

Perspectives – A Brief Comparative History



Tokens from Tepe Gawra, present day Iraq, ca. 4000 BC. . cone, sphere, and flat disk are three measures of cereals: small, larger, largest. tetrahedron is a unit of work (one man/one day?).

Used in measuring inventories of commodities and other goods. Courtesy the University Museum, the University of Pennsylvania, Philadelphia.

IONIA, perhaps the oldest coins in the world, date back to 650 – 600 BCE and were found in modern-day Turkey. Composed of “electrum”, a naturally occurring alloy of gold and silver found in streams and riverbeds.

Bitcoin (BTC or XBT; ₿) is a [protocol](#) implementing a public, permanent, and decentralized, public distributed digital [ledger](#), verified by network [nodes](#) through [cryptography](#). The currency began use in 2009, when its implementation was released as [open-source software](#). The word “bitcoin” is a [compound](#) of the words [bit](#) and [coin](#). The [environmental effects of bitcoin](#) are substantial. Its [proof-of-work](#) algorithm for [bitcoin mining](#) is designed to be computationally difficult, which requires the consumption of increasing quantities of electricity, the generation of which has contributed to carbon dioxide emission.

Tokens pictured above were in use approximately 6,000 years ago. These tokens’ geometric shapes include quadrangles, triangles, paraboloids, ovals and biconoids, but also naturalistic forms such as vessels, tools and animals. These tokens were characteristically covered with lines or dots conferring qualitative information. Triangles, paraboloids, and mostly disks occurred in series bearing various sets of lines. Plain and complex tokens were found by the dozen or the hundreds in Near Eastern archaeological sites from Palestine to Anatolia and from Syria to Persia.

Tokens historically provided insight into counting¹, economy², administration³, cognition⁴ and writing⁵, playing a major role in development of counting, data processing and communication. Plain tokens are not unique to the ancient Near East and other parts of the world⁶, however complex tokens appear unique to the Near East. *Tokens became a standard for counting, administration, and required human innovation and acceptance.*

IONIA represent the earliest coins, suggesting a change in manner of recognition and transfer of economic value. They also represent use of a natural alloy of gold and silver, “electrum”, processed into a circular shape⁷, as a medium of exchange. Electrum⁸ occurs naturally. *Humans added additional metals to enhance this alloy. Similar to Tokens as a standard of measure, in discovering and shaping Electrum, Humans created a medium of exchange value standard.*

BitCoin represents a non-physical, digital form of medium of exchange, created by humans, requiring substantial electricity to produce and continuously maintain, being subject to a variety of risk exposures, lacking comparative long-term persistence.

¹ Tokens shed light on the beginning of counting. First, tokens were used in one-to-one correspondence: three jars of oil were shown by three ovoid tokens, a simple way of reckoning. Second, each commodity was counted with a specific type of tokens, i.e. jars of oil could only be counted with ovoid tokens, denotes “concrete counting”, characterized by different numerations or sequences of number words to count different categories of items.

² Tokens were linked to the economy, as their invention corresponds to the beginning of agriculture. The counters served exclusively to keep track of commodities. The plain tokens stood for farm products: small and large cones, spheres and flat disks stood for different measures of barley; ovoids for jars of oil; cylinders and lenticular disks represented numbers of domesticated animals and tetrahedrons for units of labor. The proliferation of token shapes and markings reflected the multiplication of commodities manufactured in urban workshops. Triangular shapes stood for ingots of metal; series of disks bearing on their face various numbers of parallel lines stood for various qualities of textiles and paraboloids for garments. Quantities of beer, oil, honey were shown by tokens in the shape of their usual containers. There appears to be no evidence that tokens were used for trade. Instead, they were central to administration.

³ Mastery of counting and accounting with tokens fostered an elite based on administrative skills, who controlled redistribution of economy. The main function of tokens was to track household and workshop contributions of surplus goods to communal wealth and their redistribution for support of underprivileged or organization of religious festivals. The bullae and envelopes with their multiple office seals illustrate toughening of city state administrations, when unpaid contributions were recorded until their settlement.

⁴ Counting with tokens reflected the level of cognition of preliterate oral cultures. [Malafouris] Data processing with tokens was tactile. Counters were meant to be grasped and manipulated with the fingers. Addition, subtraction, multiplication and division of quantities of commodities were done by moving or removing counters by hand. Tokens processed data concretely. Items counted consisted exclusively of goods, such as barley, animals and oil. Plurality was treated concretely, in one-to-one correspondence and with concrete numerations.

⁵ Tokens represent the first stage in the 9000-year continuous Near Eastern tradition of data processing. They led to writing. The change in communication that occurred on envelopes when the three-dimensional tokens were replaced by their two-dimensional impressions is considered the beginning of writing.

⁶ Identical artifacts have been excavated in Central Asia at Jeitun, in Western China at Shuangdun and the Indus Valley at Mehrgarh. Similar clay counters in the same shapes and sizes are also reported in Europe [Budja], Africa and Mesoamerica.

⁷ In 2016, archeologists discovered a small golden bead while digging in an ancient village, **Pazardzhik** in central **Bulgaria**. Approximately 6,500 years old, this bead is the oldest processed gold artifact produced by humans, some 4,000 years older than the oldest coin, thus humans had many millennia of metallurgical knowledge to guide their hands.

⁸ Electrum alloys with a high iron content are likely natural, while those with high proportions of lead and copper are mostly man-made. Copper was added to harden and redden the electrum, and lead was a by-product of silver refining. Iron, along with other trace elements, like bismuth, mercury, and tellurium, are naturally occurring in electrum.