CHAPTER 1

Origins and Forms of Writing

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Writing is a system of graphic marks that represent the units of a specific language. The units to be represented (whether individual sounds, syllables, parts of words, or some combination of all three) are a function of the structure of the language, the needs and traditions of the society that uses that system, and the capabilities of the human brain. *Writing* is a general term for a visual system distinct from art, and a mode of language use that is distinguished from speaking, whereas *writing system* refers to a specific type of graphic marks that represent types of linguistic units. Other words for writing systems are *script* and *orthography*. Alphabets (such as the Roman alphabet), syllabaries (such as Cherokee or Ethiopic, which represent consonant + vowel syllables), abjads (such as Arabic, which represent only consonants), and logosyllabaries (such as Chinese, which represent words) are all types of writing systems.

Writing is a unique human achievement, and this chapter sketches some of the history of this achievement. It is distinct from art, as we discuss. We visit the three known origins of writing in Mesopotamia, China, and Mesoamerica to show how writing arose, in what forms, and how it spread. We also provide an overview of how writing systems have been studied in modern times, and we propose some ideas about what the future might hold for writing and writing systems.

ART AND WRITING

Humans created two major systems of visual symbols to express themselves and to communicate with others: art and writing. By visual symbols we mean markings standing for a meaning shared by a community. For example, in Western society, the picture of a dove evokes peace. It is a common assumption that art and writing are related and, in particular, that writing has its origin in pictures. However, both communication systems are fundamentally different, fully independent from each other, and play different roles in society.

Archaeological evidence shows that art preceded writing by some 25,000 years. The first evidence of it comes from France in the Paleolithic Aurignacian period about 30,000 BCE. The appearance of art does not coincide with any major physiological, technological, or economic human development. Therefore, it remains a mystery why image making appeared so relatively late in human cultural development. The first art creations consisted of lines,

circular depressions called *cup marks*, incomplete sketches of animals, and a motif interpreted as a female vulva, all pecked with a flint axe on stone boulders (Bahn & Vertut, 1988, 1997; Leroi-Gourhan, 1971). In the Gravettian period, about 23,000 BCE, small three-dimensional sculptures representing obese women become familiar. The same repertory of shapes made with the same technique were repeated in several rock shelters of southwestern France. They attest to the existence of an extended community of Paleolithic humans who communicated meaning via complex visual symbols that were stylized in various ways. A community, dispersed in time and space, communicating with visual symbols: All of these elements underlie the development of writing as well.

What did Paleolithic cup marks mean, and why were they associated with animal designs or vulvae? We will never know for certain. However, most scholars consider them to be representing the elements of a cosmology. The images stood for ideas of utmost significance for the society, such as the creation of the world, the meaning of death, and the principle of reproduction. According to this hypothesis, visual art dealt with the supernatural, the unknown, the feared, or the wanted. It was a powerful instrument of thought to conceive ideas and bring a community to forge a common understanding of the mysteries of life. By the late Upper Paleolithic and the following Mesolithic and Neolithic periods, art had become a worldwide phenomenon: No culture is known that does not foster art.

THE ORIGINS OF WRITING

The available evidence shows that writing arose autochthonously in three places of the world: in Mesopotamia about 3200 BCE, in China about 1250 BCE, and in Mesoamerica around 650 BCE. Devising a system of graphic symbols to represent the sounds of language is, in itself, a remarkable achievement. However, the spread of this system through a society and across a geographical area is also remarkable. After all, communicating with writing is impossible if the recipient of a written message does not know the meaning of the written symbols. Thus, when we refer to the *spread of writing*, we mean not only the dissemination of the concept of representing the sounds of language with graphic symbols or the migration of those symbols, but also the dissemination of the rules and standards of what the graphic signs represent. This was as important at the beginning of writing as it will be in the future. As recently as 2005, archaeology has played an active role in informing theories about the origins of writing, and archaeologists may someday discover evidence that China, Mesopotamia, and Mesoamerica influenced each other, or that other regions or cultures influenced them. Until such evidence is uncovered, it is reasonable to treat these regions separately and the writing systems that arose as unique.

Mesopotamia

The function of writing when it came about in 3200 BCE was exclusively economic. Whereas art dealt with the numinous, each sign of writing stood for a precise unit of a specific commodity—the things of mundane life. After 10,000 BCE, art became an integral part of every culture, whereas writing remained the asset of few civilizations. Moreover, art came without precedent, whereas the signs of writing derived their shape, meaning, format, and economic function from a 4,000-year-old counting system using clay counters called *tokens*. The long evolution from counting to writing can be summarized as follows (Schmandt-Besserat, 1996).

The Token System Antecedent of Writing. The token system coincided with the Neolithic Revolution, when animals and cereals were first domesticated. About 7500 BCE, probably in a Syrian village, farmers modeled counters in clay in various specific and striking shapes that were easy to recognize, remember, and duplicate. Each shape was assigned a meaning: A cone was a small measure of grain, a sphere stood for a large measure of grain,

