TOKENS:
FACTS AND INTERPRETATION

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The first part of the article summarizes some of the major pieces of evidence concerning the archaeological clay tokens and in particular the technique for their manufacture, their geographic distribution, chronology, and the context in which they are found. The second part is devoted to the interpretation of tokens as the first example of visible language and, in particular, as an antecedent of Sumerian writing.

This paper deals with tokens recovered in archaeological sites of the ancient Middle East.[1] The first part summarizes the factual evidence available on the artifacts. The second part discusses what can be extrapolated from these facts for reconstructing what the tokens stood for and their significance. The interpretation focuses, in particular, on the way the objects were manufactured, their function as a counting device, the mode of reckoning they illustrate, and finally, the socio-political role they play in pre- and protoliterate communities. In the conclusion it will be proposed that tokens led ultimately to writing as a consequence of interrelated economic, social, and conceptual changes.

I. THE FACTS

The factual evidence on tokens includes their physical aspect, geographic distribution, number and findspots at given sites. Gathering this data involved visiting all possible collections of tokens in major museums of North America, Europe and the Middle East where they have been stored since excavation, counting the number of specimens, making a sketch of their shape and eventual markings, measuring their size and making note of all particular features. In the best instances, tokens identified by a field or museum number could be traced to the corresponding entry in field notes, excavation catalogue or site report in order to identify the level and location where they were found in excavation.

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1 The Physical Evidence

Tokens are small artifacts modelled into standard forms either geometric or naturalistic. The shapes are as follows: spheres, disks, cones, tetrahedrons, biconoids, ovoids, cylinders, triangles, paraboloids, rectangles, cubes, rhomboids and hyperboloids (Figure 1). Others are miniature representations of tools, containers, pieces of furniture, fruit, animals and parts thereof. Tokens can be classified according to types and subtypes. The types refer to the shapes as described above whereas the subtypes refer to the intentional variations of size within the types or the addition of markings. Spheres, cones and tetrahedrons, for example, occur consistently in two sizes. Spheres also occur as fractions such as hemispheres and ¾ spheres. The markings consist of incised lines, notches, punches, pinched appendices or appliqué pellets. These are applied clearly on the face of tokens but with no particular concern for composition or esthetics. The lines and punctuations are displayed on a single face of the disks, triangles, paraboloids and other flat tokens, but cover the entire surface of spheres, ovoids, cones and other globular forms (Figure 2). The practice of applying markings on tokens is attested in the earliest assemblages of the VIIIth millennium B.C.[2] Tokens bearing markings remain rare, however, during the entire duration of the system, except between 3400-3100 B.C., when they become widely used at selected sites such as Uruk and Tello in Mesopotamia: Susa and Chogha Mish in Iran; and Habuba Kabira and Tell Kannas in Syria.[3] These assemblages of tokens characterized by a proliferation of markings are referred to as "complex tokens". Some complex tokens are also perforated. In the case of Uruk, for instance, 35.4% of the collection of 647 tokens bear markings and 15.6% are perforated.[4] The various assemblages of complex tokens are strikingly similar. They share, in particular, a same fine clay of buff-pink color and the markings they bear are identical in pattern and manufacture.

related economic, social and conceptual changes

The size of tokens ranges, usually, between 1-3 cm across, with some examples measuring between 3-5 cm and rare specimens being less than 1 cm. There are sites, like Tepe Asiab, where tokens are consistently smaller than usual, with series of spheres, measuring less than 1 cm. On the other hand, sites like Tepe Yahya produced tokens larger than the norm.

The choice of material used to manufacture tokens is limited to four. As a rule, tokens are made of fine untempered clay. There are also examples made of stone, bitumen or plaster. The stone specimens are found, mostly, in north Mesopotamia and those of bitumen, which are exceedingly rare, seem restricted to the Susiana plain of Western Iran. There are occasional tokens made of plaster, for example, at Suberde in Turkey.

There can be great differences in the care given to the manufacture of tokens even among specimens from a same assemblage. Most clay tokens are modelled into a well defined shape with precise and crisp edges but others are sloppily done. The stone tokens which required far greater skill to manufacture and a time consuming polishing process usually show excellent craftmanship.

The color of clay tokens varies from buff to black with grey, red and pink specimens. Tokens of the neolithic period often show a black core whereas complex tokens of the IVth millennium B.C. are buff-pink throughout their thickness. Stone tokens are often made of colorful stones such as pink, green or black marble or white alabaster.

Differential Thermal Analysis (DTA) and electron microscopy have determined that tokens of various periods and various sites such as Tepe Asiab about 7800 B.C., Tepe Sarab, ca. 6500 B.C. and Susa, ca. 3300 B.C. were consistently fired at a low temperature never exceeding 700° C.[5]

FIGURE 1: TOKENS FROM SEH GABI, IRAN.
COURTESY OF ROYAL ONTARIO MUSEUM, TORONTO, CANADA.

