Tokens in China, Europe and Africa – The significance

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Over the last decades, excavators in various parts of the world, in particular China, Europe and Africa, have reported finding clay tokens similar to the Near Eastern counters, forerunners of the cuneiform script. In this paper I will argue that the ubiquity of geometric counters for counting in one-to-one correspondence highlights 1) a fundamental aptitude of the human mind; 2) the unique contribution of the Mesopotamian Uruk state administration that developed the system into writing.

Keywords: *Tokens, Counters, Uruk, Shuangdun Culture, Teotihuaca*

This paper deals with the fact that tokens, familiar in the prehistoric Near East (Schmandt-Besserat 1992, 2009, 2010), are also recovered in excavations in China, Europe and Africa and most recently in Mesoamerica (Manzanilla 2009:30 figure 2.8). Tokens were small clay artifacts in geometric shapes that were used as counters to keep track of goods before writing. I list below a selection of sites that yield tokens outside the Near East and consider what can be learned from the new data on the universality of the art of counting with geometric counters.

China

Tokens were recovered in recent Chinese excavations in the presentday Anhui province of the People's Republic. The artifacts belong to the Neolithic Shuangdun Culture that flourished about 5500 BC. The types

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most frequently used were cones, spheres and disks (Kan et al. 2008 v. 2, 130:1-12, 133:1-4, 132:1-12). Further Neolithic Chinese sites yielding tokens are Qianshan Xuejiagang, also in the Anhui province, Lintong Jiangzhai in the Shanxi province, and Tianmen Dengjiawan in the Hubei province (Yan & Park 2006).[1]

Europe

In Eastern Europe, assemblages of Neolithic tokens from Slovenia have been the subject of a careful study by Michael Budja (1998). Further west, tokens dated to early fourth millennium BC in the shapes of cones and spheres were identified in Italy at Capo Alfiere, Calabria (Morter 1994). Still further evidence from Vivara, Italy, in the first half of the second millennium is especially interesting because of a particular way to create subtypes by dividing disks into halves and quarters.

Africa

Tokens are present in Egypt, but rare (Schmandt-Besserat 1978). As was customary for the early Egyptian excavation reports, only the stone specimens were published at Abydos, namely 49 spheres (Emery 1954). Further south, in Khartoum, in the Sudan, A. J. Arkell (1949:79*ff*) reported two types of Neolithic tokens: spheres and disks with a number of subtypes bearing markings. Ten of the 26 spheres reported display deep grooves.

Disks feature incised lines on their face or around the edge. Jebel Moya, also in the Sudan (Addison 1949:214, 227, 241, 242 and vol. 2 plates CV:11-13, CXIV:6-11), yielded small cones and disks with various markings, as well as disks, parabollae and long shapes cut from potsherds dated from the Meroitic period at the end of the 1st millennium BC.

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Mesoamerica

The Teotihuacan collection consists of small cones and cylinders modeled by hand (Manzanilla 2009:30 figure 2.8), and 550 disks made from potsherds or mica. The disks were either whole, or cut into halves, quarters or thirds. Further substantial tokens assemblages were excavated at Teopancazco, where 12% of the 530 disks were cut in halves, and at Xalasco, where 42% of the 303 disks were cut into quarters. The date of these tokens is 1-500 AD when Teotihuacan was a vast multiethnic metropolis in Central Mexico.

The Three Token Groups

The presence of tokens in Shuangdun, western China, is not so surprising because, as shown in Jeitun (Masson & Sarianidi 1972:35) and Anau (Pumpelly 1908:167-168 figures 395, 396; Schmandt-Besserate 1992 vol. 2:28-31), Central Asia produced in the 7th Milennium BC sizeable assemblages of tokens including cones, spheres, discs, and biconoids. The Shuangdun tokens can therefore be considered as the extension of the Central Asian prehistoric accounting system, which itself was indebted to Mesopotamia or Persia. If, as is the present consensus, agriculture was brought to Europe from the Near East, it is plausible to consider that the practice of counting with tokens traveled from East to West as part and parcel of the Neolithic tool kit (During 2010). Finally, it is more difficult, but still conceivable to argue, that the idea of clay counters was passed on from the Levant to Egypt and from there to Khartoum in the Sudan. In this perspective, the ancient Near East, including Syria, Anatolia, Mesopotamia and Persia, may be considered as the core region that initiated a system of counting and accounting with tokens, while China and Europe were peripheral, with Egypt and Central Africa more tenuously so. Of course, neither the much later Meroitic tokens of Jebel Moya nor those of second millennium Vivara or of distant Teotihuacan can in any way be related to the core region or its periphery. They have, therefore, to be considered as a third group that I will refer to as “distant.”

Similarities

The Chinese, European, and African tokens from Khartoum share material, forms and size with their Near Eastern prototypes. Most importantly, they were based on the same symbolism, and served a similar economic function.