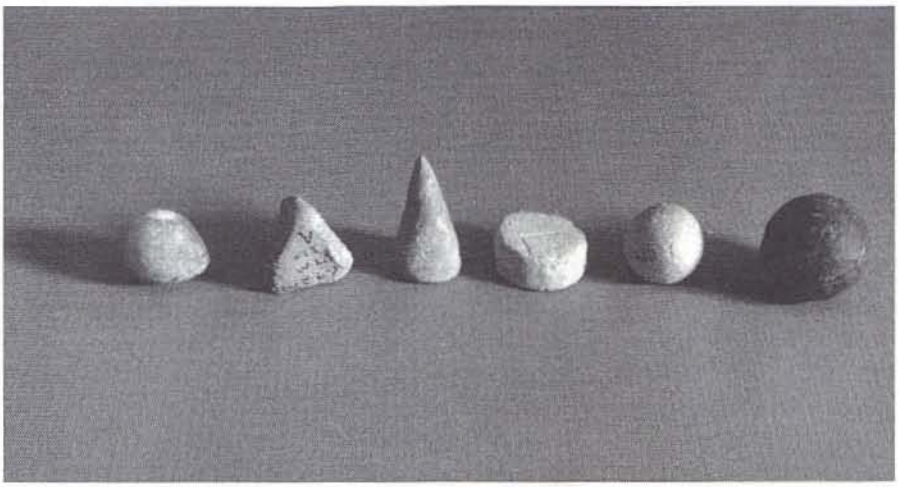

Figure 1.1. Some of the earliest token types from Tepe Gawra, present-day Iraq. Courtesy Denise Schmandt-Besserat, University of Texas–Austin.

a cylinder for an animal of the herd, and an ovoid for a jar of oil (Fig. 1.1) This invention was simple, but it was a great invention: It was the first visual code—the first system of artifacts created for the sole purpose of communicating information. Art communicated profound, but vague, ideas, but the tokens communicated concrete, discrete information on specific quantities of merchandise such as grain and animals.

The token system was destined to a long life remaining in use for 4,000 years. Art's evolution paralleled technological advances such as the use of copper and bronze tools, whereas the tokens were driven by the needs of an economy of redistribution. When city-states came about, in the 4th millennium BCE, the tokens became a complex system with multiple shapes and multiple markings, incised or punched, to record the products of urban workshops such as wool, textiles, garments, mats, vessels, and tools, imported goods such as metal, or processed foods such as trussed ducks, honey, and bread (Fig. 1.2). There were also new tokens to record goods with greater precision in order to satisfy the more stringent state administration, such as special tokens designating rams, ewes, and lambs (i.e., the sex and age of animals).

The token system shared with art one archaic feature. From the beginning of its use, around 7500 BCE, to the very end, around 3000 BCE, the tokens, like images, represented the number of units of goods in one-to-one correspondence. Six jars of oil were shown with 6 ovoids and 10 jars of oil with 10 ovoids. Keeping records with tokens was cumbersome and bulky.

Two-Dimensional Signs. About 3500 BCE, the temple economy of the Sumerian city of Uruk required keeping tokens in archives—perhaps to keep track of debts until they were settled. The temple administration invented envelopes consisting of small hollow clay balls in which tokens could be held together and be protected from tampering. The envelopes also offered a clay surface on which the temple officials as well as debtors could impress their seals to warrant the terms of the transaction represented by the tokens inside (Fig. 1.3).

About 3500 BCE, the envelopes were perfected to make their content visible. The tokens were impressed on the surface showing how many of what shape were included inside. This invention was a major step toward writing because the three-dimensional tokens were reduced to two-dimensional markings (Fig. 1.4).

Evidence from such cities such as Uruk in Mesopotamia, Susa in Elam, and Habuba Kabira in Syria shows tokens (dating from 3300–3200 BCE) imprinted on a solid clay ball—a tablet (Fig. 1.5). Accordingly, the signs were no longer merely duplicating actual tokens

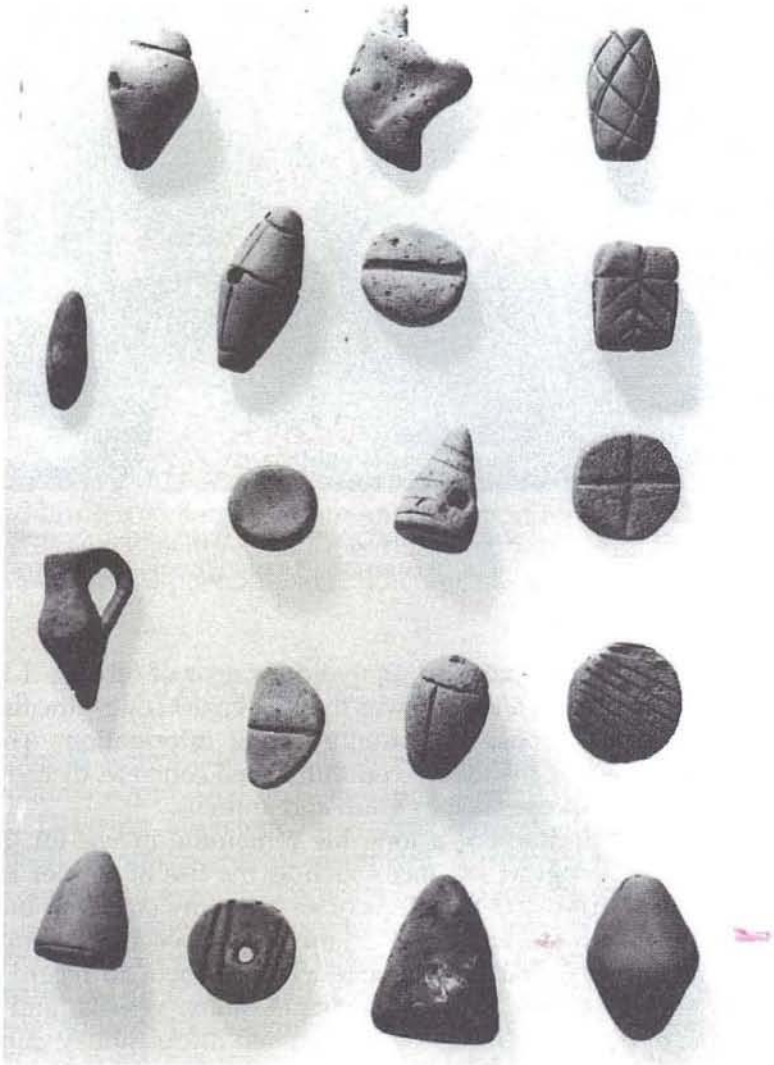

Figure 1.2. Complex tokens from Uruk, present-day Iraq, ca. 3300 BC E. Courtesy Vorderasiatisches Museum, Bodestrasse 1–3, D-1020 Berlin, Germany.

held within. The tablets did altogether away with tokens, and by doing so, the signs became independent entities. The tablets were far more convenient than envelopes filled with tokens because they could display permanently one or even several accounts that could be viewed at a glance.