2. Geographic Distribution and Number

Tokens have been excavated in a large geographic area of the Middle East. The largest concentration of sites yielding tokens is in Iraq and Iran with respectively 45 and 42 sites. Among the Iraqi sites feature Uruk, Ur and Tello in the south and Tepe Gawra, Arpachiyah, Tell-es-Sawwan, Yarim Tepe, Jarmo, M'lefaat and Maghzaliyah in the north. The major Iranian sites with tokens are Susa, Chogha Mish, Chaga Sefid, Jeitun, Zagheh, Hajji Firuz, Tepe Sarab, Tepe Asiab and Ganj Dareh Tepe. Furthermore, tokens have been recovered in 15 sites in Syria, 9 in Israel, 5 in Turkey and 1 in Saudi Arabia. Among them, Habuba Kabira, Tell Kannas, Tell Ramad, Tell Aswad, Ghoraife and Mureybet have produced the most representative token assemblages of Syria: Jericho, Munhata, Beidha and Ain Ghazal in Palestine; Gritille, Can Hasan, Suberde, Cayönü Tepesi and Beldibi in Turkey. Dharan is the only site yielding tokens identified in Saudi Arabia.

The number of tokens varies greatly at each site. For example, there are about 2000 tokens from Jarmo in Iraq, ca. 6500 B.C.,[6] whereas, a single token (namely a paraboloid) is known at the site of Ubaid.[5] Uruk and Susa in the IVth millennium B.C. have each produced about 700 tokens.

3. Chronology

Stratigraphic excavation and Carbon[14] provide a chronological framework for the study of the token system.[8] The earliest counters appear in sites which cluster around 8000-7500 B.C. such as Ganj Dareh, level E, (GAK 807 : 8450±150 B.C.); Tepe Asiab (unique level, UCLA B and C : 7900-7700 B.C.); Tell Mureybet, level III (P. 1220 : 8000±100 B.C.) and; Tell Aswad, level I, (Gif-2633: 7790±120 B.C.). Tokens continue to be used in sites of the VIIIth- IIIrd millennium B.C. such as Ali Kosh (Shell 1246 : 6450±200); Jarmo
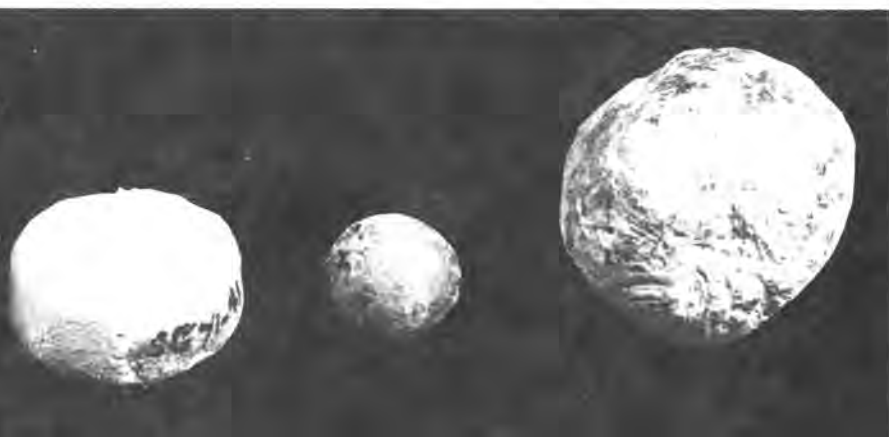
(UCLA-1714 E: 6030±140); Tell Ramad II and III (GRN 4822 :
5950±50, GRN 4823 : 5930±55); Tell es-Sawwan I (P-855 : 5506±73);
Arpachiyah (P-548 : 5077±83); Hajji Firuz (P-502 : 4945±83); Chogha
Mami (BM-483 : 4896±182); Tall-i-Bakun (P-438 : 4220±83); Zagheh
(TUNC 11 : 4133±84); Farukhabad (M-2152 : 3210-3310 B.C.); [9] Susa
(SPr1 : 3143±104).[10]

Complex tokens occur in level VI of the sanctuary of Eanna at Uruk
and disappear in level III. At Susa they are present in levels 18-17
but no longer in level 16. Unfortunately, none of these levels at the
two sites are dated by Carbon[14]. Instead the stages of their occupa-
tion are estimated, conventionally, according to the relative chronol-
ogy established for the sanctuary of Eanna at Uruk. The period of
Uruk VI to the end of Uruk IV is estimated to about 3350-3100
B.C.[11]

4. The Context

Controlled excavations in several sites provide information on the
context in which tokens were found. At Tell Mureybet the first to-
kens appear in level III, in a layer characterized by a quantum jump
in the quantity of cereal pollen.[12] No tokens are reported, on the
other hand, in the earlier levels, Mureybet I and II, which yield
remains of wild grains. The majority of tokens at Hajji Firuz origi-
nated in a small structure showing no evidence for any domestic
activity.[13] On the other hand, tokens were rare in the houses where
cooking and flint chipping were taking place. At Uruk 95% of the
tokens belonged to the sanctuary of Eanna, 2.2% to the area of the
Anu Ziggurat and 2.8% to the city private quarters. In the Eanna
precinct the tokens were recovered among trash deposited in vacant
lots in antiquity. They were sometimes found in groups of 50 to
several hundred mixed with other discarded materials such as

FIGURE 2: TOKENS FROM SUSA, IRAN.
COURTESY OF MUSEE DU LOUVRE, DEPARTEMENT DES ANTIQUITES ORIENTALES.

broken jar sealings and tablets; pottery vessels, such as bevelled rim bowls; and clay cones used for decoration of monumental architecture.[14] Only once was a group of tokens recovered on the floor of a structure. These 75 tokens were mixed with the ashes of a hearth in a typical Eanna building with a facade decorated by recesses and indentations.[15] In Susa, Habuba Kabira and Chogha Mish, complex tokens belonged to assemblages featuring seals, sealings, tablets, bevelled rim bowls, and clay cone mosaics identical to those of Uruk.[16]

