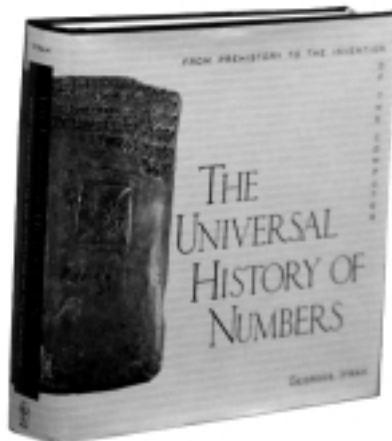


The Universal History of Numbers

Numbers are so elemental that it seems inconceivable we could have lived without them, yet numbers are only an abstract idea that gradually dawned on humans. The evolution of numbers as they inhabited cultures, then faded, and erupted again, diversifying in hundreds of filigreed variations, is really a history of thinking itself. Beginning with numbers—even more than letters—we began living in our heads. Thousands of years later a restless man sets out to answer an almost childlike question: where did numbers come from? In his pursuit—becoming a world expert along the way—he uncovers this exponentially complex, infinitely fascinating, and forever enlightening history. This is the ultimate archive about the culture of numbers. No other source knows as much about numberhood.

—KK

The Universal History of Numbers
From Prehistory to the Invention of the Computer
 Georges Ifrah
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 \$40
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solitude in the face of life and death, of the specificity of their species as distinct from other living beings, of the singularity of their selves as distinct from others, or of the difference of their sex as distinct from that of their partners.

PALMYRENEAN AND HEBREW LETTERS	ARABIC LETTERS	TALSMERI ALPHABET	PALMYRENEAN AND HEBREW LETTERS	ARABIC LETTERS	TALSMERI ALPHABET
א	א	א	א	א	א
ב	ב	ב	ב	ב	ב
ג	ג	ג	ג	ג	ג
ד	ד	ד	ד	ד	ד
ה	ה	ה	ה	ה	ה
ו	ו	ו	ו	ו	ו
ז	ז	ז	ז	ז	ז
ח	ח	ח	ח	ח	ח
ט	ט	ט	ט	ט	ט
י	י	י	י	י	י
כ	כ	כ	כ	כ	כ
ל	ל	ל	ל	ל	ל
מ	מ	מ	מ	מ	מ
נ	נ	נ	נ	נ	נ
ס	ס	ס	ס	ס	ס
ע	ע	ע	ע	ע	ע
פ	פ	פ	פ	פ	פ
צ	צ	צ	צ	צ	צ
ק	ק	ק	ק	ק	ק
ר	ר	ר	ר	ר	ר
ש	ש	ש	ש	ש	ש
ת	ת	ת	ת	ת	ת

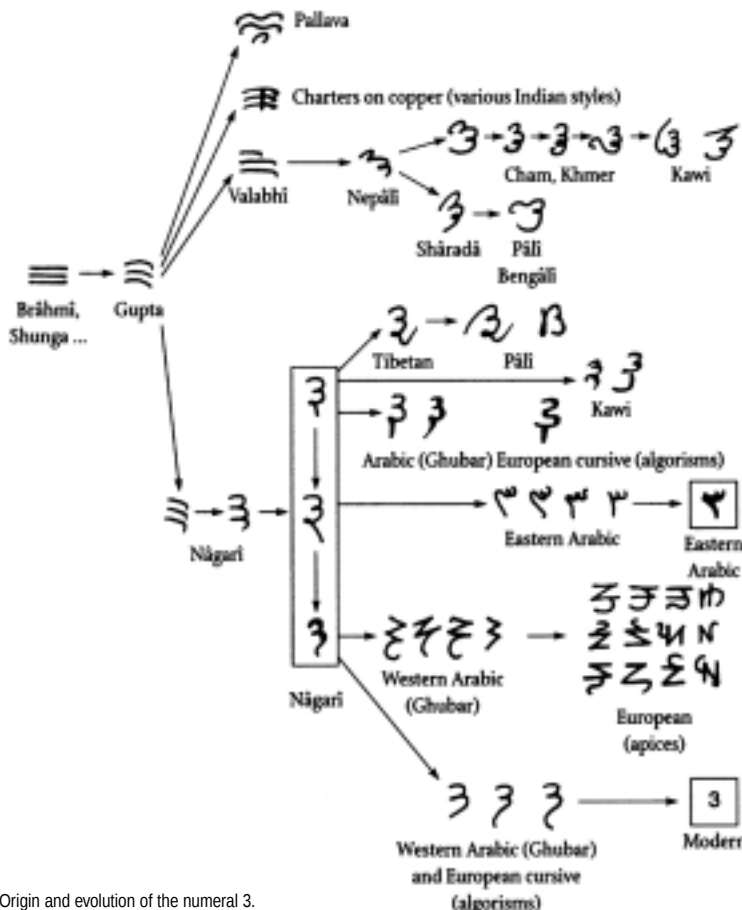
Secret alphabet (still used in Turkey, Egypt, and Syria in the nineteenth century) compared with the Arabic, Palmyrenean, and Hebrew alphabets.

Most peoples throughout history failed to discover the rule of position, which was discovered in fact only four times in the history of the world. (The rule of position is the principle of a numbering system in which a 9, let's say, has a different magnitude depending on whether it comes in first, second, third... position in a numerical expression.) The first discovery of this essential tool of mathematics was made in Babylon in the second millennium BCE. It was then rediscovered by Chinese arithmeticians at around the start of the Common Era. In the third to fifth centuries CE, Mayan astronomers reinvented it, and in the fifth century CE it was rediscovered for the last time, in India.

Obviously, no civilization outside of these four ever felt the need to invent zero; but as soon as the rule of position became the basis for a numbering system, a zero was needed. All the same, only three of the four (the Babylonians, the Mayans, and the Indians) managed to develop this final abstraction of number; the Chinese only acquired it through Indian influences. However, the Babylonian and Mayan zeros were not conceived of as numbers, and only the Indian zero had roughly the same potential as the one we use nowadays. That is because it is indeed the Indian zero, transmitted to us through the Arabs together with the number-symbols that we call Arabic numerals and which are in reality Indian numerals, with their appearance altered somewhat by time, use and travel.

If you wanted to schematise the history of numbering systems, you could say that it fills the space between One and Zero, the two concepts which have become the symbols of modern technological society.

Nowadays we step with careless ease from Zero to One, so confident are we, thanks to computer scientists and our mathematical masters, that the Void always comes before the Unit. We never stop to think for a moment that in terms of time it is a huge step from the invention of the number "one", the first of all numbers even in the chronological sense, to the invention of the number "zero", the last major invention in the story of numbers. For in fact the whole history of humanity is spread out backwards between the time when it was realised that the void was "nothing" and the time when the sense of "oneness" first arose, as humans became aware of their individual



Origin and evolution of the numeral 3.