The Creation of Numerals. Signs traced with a stylus, rather than impressed with actual tokens, appeared at the Mesopotamian city of Uruk about 3100 BCE. These incised signs had the advantage of accurately illustrating the exact shape of the most intricate tokens and their particular markings. Incisions led to more than changed shapes, as they also marked the introduction of numerals (Fig. 1.6). The incised signs were never repeated in one-to-one correspondence. Numbers of jars of oil were no longer shown by the sign for jar of oil repeated as many times as the number of units of oil to record. The sign for jar of oil was preceded by numerals—signs for abstract numbers. Whereas the tokens fused together inextricably the concept 1 with that of a unit of merchandise, the incised signs abstracted the concept of *oneness* from that of the item counted.

The units of grain were used to express such abstract numbers as 1, 2 or 3 (and upwards). "1" was indicated by the impression of a cone token that formerly was a small measure of

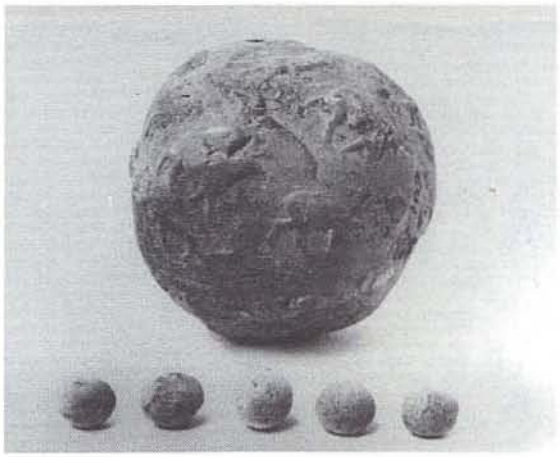

Figure 1.3. Envelope with six spheres it contained. The animal designs are those of seals authentifying the contents, from Susa, Iran, ca. 3300 BC E. Courtesy Musée du Louvre, Départment des Antiquités Orientales, Paris.

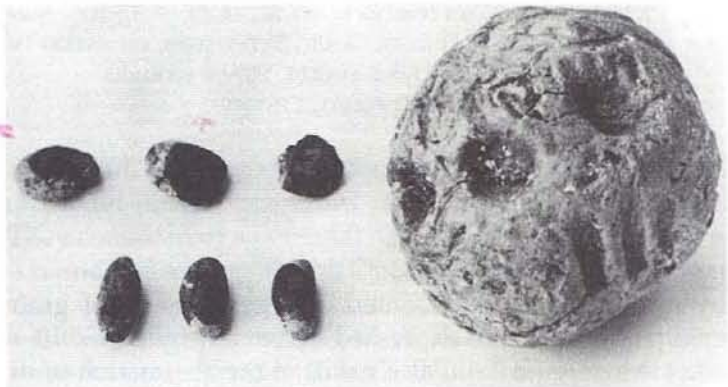

Figure 1.4. Inscribed Envelope. The 3 long wedges and 3 flat circular markings indicate the three cylinders and three disks held inside, from Suza, Iran, ca 3300 BC E. Courtesy Musée du Louvre, Départment des Antiquités Orientales, Paris.

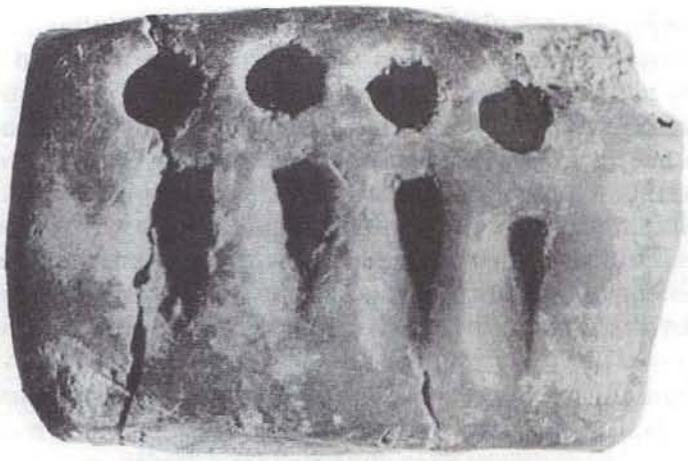

Figure 1.5. Impressed tablet featuring an account of four large (circular markings) and four small (wedges) meausres of grain, from Godin Tepe, Iran, ca. 3100 BC E. Courtesy Dr. T. Cuyler Young, Royal Ontario Museum, Toronto, Canada.