Three northern Mesopotamian sites provide the evidence of tokens deposited in burials. Tell-es-Sawwan I and II, in the VIth millennium B.C. produced burials, among which were those of infants, that included stone spheres.[17] In the Vth millennium B.C. one clay sphere is reported in a grave at Arpachiyah.[18] Tepe Gawra in IVth millennium B.C. is the third assemblage yielding tokens among funerary deposits. It was by no means a common practice at the site, and only one out of 306 simple graves and four out of 80 richly furnished tombs were found to include tokens. The grave which contained 34 cones was that of an adult male whose legs had been amputated.[19] A child was buried in the earliest of these tombs, dated to a level XIA[20] whereas the three others, tomb 102, 107 and 110 which belonged to level X, about 3200 B.C., were those of adult males. The first, tomb 102, included rich furnishings among which were one macehead, two obsidian vessels, beads, 23 stone spheres and 3 cones.[21] Tomb 110 was a double burial furnished with 6 gold rosettes, some decorated with turquoise; 2 gold studs, gold and stone beads, 1 seal of lapis lazuli, 2 mace heads, 2 serpentine beakers, 1 ivory comb and 6 stone spheres.[22] Lastly, No. 107 was that of a man prestigious enough to have a shrine built upon his tomb. In fact, he was the only individual so honored. His only funerary gift consisted of 6 stone spheres.[23] It is well understood that the burial had not been robbed and was intact at the time of excavation.

5. Tokens Enclosed in Envelopes

The ten following sites have produced tokens stored in envelopes: Shah Dad,[24] Tepe Yahya,[25] Chogha Mish,[26] Susa,[27] Farukhabad,[28] in Iran; Uruk[29] and Nuzi[30] in Iraq; Habuba Kabira[31] in Syria; Dharan in Saudi Arabia and Dumah in Israel.[32] The envelopes are made of clay and consist of hollow spherical or ovoid balls measuring about 5-9 cm in diameter (Figure 3). A total of 14 envelopes have been opened either intentionally or accidentally producing a total of 120 tokens. The number of tokens contained in each envelope varies from 2 to 52. The following types of tokens were found stored in envelopes: spheres, disks, cones, tetrahedrons, ovoids, triangles, paraboloids, rectangles, containers and miscellaneous. Some cones, tetrahedrons, ovoids and containers bear incised and punched markings showing that plain tokens as well as complex tokens were held in envelopes. For example, in Habuba Kabira one of the envelopes yielded as many as 8 incised ovoids.

Most envelopes bear the imprints of one or several seals covering their entire surface. Sixteen envelopes also bear markings which, except on two occasions, repeat the number and shapes of tokens held inside (Figure 4). Some of these markings were made, obviously, by impressing the tokens upon the surface. This is the case of Habuba Kabira where the ovoids fit exactly in the negative imprints shown on the surface of the envelope. A Susa envelope is unique in showing a discrepency between markings and the tokens contained. It shows 3 circular markings but, apparently, held only 2 spheres.[33] Another envelope from Susa shows the right number of tokens but the markings impressed have little to do with the shape of the counters. In this case 1 large sphere, 6 spheres and a disk are shown with a circle, 6 vertical lines and a miniscule triangular impression.[34]

Like the tokens found loose, the envelopes are rarely found *in situ*. At Uruk 25 specimens were stuck in a cavity of the wall surrounding the Stone Cone Temple. At Susa a number of envelopes were scattered on a large area of a room. One specimen was held in a small jar together with a spindle whorl, a flint blade, a shell and pierced roun-

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The envelopes are made of clay and consist of hollow spherical or ovoid balls about 5-9 cm in diameter.

dels. These envelopes from Susa belonged to level 18-17 of Chantier Acropole I which are dated to about 3300-3200 B.C.

A similar artifact, referred to as an "egg-shaped tablet", is reported at Nuzi, Iraq (Figure 5). The specimen dates to about 1500 B.C. and is, therefore, far later than the protoliterate envelopes. The Nuzi envelope was made of clay, bore seal impressions, and was inscribed with the following text in cuneiform script:[35]
"counters (referring to sheep and goats):
21 ewes that have given birth
6 female lambs
8 full grown rams
4 male lambs
6 she-goats that have given birth
1 he-goat
2 female kids
seal of Ziqarru (the shepherd)."

The Nuzi envelope was found complete and produced 48 counters when it was broken open. Unfortunately, the shape of the counters is not known since they were lost without being properly reported.