It is not surprising that clay was the material chosen the world over to manufacture counters because, thanks to its remarkable quality of plasticity, it can easily be modeled, with the bare hand, in an infinite number of discreet shapes that are easy to recognize, identify, remember, and replicate. Cones, spheres, and disks are the most ubiquitous shapes showing a shared predilection for geometric shapes. In China and Europe the tokens are plain, i.e. mainly devoid of markings, which make them

unequivocally similar to the Neolithic and Chalcolithic Near Eastern assemblages of 7500 -3500 BC, with the only difference that several forms such as cylinders, tetrahedrons and ovoids seem absent in the periphery. From the origin, the Near Eastern tokens served to keep track of amounts of goods in the early agricultural communities. For instance, the earliest examples of 7500 BC were recovered in level III of the site of Mureybet in Syria, which marked the transition to agriculture. Tokens occur in the sixth millennium BC in China and in the fifth and fourth millennium in Europe and Africa, where they also coincided with the beginning of agriculture. The need for counting and record keeping therefore may be attributed to farming, and in particular to the economy of redistribution typical of the early agricultural settlements.

It is important to understand that counting - the ability to determine the number of items in a collection – changed the economy. Counting and counters gave power to impose contributions and enforce their delivery. In other words, they gave control over the production and exchange of real goods. As I have discussed elsewhere (Schmandt-Besserat 2001), it is likely that the Near Eastern prehistoric tokens served for the administration of goods collected from communities on the occasion of seasonal festivals. The created surplus of staple goods, such as grain and animal on the hoof, was the fulcrum of the redistribution economy and tokens played a key role in its administration.

It is remarkable that, within and without the Near East, the tokens

were based on the same fundamental principle. Namely, the counters stood for real goods and by doing so abstracted commodities from reality. The heaviest and bulkiest loads of grain, or the most unruly animals, could easily be counted with the miniature counters. Moreover, the tokens made it possible to count goods, whether in the field or harvested, whether stored or promised. Collectively, the Neolithic communities of the core and periphery solved the same concern by the same symbolic means.

It is even more intriguing that geometric shapes were always selected to symbolize the merchandise. To each token shape was assigned a discreet meaning: in the Near East, a cone was a small measure of grain, and a sphere stood for a large measure of grain. In fact, it is likely that, when there was borrowing, the tokens were adopted wholesale, keeping the same meaning attached to the same form. The similarity in the use of symbolism and the overall propensity for geometric shapes may point to a common human innate cognitive capacity.

It is also significant that, wherever they were adopted, the tokens were based on a same archaic technique of counting. As it is well documented by the numbers of counters held in the Near Eastern envelopes, the tokens were used in one-to-one correspondence. Six small measures of grain were shown with six cones, and ten small measures of grain with ten cones. Furthermore, tokens in multiple shapes are characteristic of a method of counting referred to as concrete counting. Concrete counting is characterized by using special number words, or special counters, to compute each particular category of items. For instance, small measures of grain could only be counted with cones and vice versa spheres could only be used to tally large measures of grain. Accordingly, the ubiquity of tokens demonstrates that concrete counting was the norm in many cultures. In other words, numeracy seems to have evolved similarly in many parts of the world, with a stage of archaic counting, such as concrete counting, preceding the acquisition of abstract numbers.

The tokens from the Near East and the peripheral regions have an

unmistakable family resemblance in material, manufacture and size. They were used consistently for the same purpose, which is to be expected since they stem from the same origin. In comparison the distant group has a distinctly different feel. These tokens are larger, bulkier, and less carefully manufactured. The repertory of shapes is limited to cones, cylinders and mostly disks except at Jebel Moya where the collection has a rich number

of original shapes never seen elsewhere. Both Vivara and Teotohuacan (of course independently) create disk subtypes by cutting them in halves, thirds, quarters, which never happens in the core and periphery. Finally, some of the Teotihuacan tokens are cut in mica.

Surprisingly the tokens from the third, distant group, share some of the main features of the original Near Eastern tokens. All were mostly made of clay; they symbolized units of goods with geometric shape (Linda Manzanilla interprets the disks and their various subtypes as different quantities of tortillas); they served for concrete counting and accounting in one-to-one correspondence. The fact that many cultures, far or near, and in diverse time periods could readily borrow from one another, or invent independently, a similar system of counters of geometric shapes to refer to specific quantities of merchandise may point to a commonality of cognitive aptitudes in the preliterate world.

Differences

The Near Eastern token assemblages distinguish themselves from all the others by being larger, and most importantly, by evolving from plain to complex forms. Where the excavators were vigilant, tokens were recovered by the hundreds in Mesopotamia and Persia. For instance, the site of Jarmo, Iraq, produced 1153 spheres, 206 disks and 106 cones. In comparison, the tokens in the distant group collections are also quite numerous, but those of the periphery are fewer.

The most significant difference between the tokens within and without the Near East is the fact that the former evolved, but the Chinese, European, African and Mesoamerican tokens did not. In Mesopotamia, after a period of about four thousand years when tokens showed little or no change, abruptly about 3300BC, the assemblage of the city of Uruk became very complex. It featured some seven additional types of tokens, among which such new forms as triangles, quadrangles and parabollae, but also some more naturalistic shapes such as miniature heads of animals, vessels and tools. These main types were further differentiated into some 300 subtypes by the addition of lines or dots. The phenomenon of complex tokens extended beyond the metropolis to all the cities under Uruk's sway. Namely, the exact same types and subtypes of complex tokens have been

recovered in Tello in Iraq; Susa and Chogha Mish in Iran and; Habuba Kabira and Jebel Aruda in Syria. No such complex assemblage is known outside the Uruk realm.