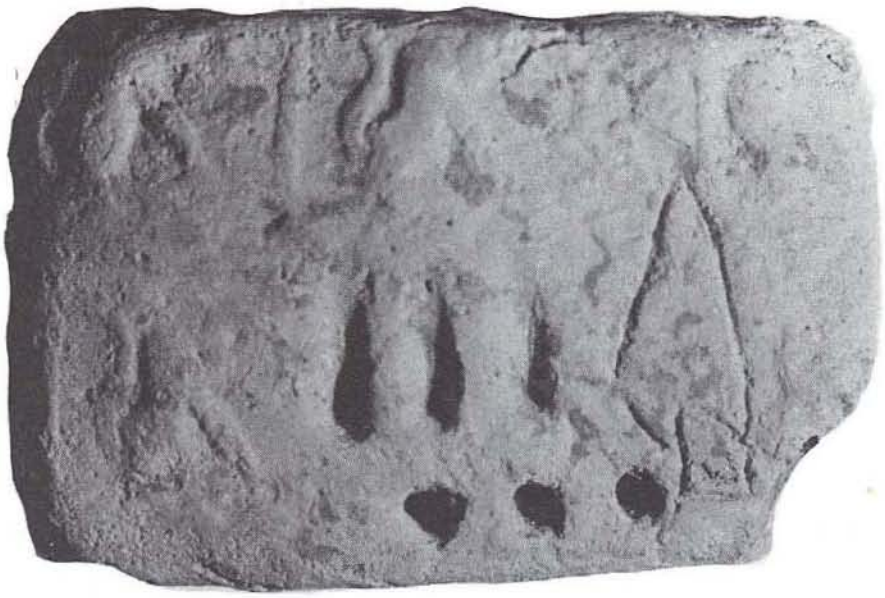

Figure 1.6. Pictographic tablet featuring an account of 33 measures of oil, (circular = 10, wedges = 1) from Godin Tepe, Iran, ca. 3100 BC E. Courtesy Dr. T. Cuyler Young, Royal Ontario Museum, Toronto, Canada.

grain, and "10" by a sphere that represented a large measure of grain. It was a great economy of signs: 33 jars of oil were expressed by seven signs (3 × 10 + 3 × 1 + "oil")—instead of 33 (Fig. 1.6). Most important, as a result of the abstraction of numbers, the signs for goods and those for numerals could evolve in separate ways. Writing and counting generated different sign systems.

The Sound of Speech Emulated. About 3000 BCE, the Sumerian city-state administration required recording the personal name of the individuals who gave or received the goods listed on the tablets. Phonograms—signs standing for sounds—were created. The new signs were simple, incised sketches with no concern for esthetics. They singled out things that were easy to draw that stood for the sound of the word they evoked. The drawing of a man's body stood for the sound *"lu"* and that of the mouth for *"ka,"* which were the sounds of the words for *man* and *mouth* in the Sumerian language (Fig. 1.7). The syllables or words composing an individual's name were written like a rebus. For example, the modern name *Lucas* could have been written with the two signs mentioned earlier "lu - ka." The stage of pictography—writing with pictures—when the technique of writing came in its form closest to visual art, was in fact the time when writing became removed from the concrete world of logography to be formally connected with the sounds of speech by the extraordinary invention of phonograms.

The Parting From Accounting. In 2800 BCE, 400 years after the invention of clay tablets, writing still dealt exclusively with accounting. The texts listed merchandise received or dispensed by a temple administration, stipulated land donations, or compiled signs to be used by accountants for performing their tasks. But a scribe at the court of the kings of Ur, a southern Sumerian city, in about 2700 to 2600 BCE, innovated by using a chisel to inscribe

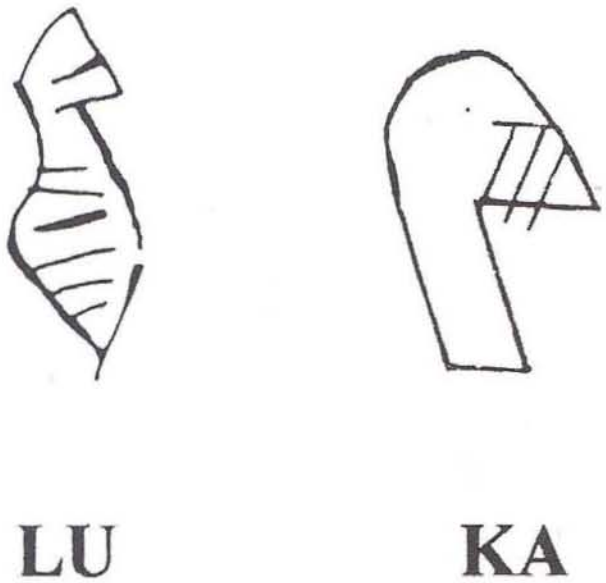

Figure 1.7. Example of the rebus principle used to record names.

gold, silver, and lapis lazuli objects to be deposited in tombs (Moorey, 1982; Woolley, 1934). The royal scribe of Ur did not list quantities of goods. His inscriptions had nothing to do with accounting. They consisted of a personal name such as *Meskalamdug* wrought on a gold bowl (Fig. 1.8) or a name and a title, "Puabi, Queen," carved on a lapis lazuli seal (Burrows, 1934) (Fig. 1.9).

For the first time, this scribe put writing to work for a function other than accounting. That new purpose was funerary. The Sumerian belief that the name of a deceased individual was to be spoken aloud at regular intervals in order for his or her ghost to exist in the underworld explains the funerary texts (Bayliss, 1973; Jonker, 1995; Niditch, 1996; Scurlock, 1988). Meskalamdug's name, couched in gold, suggests that casting the sounds of a name into writing was held equivalent to a perpetual utterance for the benefit of his ghost. After 5,000 years of accounting, the second function of writing was to guarantee the survival of the dead in the netherworld (Westenholz, 1993). At this point, for the first time, art and writing became complementary. The artifact enshrined the written word.