FIGURE 3: ENVELOPE FROM SUSA, IRAN, WITH ITS CONTENT OF FIVE SPHERES.
COURTESY OF MUSEE DE LOUVRE, DEPARTEMENT DES ANTIQUITES ORIENTALES.
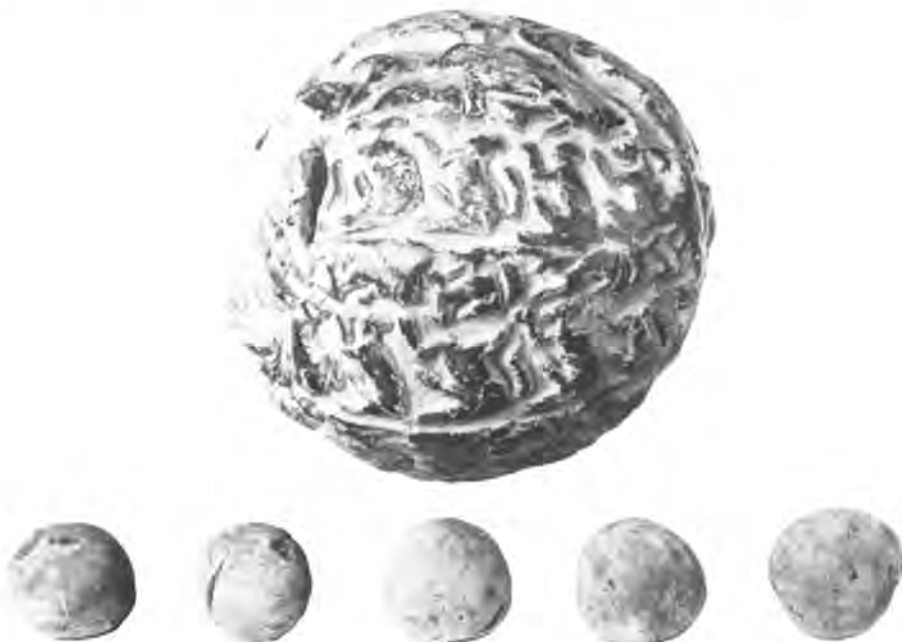
II. INTERPRETATION

A number of logical inferences can be drawn from the facts summarized above concerning the manufacture, function and significance of the tokens. These interpretations, in turn, give new insights into the technology, economy, cognitive skills and social organization of the cultures that used the artifacts.

1. The Manufacture

The fact that tokens exhibit variations in size and form indicates that they were not produced in molds but handmade. Consequently, it can be assumed that each token was separately modelled by pinching a small lump of clay between the fingers and that markings were added, individually, with a pointed instrument or stylus. Furthermore, the striking resemblance between the various assemblages of complex tokens from distant sites such as Uruk, Susa and Habuba Kabira suggests that in the IVth millennium B.C. tokens may have been mass produced in central workshops.
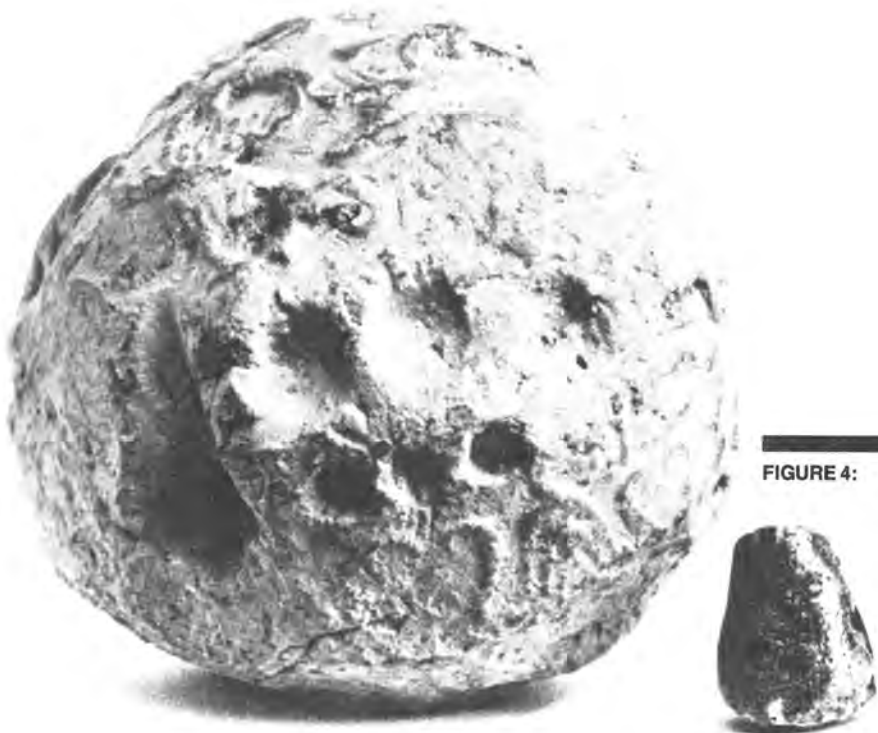

FIGURE 4:

The various tests, such as DTA and electron microscopy establish that tokens were among the earliest clay artifacts to be subjected to firing — if not the earliest. It is probable that, during the Neolithic period, tokens were baked in an open fire. This is suggested by the low temperature of combustion and the black core showing an incomplete firing. Moreover, the range of colors represented among the tokens probably derived from the position the artifacts occupied in the hearth during the firing process. The black and grey specimens can be explained by the reducing atmosphere prevalent in the center of an open fire, whereas the red and buff specimens could result from the oxidizing atmosphere of the periphery. The tokens of the IVth millennium B.C., on the other hand, which were buff-pink throughout their thickness, were baked, possibly, in an oven where temperature and ventilation were fully controlled.

2. A system

The fact that groups of different types of tokens are found together, recurrently, either in hoards, such as those of Uruk, or enclosed in envelopes, indicate that all the tokens, including plain and complex specimens, belonged to a single system. Furthermore, because tokens of the same type, manufactured in the same way in similar sizes and bearing identical markings, are recovered, without any discontinuity, in most archaeological sites of the Middle East, there can be no doubt that the token system was widely used in the region during five millennia.

