crest of the Peacock: Non-European Roots of Mathematics*. New York: Penguin Books, 1991.

Ore, Oystein. *Number Theory and Its History*. Mineola, NY: Dover, 1988.

Pappas, Theoni. *The Joy of Mathematics*. San Carlos, CA: Wide World/Tetra, 1989.

Room, Adrian. *The Guinness Book of Numbers*. Middlesex, England: Guinness Publishing, 1989.

Struik, Dirk J. *A Concise History of Mathematics*. Mineola, NY: Dover, 1987.

Zaslavsky, Claudia. *Africa Counts: Number and Pattern in African Culture*. New York: Lawrence Hill Books, 1979.