The Sentences of Speech Emulated. The concern for survival in the afterlife continued to bring art and writing together. About 2600 or 2500 BCE, a scribe inscribed small statues in the name of deceased individuals. He further added a prayer asking for a long afterlife to the god to whom the statue was dedicated (George, 1999). The inscription gave speech to the worshipper figure who addressed the gods in writing using sentences with subjects, verbs, and complements, bringing writing to model itself onto speech by adopting the syntax of spoken language. It was the powerful combination of sculpture and writing that was the true take-off of writing. About 2500 BCE, a Sumerian king was able to describe his victories in a lengthy text (Cooper, 1983). By 2000 BCE, writing was used for historical, religious, legal, scholarly, and literary texts, including poetry.

The Spread of Writing. Mesopotamia and its nearest neighbors Syria and Elam, in present-day Western Iran, are unique in presenting the evidence for the synchronic stages of tokens, envelopes, and tablets (Schmandt-Besserat, 1992). But the cognitive steps that

MESKALAMDUG

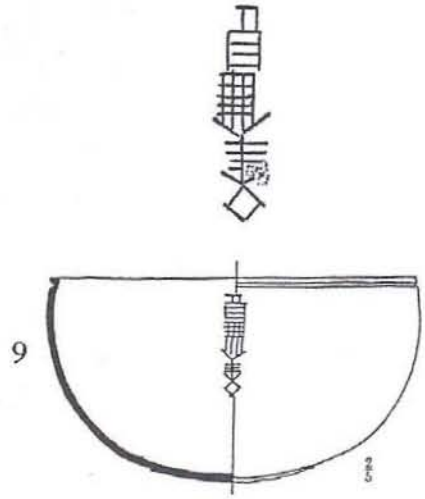

Figure 1.8. Graphic design: Meskalamdug—inscription on gold bowl (U 10002) from the tomb of Meskalamdug (PG 755) Royal Cemetery of Ur, ca. 2700 BC E. This bowl was found in the hands of the skeleton. From C. L. Woolley, *Ur Excavations, Vol. II: The Royal Cemetery*, Oxford University Press, London, 1934, Plate 232: 9.

PUABI, QUEEN

Figure 1.9. Name carved on Queen Puabi's seal (U10939) recovered in Royal Tomb 800 of the Royal Cemetery of Ur. From C. L. Woolley, *Ur Excavations, Vol. II: The Royal Cemetery*, Oxford University Press, London, 1934, Plate 191.

led from logography to numerals and phonograms occurred only once in Mesopotamia. The Mesopotamian writing system constitutes the prototype of the other Bronze Age writing systems of the Old World. When the Proto-Elamites created their own script, they borrowed simultaneously the concept of abstract numbers and phonetic signs from Mesopotamia (Hoyrup, 1994). Egypt, where the use of tokens in prehistory is not clearly attested, produced a full-blown writing system based on the rebus principle visibly imitating Mesopotamia. Carbon 14 dating disproves the claims for Egyptian primacy (Boehmer, Dreyer, & Kromer, 1993). About 2500 BCE, the Indus Valley Civilization devised a script that had no links with the Mesopotamian-like tokens recovered in pre-Harappan sites (Possehl, 1996). Crete probably adopted first the idea of tokens and then that of writing. This is suggested by the fact that Minoan clay counters in the shape of miniature vessels seem unrelated to the Linear A or B scripts used in the Aegean between 2200 and 1300 BCE (Poursat, 1994). The Mesopotamian tokens and writing loomed large over the process of civilization in the Old World.

The Cuneiform Script. The Mesopotamian script reached its classical period about 2200 to 2000 BCE when scribes used a reed stylus with a triangular end that produced cuneiform's distinctive wedge patterns. Though always remaining partly logographic (one sign = one concept), the script represented ever-more syllables, not individual sounds, making the script a syllabary (Walker, 1987). This first writing system played a vast role in the diffusion of writing: In the course of the third to first millennia BCE, it was adapted to languages of various families such as Akkadian and Eblaite (Semitic); Elamite (perhaps Dravidian); Hittite and Old Persian (Indo European); and Hurrian and Urartian (whose identification as Caucasian is disputed). The cuneiform script lost ground when Aramaic, written with a flowing hand on papyrus or parchment, became prevalent in the Near East. Cuneiform writing lingered in Mesopotamia until the Christian era.

The Alphabet. The alphabet was invented only once—which means that all the present alphabets, from Latin, Arabic, Greek, Cyrillic, Hebrew, Ethiopian, and Tamil to Navaho derive from the same first alphabet. The invention of the alphabet took place in the Near East, probably in present-day Lebanon, about 1700 BCE (Healey, 1990). Neither syllabic nor logographic, it owed nothing to the cuneiform; rather, it was a totally new system based on the identification of the distinctive sounds of a language and matching each with a specific sign. The first alphabet consisted of 22 letters, each standing for a phoneme—a single speech sound. The success of the alphabet was to streamline script. Compared to the some 600 cuneiform signs, the 22 letters were easy to learn allowing literacy to spread more widely. The letters of this first alphabet, however, only represented consonants.

The Phoenician cities that thrived on the coast of present-day Syria and Lebanon between 1000 and 300 BCE played an important role in the diffusion of the alphabet across the Mediterranean Sea, and in particular to Greece. (Markoe, 2000; Whitt, 1995). Perhaps as early as 800 BCE, the Greeks adapted the Semitic alphabet to their Indo-European language by adding letters for vowels. This resulted in a 27-letter alphabet that made it easier to transcribe the spoken word and even easier to read, because all the sounds were indicated (Cook 1987). In turn, the Etruscans, who occupied the province of Tuscany in present-day Italy, starting in the eighth century BCE adopted the Greek alphabet by slightly modifying the shape of the letters (Bonfante, 1990). When Etruria was conquered by Rome in the first century BCE, the Etruscan alphabet became that of the Romans. The diffusion of the Latin alphabet followed the conquests of the Roman armies through Europe (Reynolds, 1991).