Concerning the size of token assemblages, it is interesting to note that Uruk and Susa, the main centers of Mesopotamia and Elam in the IVth millennium B.C., produced an almost identical number of tokens amounting to some 700 specimens. Otherwise, the number of tokens at each site is not always meaningful because it depends on such variables as the volume of dirt examined, the methods of excavation and luck. On the one hand, the fact that Jarmo produced 2000 tokens demonstrates that the artifacts could be plentiful in a typical

ENVELOPE FROM SUSA, IRAN, SHOWING MARKINGS CORRESPONDING TO THE TOKENS ENCLOSED. MUSEE DU LOUVRE, DEPARTEMENT DES ANTIQUITES ORIENTALES.

Neolithic village. On the other hand, the single paraboloid described at the site of Ubaid should not be interpreted as indicating that Ubaid used only one type of token. It merely acknowledges that only one token has been found, identified or reported upon at Ubaid. In fact, this particular specimen was included and illustrated in the report not because it was identified as a counter but only because it was misinterpreted as the part of a monumental sculpture, namely, the tongue of a lion.

3. The Evolution

According to Carbon[14], or relative chronology in the case of the protoliterate period, the token system remained in use from about 8000 B.C. to 3100 B.C., after which it becomes rare. The some 5000 years of existence of the token system can be divided into three major phases as follows:

1. 8000-3400 B.C. The assemblages of tokens consist primarily of spheres, disks, cones, tetrahedrons and cylinders (Figure 1) with rare triangles, rectangles, hyperboloids, vessels and animal heads. Most tokens are plain faced with only few examples bearing incised or punched markings.

2. 3400-3100 B.C. Complex tokens occur in level VI of Eanna at Uruk (Figure 2). The number of token types increases by the addition of biconoids, bent coils, rhomboids, tools and fruit; triangles, rectangles, containers and animal heads become frequent. The number of subtypes also multiplies by the addition of numerous patterns of incised lines, different numbers of notches, punch marks, pinched or appliqué features. A sizeable number of complex tokens are perforated. There is a dichotomy between sites which yield complex tokens and those that do not partake in this phenomenon such as Tepe Gawra in north Mesopotamia.

3. After 3100 B.C. complex tokens disappear. All assemblages revert to plain tokens bearing no markings. They are often limited to a few shapes, mostly spheres and disks.

4. An Accounting Device

The Nuzi envelope is the Rosetta Stone which revealed the function of tokens (Figure 5). The 48 artifacts it contained corresponded, visibly, to the 48 animals listed in cuneiform script on its face. It could be inferred, therefore, as A. Leo Oppenheim suggested, that the Nuzi envelope was an accounting device using two different methods to refer to the same 48 animals: cuneiform writing and counters.[36]
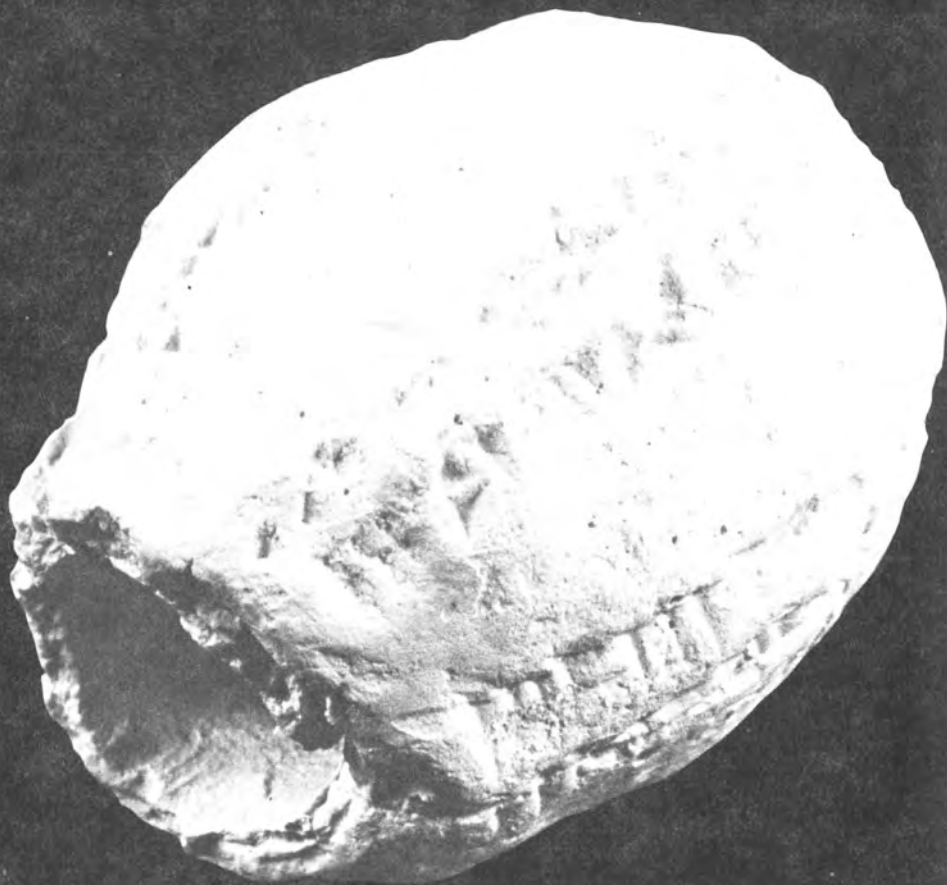
FIGURE 5: ENVELOPE FROM NUZI, IRAQ. COURTESY E. LACHEMAN

The Nuzi envelope is the Rosetta Stone which revealed the function of tokens.