The multiplication of token shapes occurred simultaneously with the rise of the Uruk city state, which implies that the state administration was strengthened in order to control the production and movement of a larger variety of goods with greater specificity. This further underscores that, in the Near East, the need for counting and accounting went hand in hand with the growth of formal leadership.

Tokens and Writing

The evolution from plain to complex tokens in Uruk is important because it started the series of events that led to the invention of writing. First,

the Uruk accountants invented envelopes in the shape of hollow clay balls to hold together tokens representing debts. The second step was to mark on the outside of the envelopes the shape of the tokens held inside. This was done by impressing the tokens in the soft clay of the surface of the envelope. These impressions indicated the types of the tokens held inside the envelopes, while their number was shown in one-to-one correspondence. The hollow envelopes holding tokens did not have a long duration, but the markings made by impressing tokens on their face survived. With a third invention, they were imprinted on solid lumps of clay – tablets. In time the impressed markings were complemented by more legible signs, still in the form of tokens, but traced with a stylus. Fourth, the final momentous invention was to confer a phonetic value to signs. The phonograms were no longer in the shape of tokens. The new signs were incised sketches of things easy to draw that stood for the sound of the word they evoked. The drawing of a man stood for the sound "*lu*" and that of the mouth for "*ka*," that were the sounds of the words for "man" and "mouth" in the Sumerian language. The phonograms were invented for composing individuals' names. These were written like a rebus, for example, the modern name "Lucas," could have been written with the two signs mentioned above "lu - ka." These archaic tablets are considered the origin of the cuneiform script.

Like the phenomenon of complex tokens, the metamorphosis of tokens

into impressed markings, and the change from envelopes to tablets, occurred only in sites yielding a typical Uruk administrative assemblage that included special cylinder seals picturing the Uruk high priest, referred to as *En*, typical pottery bowls and jars, and a monumental architecture decorated with cone mosaics. The invention of writing can undoubtedly be attributed to the Uruk administration and probably to a single accountant, whose name has forever disappeared from human memory.

Things happened differently in China where forty five round clay envelopes, 4-6 cm in diameter, holding from one to seven small clay spheres inside were excavated at the site of Anhui Qianshan Xuejiagang and 60 more at Lintong Jiangzhai, in the Shanxi province (Yan & Park 2006). The excavators report that many of the envelopes are marked with small holes and linear impressions but do not specify whether the number of markings is related to the number of spheres inside. The resemblance of these artifacts with those from the Near East is remarkable, but the fact that the objects were found in graves, suggests a function different from those of Uruk. The Chinese envelopes with or without markings eventually disappeared without ever leading to any further development. In particular, the shapes and patterns of the large collection of pottery markings, for which the Neolithic Shuangdun culture is famous, show no likeness with the form of the contemporaneous tokens or their markings (Kan et al. 2008). Furthermore, since the pottery markings of Shuangdun are not considered to be a script, the Chinese tokens can in no way be regarded as an antecedent of writing in China. The hollow clay envelopes used to hold tokens, that led to a dead end in China, but sparked off writing at Uruk, may be the best illustration of the serendipity that presided over the invention of writing.

Uruk invented writing and, by doing so, smote the first breach into the prehistoric Near Eastern token system. The new technology was in total contrast to the simple geometric counters. The token system had spread so swiftly and easily from culture to culture that in 7500 BC they were used in Tell Mureybet in Syria, as well as at Tepe Asiab in Persia, at the other end

of the Fertile Crescent, The same clay counters remained for millennia a common feature in villages and towns of the entire Near East and beyond. In fact the 1500 BC Nuzi envelope filled with counters is prime evidence that, in the Near East, tokens served the illiterate long into historical times. Instead, writing proved hard to learn because it required a special eye-hand

coordination to trace the signs; the two-dimensional script, which could not be manipulated by hand, was far more abstract and thus more difficult to use. Consequently, for several centuries writing remained confined to the administration of the Uruk city state, where only a score of Mesopotamian accountants could master it. Once writing became phonetic it became language and culture specific. Whereas tokens had united a vast number of cultures, writing became a great divide.

Conclusion

The tokens were counters. They were tools of the mind, and as such, can shed light on the cognitive skills of preliterate humans (Malafouris 2010). The similarity of all the known assemblages of tokens of several continents and throughout time suggests that the simple system of counters matched some fundamental aptitudes of the human mind. Among the common diagnostic traits features the predilection for small three dimensional artifacts that can be manipulated with the fingers; the propensity to select geometric shapes to facilitate memory; the method of one-to-one correspondence to perform additions and subtractions; finally, concrete counting, which allows one to count one item at a time. Today's abacus, the ultimate heir of the tokens, which still helps children all over the world to master the art of counting, testifies that the tokens tapped into some fundamental universal cognitive predispositions of the human mind.

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