Chinese

Among these three origins of writing, Chinese is the only one that has an unbroken record of use in the last three millennia leading up to the modern time. The earliest evidence of

Chinese characters dates to 1250 BCE. About 4,500 symbols have been identified on shards of turtle shell and cow bone, used in divination practices. Questions to an oracle were written on the shell or bone, which were then heated in the fire; the resulting cracks were read, and the answers given were also inscribed in the bone. About 1,500 of these 4,500 symbols have survived as modern Chinese characters. The oldest examples of oracle bone writing have been found in north central China in the Shang region. There is no evidence that the Shang were solely responsible for developing writing in China, but there is also no evidence of Chinese writing at any other place at an earlier time (Keightley, 1978, 1989).

From the beginning, Chinese was written vertically, the columns read right to left. (Modern conventions have also added horizontal, left-to-right reading.) Early Chinese writing had several variants. The "great seal" script, *ta chuan,* was used in 1200 to 800 BCE on bronze vessels and carved on character seals, and was also used in all other writing. Other seal scripts were the most diverse of formal writing. From 403 to 221 BCE, a number of independent states developed their own script styles, but from 221 to 206 BCE the Qin dynasty established a standard script called *hsiao chuan,* or "lesser seal script." This gave way to *li shu,* the "clerkly script," a straighter style that was easier to write, developed by the staff of the imperial democracy and used from 206 BCE to 220 CE. Around the second century CE, a third formal style, the standard script (or *kai shu*), was developed (Boltz, 1994).

Until the early 20th century, all dialects of Chinese were written in a literary dialect that dated to the late Old Chinese period, about 1100 BCE to 100 CE. This meant that literate Chinese wrote in a way they themselves did not speak. This form persisted, in part, because of the Chinese civil service's power in creating and maintaining the written standard for some 2,000 years. However, in the early 20th century, a reform movement in China adapted modern spoken Chinese as the basis for written Chinese. Now writing is done in Modern Standard Chinese, a dialect close to the Mandarin spoken in Beijing.

The most remarkable feature of Chinese writing is the size of its character set. Since around 100 CE, when the scholar Xu Shen created a dictionary of 9,353 characters, the number of characters has steadily increased to about 60,000. Most of these characters, however, are archaic words, variant characters, or proper names. For the modern Chinese writer and reader of Chinese, 1,000 characters account for 90% of all occurrences in texts, and 2,400 characters cover 99% of occurrences. In other words, only a slight fraction of the total number of characters is required to be fully literate in contemporary Chinese societies (Boltz, 1994).

In the West, a myth about Chinese writing has persisted. Because Chinese characters are written with elaborate series of pen strokes, and because Chinese calligraphy is done with brushes and ink, the characters have been considered small pictures that represent ideas. This is not the case, and numerous books have been devoted to dispelling this myth (DeFrancis, 1984). Most characters do represent speech sounds; 90% of the characters consist of a graphic element that indicates pronunciation, combined with another element that marks meaning.

Mesoamerica

In Mesoamerica—what is now southern Mexico and the countries of Central America—as many as 13 different writing systems had been developed by 900 CE by various civilizations (Lounsbury, 1989). The most visible of these is the Maya writing system, because it was written on stone on upright monuments know as *stelae,* and because major advances in Maya decipherment have been made in the last 20 years (Coe, 1999). Maya was written during the height of the civilization, from 250 to 900 CE through to the 16th century, when Christopher Columbus first encountered the Maya.

Maya characters are known as *glyphs,* about 800 of which are known to exist. Each glyph organizes several smaller elements known as graphemes and contains a main grapheme with one or more diacritics. The diacritics can appear to the left, right, top, or bottom of the

main symbol. The glyphs represent morphemes (or basic units of words), syllables (consonant + vowel sequences), as well as semantic and phonological determinatives. Because there was no set standard for glyph construction, writers could present the same word in many different ways, often in the same texts, and writers took pleasure in creating these variants. Glyphs were always written in paired vertical stacks and read top to bottom, left to right, in a zig-zag fashion. The sequences of graphemes in a glyph are read, more or less, from the upper left corner to the lower right.

The Maya carved glyphs on stone stelae and painted them on ceramics and bark paper books called codices; archaeological and deciphering work is done with the stelae and other stone carvings as well as the codices. If writing in Mesopotamia is associated with economic functions, then in Mesoamerica writing is associated with calendrical calculations and the actions of kingly dynasties. Hundreds of codices existed and were used by the Maya; many were destroyed by the Europeans as pagan works; others hidden or lost by the Maya decomposed. (Since the 19th century the extant codices have been copied and photographed; though they are known by the European cities where they reside—the Dresden Codex, the Madrid Codex, the Paris Codex, and the Grolier Codex—they are now distributed worldwide via the Web.)

Despite its prominence, Maya writing was not the oldest Mesoamerican writing, and archaeologists have attempted to establish its lineage more precisely. Some markings that may be precursors date as early as 1100 BCE. The earliest writings that are recognizably antecedent to later scripts date to around 650 BCE in the states of Tabasco and Oaxaca, Mexico. In 2002, archaeologists M. Pohl, K. Pope, and C. von Nagy announced the discovery of a roller stamp and plaques with glyphs, which were found near the Olmec site of La Venta in Tabasco (Pohl, Pope, & Von Nagy, 2002; Stokstad, 2002). The discovery bolstered the theory that the Olmec had influenced other civilizations and cultures. From 400 BCE to 200 CE, three related writing systems were used in Mesoamerica. The Isthmian script (the descendent of the Olmec script and a logosyllabic script like the later Maya script) was used from the Mexican Gulf Coast through the Isthmus of Tehuantepec; the Oaxacan script was used in the Valley of Oaxaca; and the Maya script was used in an area that extended from the Yucatan peninsula to the foothills of the Guatemalan Highlands.