Pierre Amiet saw a parallel between the protoliterate envelopes of
Susa and that of Nuzi and, in particular, between the objects they
contained.[37] The comparison was daring because, not only are the
Susa envelopes 2000 years earlier, but there is no known example of
any comparable device holding tokens during the 2000 years separat-
ing the artifacts. Despite the puzzling gap in the evidence, it is
reasonable to argue that the two kinds of envelopes are similar in
many ways. Both are made of clay, contain small artifacts, are im-
pressed with seals and, most importantly, sometimes bear inscrip-
tions. The markings on the protoliterate envelopes are not cuneiform
signs for the good reason that the cuneiform script was not developed
at that early date. The protoliterate markings, on the one hand,
replicated the shape and number of the tokens enclosed: and, on the
other hand, were identical to signs impressed on the first Sumerian
tablets (Figure 6) — the earliest ancestors of cuneiform writing.
Evidently, the protoliterate envelopes, like the Nuzi example, ex-
pressed the same information in two different ways: tokens and im-
pressed signs. Consequently, the protoliterate envelopes, like that of
Nuzi, can be considered to be accounting devices holding counters.

FIGURE 6: IMPRESSED TABLET FROM SUSA, IRAN.
COURTESY MUSEE DU LOUVRE, DEPARTEMENTS DES ANTIQUITES ORIENTALES.

5. The Precursor of Writing

Two pieces of evidence support the argument that tokens are the precursor of writing: chronology and the similarities between tokens and the first signs of writing. Assyriologists have established that the evolution of the cuneiform script, written on clay tablets, can be divided into three main phases:

1. IIIrd millennium B.C.: archaic script
2. 2900-3100 B.C.: pictography (Figure 7).
3. ca. 3100-3150 B.C.: impressed signs (Figure 6).

A still earlier stage can now be added:

4. ca. 3200 B.C. impressed signs on envelopes holding tokens (Figure 4).

Carbon[14] dates available for Mureybet III, Tepe Asiab, Hajji Firuz, Arpachiyah, Seh Gabi, etc. . . . and the relative chronology of Uruk, indicate that the token system evolved as follows:

1. 8000-3100 B.C. Token assemblages include many shapes (Figures 1 and 2).
2. ca. 3400-3200 B.C. Groups of tokens are enclosed in envelopes (Figure 3).
3. 3100-3000 B.C. The token system dwindles.

In this perspective, the envelopes emerge as a link between tokens and writing, establishing a continuity between the two systems. Accordingly, the evolution of record keeping in the ancient Middle East can be summarized as follows:

1. 8000-3200 B.C. Accounting is performed with tokens.
2. 3200-3000 B.C. The token system and writing overlap.
3. 3100-3000 B.C. The advent of pictography which marks the true take off of writing coincides with the decline of the token system.

It should be emphasized here that the steps that led from tokens to writing cannot be precisely dated. There is no Carbon[14] date available, in particular, for the chronology of envelopes, marked envelopes and the first tablets bearing impressed signs. The artifacts are presently dated only according to the relative chronology of Uruk. This is due to the fact that the events leading from tokens to scripts occurred in rapid succession between 3400-3150 B.C. making it difficult to pinpoint exactly each stage of the sequence.

The problem is aggravated by the fact that envelopes are not found in a stratigraphic context but among trash accumulated at unknown times in antiquity. Even the envelopes of Susa recovered on the floor of buildings cannot be considered *in situ*. The artifacts were discarded, probably, by the occupants of the buildings seemingly because they were not worth saving when the rooms had to be cleared

for repairs or rebuilding. The fact that we are dealing with trash is shown by the pattern of distribution of the artifacts on the floors. They were not clustered together along a wall as is the case of archives found *in situ*. Instead they were scattered randomly on large surfaces of the rooms. This also explains the heterogeneous nature of some groups of artifacts such as, for example, the jar holding one envelope together with a spindle whorl, a flint blade, a shell and pierced stone roundels.

The envelopes are also the crucial link between the shape of tokens and that of the first signs of writing. The method of storing tokens in clay envelopes where they were no longer visible, made it necessary to indicate the token contents on the surface. Consequently, the marks shown on the face of the envelopes duplicate, unambiguously, the shape of the tokens enclosed. In fact, at Habuba Kabira, the marks consisted visibly of the negative impression of the incised ovoids the envelope contained. The complete metamorphosis of tokens into graphic signs was realized on the so-called "impressed tablets" (Figure 6) when the token images were separated, definitively, from the actual tokens. Finally, when pictography was introduced the most refined incised signs featured also token prototypes, either plain or with markings. Writing thus perpetuated the repertory of symbols used for millennia for accounting with tokens.

6. Symbols for Economic Units

Sumerian pictographs are held to be the key to cracking the code of the token system. This hypothesis is founded on the fact that signs may change form without altering their meaning. Most letters of our latin script, for example, have preserved the value they had in the former Greek and Phoenician alphabets of 2500 and 3500 years ago. Egyptian and Chinese writing systems are other notorious examples of the preservation of symbols through the ages. Egyptian signs, for instance, can be identified at various stages of their 4000 years evolution in demotic, hieratic and hieroglypic scripts and, in some cases, with pre-dynastic prototypes as three dimensional amulets.[38]

FIGURE 7:
PICTOGRAPHIC TABLETS FROM URUK, IRAQ.
COURTESY VORDERASIATISCHES MUSEUM,
STAATLICHES MUSEEN ZU BERLIN.

Some cuneiform signs evolved from three dimensional artifacts. The sign for "sheep" for example, can be followed backwards in time through its 3000 year evolution, starting with the Assyrian cuneiform of 500 B.C. to the Sumerian pictograph of 3000 B.C. (Figure 7). In turn, because the Sumerian pictograph is the exact rendition of a token — namely a disc with an incised cross (Figure 2, top right) — it seems logical to assume that the disc with an incised cross also stood for "sheep".

The symbols for *ban* and *bariga* (two measures of grain) probably equivalent to our "peck" and "bushel" may have a record longevity of about 8000 years. These signs can be traced without discontinuity in the following stages of their evolution:

1. I-IIIrd millennium B.C.: cuneiform sign
2. III- late IVth millennium B.C.: impressed sign (Figure 6)
3. ca. 3200 B.C.: impressed sign on envelope (Figure 5), cones and spheres in envelopes (Figure 4)
4. 3200-8000 B.C.: cones and spheres (Figure 1)

Unfortunately, most pictographs are presently undeciphered; so, consequently, the meaning of most tokens remains enigmatic.

It is noteworthy that all the tokens identified so far stand for units of merchandise,[39] leading to the conclusion that during its entire existence the token system was an accounting system restricted to keeping track of goods. Furthermore, the plain tokens typical of the neolithic and chalcolithic assemblages, such as spheres, cones, cylinders and lenticular disks, can be matched to the symbols of staples, such as measures of grain and number of animals. On the other hand, the complex tokens familiar in the large centers of the IVth millennium B.C. are parallel to series of signs standing for manufactured goods. Among them feature, for instance, products such as bread, oil, perfume, wool, various types of cloth and garments, rope mats, pieces of furniture, tools and a variety of stone and pottery vessels. It thus appears that mostly staples were accounted for during the Neolithic and Chalcolithic periods. On the other hand, the quantum jump in the token types and subtypes which occurred in large cities

The advent of pictography ₁3100-3000 B.C.₁ which marks the true take off of writing coincides with the decline of the token system.

such as Uruk and Susa about 3400 B.C. reflected a profound change in the economy indicating the addition of manufactured goods among the commodities accounted for in the emerging state bureaucracy.

7. A Tool of the Mind

The tokens were counters and thus belong to the category of items considered by Jack Goody as "tools of the mind".[40] It is reasonable to assume, therefore, that the artifacts may shed light on the cognitive skills of the people who used them.

Tokens expressed plurality in a way fundamentally different from the way our 20th-century writing system expresses it. For example, when we write "3 sheep", we separate the concept of number from the concept of the item counted, showing each of these concepts by different symbols, numerals or letters. Tokens, on the other hand, expressed plurality in one-to-one correspondence.[41] The counters, in other words, were repeated as many times as the number of the items counted. "1 sheep" was shown by one token standing for "sheep"; "2 sheep" by two tokens; "3 sheep" by three tokens; and so on. Such a group of three tokens indicated, literally "sheep, sheep, sheep" instead of the modern western usage, "3 sheep" (or "three sheep").

Tokens also expressed plurality in a way fundamentally different from a 20th-century counting device such as the abacus. Because the abacus is based on abstract numbers which can be applied to any and everything to be counted, the beads are uniform and are used to compute any possible item under the sun. The beads of the abacus can be used, for example, to count either sheep, measures of grain or jars of oil. On the other hand, the token system is characterized by counters of different shapes to count different items. Sheep were counted with disks, small and large measures of grain with cones and spheres and ovoids served to compute jars of oil. Reciprocally, jars of oil could only be counted with ovoids, small and large measures of grain with cones and spheres and sheep with disks. There were not tokens standing for 1, 2, 3, etc. applicable to any possible item. Each token, in other words, fused together the concept of the number "1" and the concept of the item counted. The lack of counters to express abstract numbers is well illustrated by the groups of tokens enclosed in envelopes. At Habuba Kabira, for example, an envelope yielded eight identical ovoids in order to indicate "8 jars of oil".

The token system seems to correspond to the stage of "concrete counting" which preceded the acquisition of abstract numbers. Concrete counting is characterized by different numerations, or sets of numbers to count different categories of items. This mode of reckon-

ing is illustrated by the Gilyaks on the River Amur, who use as many as 24 different classes of numbers. They express "two" by different numerical expressions in each of the following connotations: 2 spears "mex", 2 arrows "mik", 2 houses "meqr", 2 hands "merax", 2 boards "met", 2 boots "min", 2 sledges "mir" etc. . . .[42] The many shapes of the tokens seem particularly well suited to concrete counting. Put differently, if we had to imagine what kind of counters would best suit concrete counting, we would have to come up with a system, similar to that of the tokens, with different counters to count different things.

The archaeological evidence is also supported by linguistics. Igor Diakonoff proposes that the many different numerical signs to express quantities, capacity, area measures etc. . . ., and the presence of at least six different numeration systems in Sumerian suggest the use of concrete counting in prehistoric Mesopotamia.[43] Starting from different sets of evidence, archaeology and linguistics arrive at the same hypothesis, namely, the existence of an archaic method of reckoning, prior to abstract counting.