When Europeans arrived in Mexico, they outlawed the use of native writing systems. Indigenous Mesoamerican people have revived the use of glyphs in contemporary times as a symbol of their heritage.

Writing as Culture

The contemporary interest in the structure of writing systems is generally agreed to begin with I. J. Gelb, a philologist at the University of Chicago, whose 1952 book, *The Study of Writing*, was the first to categorize various writing systems in terms of their history and structure. Though many of his statements about writing's relationship to language have been corrected, his book sparked exploration into writing systems. Gelb even coined a name for this field: *grammatology*. (The word is perhaps better known among humanists as the title of a book by the French philosopher, Jacques Derrida—*Of Grammatology*.)

However, scholars' interest in the relationship between orality and literacy traditions began with Milman Perry in the 1920s (Jahandarie, 1999). Perry was a Harvard classicist who first showed that the texts of the ancient Greek poet Homer were primarily oral compositions. This closed a debate (ongoing at the time) about Homer's indentity and whether "Homer" was a single author or several. (Parry argued that Homer was a single, real person who assembled his unique epics from a number of essential themes and variations that had been passed down as part of an oral tradition.) Other early investigators, such as Eric Havelock (1976), sought to uncover how literacy shaped Greek society, and the impact of the alphabet on the organization of ideas, abstract, thought, and consciousness.

In the 1960s, Marshall McLuhan, a Canadian media critic, became a popular thinker on the effects of mass media and media technologies, such as television, which led him to consider how cultures that relied on aural/oral information differed from visual cultures (Mc Luhan 1962, 1964, Moos 1997, Gordon 2003). Many of McLuhan's colleagues and followers extended these ideas to thinking about the properties of cultures that did not have books or writing. Walter Ong argued that writing is a technology that restructures consciousness of individuals who use it and refocuses the energies of societies that utilize it (Ong 1982). Anthropologist Jack Goody, characterizing writing as a "technology of the intellect," tackled the oral-literate divide to show how writing influences religion, the economy, law, and commerce (Goody 1977, 1987). David Olson argues that writing, not speech, determine our ability to reflect on ourselves (Olson and Torrance 1991, Olson 1994).

For most of the 20th century, linguists did not pay much attention to forms of written language, arguing that their task was to study language as it was spoken. In the 1970s, they found renewed interest in writing systems as evidence for abstract units of language and for insight into otherwise unobservable linguistic processes. The fact that many writing systems are alphabetic (because they represent individual sounds) suggests that individual sound segments called phonemes are fundamental to human language production. However, the fact that some writing systems encode syllables suggests that syllabic units are also fundamental. Anthropological linguists have been attentive to writing, beginning in the late 19th century, due to work describing languages indigenous to the Americas and recording narratives, oral poetry, and other verbal performance. Later they theorized how transcribing spoken utterances, conversations, and oral performances altered the interpretations of spoken discourse (Bauman & Sherzer, 1974).

Late in the 20th century, the academic attention to writing systems matured. This interest led to the publication of encyclopedic works on writing systems. These were novel because they collected language, writing, and cultural experts and combined these with state-of-the-art advances in computer printing that allowed all the characters in numerous writing systems to be printed. These works included *The Blackwell Encyclopedia of Writing Systems* (1999), edited by Florian Coulmas. Because of increased interest in teaching writing systems, several textbooks have also been published, such as *Writing Systems: An Introduction to Their Linguistic Analysis* (2002) by Florian Coulmas, and *Writing Systems: A Linguistic Approach* (2005) by Henry Rogers.

Decipherment

European scholars and explorers were deciphering ancient texts written in ancient, often no longer used, writing systems long before Milman Perry and I. J. Gelb's work. Three decipherments in particular captivated European imaginations, opening up aspects of unknown civilizations: the decipherment of Egyptian hieroglyphics, of cuneiform, and of Linear B.

In the early 19th century, a number of decipherment projects were launched, the most famous of which is the translation of the trilingual text (hieroglyphic, Coptic, and Greek) of the Rosetta stone by Jean Francois Champollion. The French scholar recognized that the hieroglyphic script was fundamentally phonetic. Using the obelisk of Philae, he noted that the names of Ptolemaios and Cleopatra had four letters in common—PT—and that these letters were shown in the expected order. Other names expanded the number of characters deciphered: Alexander, Philip, Arsinoe, Berenice, Caesar, and Claudius. Starting his work in 1808, Champollion by 1822 had drawn the connection between ancient Egyptian and Coptic, identified the difference between phonograms and logograms, compiled an impressive dictionary of ancient Egyptian, and established the first elements of a grammar (Chassagnard, 2001).

Cuneiform was first encountered by Europeans in the early 17th century CE, when travelers heard of a writing system made out of narrow, nail-shaped characters. (The word

cuneiform comes from the Latin word *cuneus*, for "wedge.") Several scholars contributed to the decipherment of the cuneiform script. Among them, Henry Creswicke Rawlinson stands out as the heroic individual who between 1835 and 1844 made paper squeezes of parts of the trilingual (Old Persian, Akkadian, and Elamite) proclamation of Darius the Great inscribed on the rock of Behistun in Western Iran. This was daring because the inscriptions were carved on a steep cliff more than 300 feet above the ground, and could only be reached either from a flimsy scaffold or dangling down from on a rope. The column of 112 lines Rawlinson copied allowed him to recognize that the Akkadian cuneiform script was polyphonic; that is, each sign could stand for several sounds (Kramer, 1963). In 1851, his publication correctly identified Akkadian, the language spoken in Babylonia, as a Semitic language and established the first rudiments of its grammar (Walker, 1987).