8. The Earliest Precursor of Numerals

Sumerian numerals — i.e., ideograms expressing number concepts — can be traced back to token prototypes. This is shown by the way numerosity is featured on the pictographic tablets of the IVth millennium B.C. With the advent of pictography, about 3100 B.C., the concepts of numerosity and of the items counted are no longer fused in a single sign. As a result, pictographs are never repeated in a one-to-one correspondence to indicate the number of units, as was the case with the signs impressed on envelopes and tablets. Instead, pictographs, such as those standing for "jar of oil" or "sheep", for example, are preceded by numerals. Furthermore, the same numerals are used to express the numerosity of all possible units of goods, showing that they stood for abstract numbers, universally applicable.

With the advent of pictography...the concepts of numerosity and of the items counted are no longer fused in a single sign.

The signs indicating numerals derive from the signs for grain measures. The sign for "1" was a short wedge, identical to the sign for *ban*, a small measure of grain; the sign for "6" was a circular sign, identical to *bariga*, a large measure of grain. It appears, therefore, that the signs, while retaining their primary meaning as grain measures, acquired a secondary abstract meaning as numerals. This phenomenon of bifurcation is shown, explicitly, on particular tablets where, in the same text, the signs are used alternately to express grain measures or numerals. Tablets recording the rations allotted to workers, for example, feature the same signs to indicate the number of workers paid and the units of grain they received.[44] The same is true in the Proto Elamite system of writing.[45]

The choice of the signs for grain units to express abstract numbers can be explained by the two following reasons. First, grain being the staple of the Middle East, it was the commodity most widely exchanged. Consequently, the signs for grain measures were most familiar to accountants. Second, the multiple grain measures could be easily converted into a sequence of numerical units.

In sum, cones and spheres indicating measures of grain in the prehistoric token system led to graphic signs expressing: 1. measures of grain, and 2. numerals.

9. An Instrument of Control

According to Claude Levi-Strauss, writing was invented for the exploitation of man by man.[46] The context in which tokens are found suggests that tokens were, also, a means of power in the hands of a few. The fact that the earliest tokens occur in the Fertile Crescent about 8000 B.C. (i.e., in the region and at the time when agriculture came about) leaves little doubt that the need for record keeping was related to particular aspects of human adaptation to food production. This is particularly evident at the site of Mureybet where tokens appear in level III, coinciding with the first cultivation of cereals indicated by a quantum jump in the yield of cereal pollen. Tokens, on the other hand, were not present in the earlier levels, Mureybet I and II, when the occupants of the sites relied on an economy based on hunting and gathering.

It is unlikely, however, that the mere fact of harvesting crops and tending herds brought about the need for record keeping. According to ethnographic parallels, staples accumulated in communal storage, as was probably the case in early farming communities, are redistributed among members of the community without involving any reckoning.[47] Also, herding societies do not count their flocks. They know each animal by its particular characteristics.[48] Trade,

which was based on barter, probably also did not rely on accounting. It consisted in face to face transactions which, as noted by Goody, would not necessitate any record keeping.[49] It should be considered, therefore, that the primary role of the tokens may have been more than a memory aid.

The information available on record keeping in the ancient Middle East, and in particular, on the accounting devices closest to the token system in form or time, such as the Nuzi envelope or the Uruk tablets, suggest that they were used as a means of control. According to the inscription it bears, the Nuzi envelope was a legal document listing animals entrusted to a shepherd.[50] As far as we know, the pictographic tablets of Uruk kept precise records of entries and expenditures of goods in temple granaries. The seals of the various stewards demonstrate that the function of the pictographic tablets was to control the movement of goods in the temple.[51]

It is likely that the complex tokens of 3200 B.C. served the same function as the tablets that replaced them about 3100 B.C. Both of them kept records of lists of goods using related symbols; at Uruk, both tablets and tokens were recovered in the same area of the temple precinct; the seals covering envelopes and tablets were identical. It is, therefore, probable that, like pictographic tablets, complex tokens served the temple administration to control the amounts of goods delivered to the temple and their redistribution.

The notion that the tokens had a connotation of power is supported by the fact that they were deposited in the burials of prestigious individuals at Tepe Gawra. This suggests that, together with seals and maceheads, the tokens served as status symbols for the administrators who used them in daily life.

Further back in prehistory, tokens included in the infant burials of Tepe Gawra and Tell-es-Sawwan may suggest that, in these communities, the authority associated with handling tokens was an hereditary function. Lastly, the fact that, at Hajji Firuz, tokens were recovered in a non-residential building, indicates that, even at this early date, they were not mere household items but were handled in a particular place, probably by a particular individual.

On the basis of these inferences it is presumable that the development of the token system reflects the development of authority. The emergence of tokens probably marks the transition from simple household-based political systems to village-level organization. They served as a bureaucratic tool to control the production of goods and their pooling for the benefit of the community. It was the first step towards the administrative complexity of chiefdom and the state.

CONCLUSION

Tokens and writing are considered in this paper to be two increments in the development of record keeping in the ancient Middle East. The increasing complexity of the device was due to interrelated economic, social and conceptual changes. Plain tokens merely kept track of staples; complex tokens served for the inventorying of manufactured goods; and writing fulfilled the needs of a temple economy. The three steps of evolution of the system can also be correlated to the stages of village organization, cities and the state. Finally, the tokens were suitable for an archaic method of reckoning, called concrete counting, whereas writing was based on abstract counting.

Abbreviations

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UVB Vol. XXI & XXV.
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