One long-standing decipherment problem was the script called Linear B, which came from the Aegean island Knossos and from mainland Greece at the site of Pylos. It was finally deciphered in 1953 by Michael Ventris and John Chadwick (Chadwick, 1958). The script they discovered is the oldest surviving record of a Greek dialect called Mycenaean and was used between 1500 and 1200 BCE on Crete and southern Greece. A counterpart script, called Linear A, remains undeciphered.

The excitement for decipherment among Europeans was motivated by biblical scholarship and fueled by European colonial expansion into Asia and the Middle East. As the European powers moved through northern Africa, Persia, and Mesopotamia, they encountered ancient cities, archaeological sites, and other enduring monuments of civilizations that predated the ancient Greeks. Scholars' access to artifacts in European museums and libraries aided their work. Not all decipherment is finished, however. Presently, John S. Justeson is engaged in the study of the stele of La Mojjara, Mexico, making headway toward the understanding of the Epi-Olmec Hieroglyphic writing (Justeson & Kaufman, 1993). Some writing systems have never been successfully figured out because the language they represent are unknown. Among them are the Indus Valley Script, proto-Elamite, Proto-Elamite, Linear A, Meroïtic, and Rongo Rongo. Other artifacts, such as the Phaistos Disk, bear inscriptions that may or may not be writing. In the case of Rongo Rongo, a writing system on Easter Island, it is the only example of the writing system ever found.

The Spread of Writing

In 1986, the anthropologist of science Bruno Latour proposed a materialist explanation for the impact of writing on a society. In contrast to the distinctively mentalist or cognitivist arguments of Marshall McLuhan (1962, 1964), Walter Ong (1982), Jack Goody (1977, 1987a, 1987b), David Olson (1994), and others, Latour limits his arguments to how representational devices (drawings, charts, graphs, photos, and diagrams) allow scientists to make increasingly stronger arguments about the phenomena they study (Latour, 1986, 1990). Thus, representations succeed because they enable their users to do more. Without erasing the historical details, and without subsuming diverse places into the same developmental sequence, Latour's explanation extends to Maya astronomers, Chinese oracles, and Mesopotamian merchants. Writing systems may spread through the influence of religion, military and political conquest, or economic ties, but it persists for reasons that have to do with its utility for human work and its adaptability across spheres. One might use Latour to explain that many writing systems evolve toward the alphabetic, not because the alphabetic is inherently better but because it has social advantages over the representation of ideas, words, or syllables: It may be easier to learn, more easily adapted to other languages, and more efficiently ordered.

The Future of Writing

The history of writing has marked the interplay between linguistics, socioeconomics, and the forces of technological change, an interplay that will shape the future of writing. This

future may not involve creating new symbols or diffusing new ways to write down languages. However, the evolution of technology, particularly the advent of the World Wide Web, more advanced data-processing technologies, and cheap, accessible personal computers have created technical challenges.

For instance, one challenge facing writers of Chinese was inputting the large number of characters with a standard keyboard. This problem, which has existed since the advent of publishing and of the typewriter, led to several systems for writing Chinese phonetically. One system, called *Pinyin,* is used in Mainland China; another system, called *bopomofo,* is used in Taiwan. Both (which were originally developed for students to learn characters more easily) have been employed in various inputting schemes using computers, for which no standard exists. Faster computer processors and cheaper computer memory has helped widen the impact of the inputting bottleneck on writing Chinese on computers.

Another challenge that faced computer users around the world was ensuring that different computing platforms, operating systems, and software programs could swap, share, and process text data, regardless of the writing system of the text. Computers do not store, send, or process letters or characters; rather, they process strings of numbers that are encoded by software and displayed on computer screens as the appropriate letters, numerals, punctuation marks, and other symbols. As an example, when computer A sends a string of numbers to computer B, both computers must share the same formula for turning those numerical strings into the appropriate visual symbols. The development of a universal standard for text encoding with computers would therefore be an important development for the future of writing (Erard, 2003).

The earliest computers could encode only limited character sets, such as Roman and Cyrillic. As personal computers spread globally, and as the computer industry began looking for global markets, it became clear that many people in the world would purchase and use computers only if they could write their native scripts on them. In the late 1980s, computer scientists from IBM, Xerox-Parc, Apple, and other computer companies began working on a solution: a universal standard for text encoding that would be installed as part of the basic architecture of all hardware and software. This standard, now known as Unicode, contains encodings for 96,000 characters and 55 writing systems, from Chinese to Thai to Mongolian to Gothic. Approximately 70,000 of Unicode's encodings are for Chinese characters. However, about 100 writing systems, most of them used by small groups or of ancient or academic interest, remain to be encoded. These include Egyptian hieroglypic, cuneiform, Balinese, Javanese, and Tifinagh (or Berber). A group at the University of California–Berkeley, called the Universal Scripts Initiative, is working on standardizing character sets for these minority writing systems in order to make them a part of the Unicode standard as soon as possible (Erard, 2003). This will ensure that Unicode is universal and allows as many people as possible to participate in the digital age.

The future of writing will also be determined by communications technologies. The rise of e-mail, chat rooms, and bulletin boards, as well as the widespread use of text messaging on cell phones, has created new symbols in Europe, North America, and Asia. In e-mail text, users invented "emoticons," graphic symbols that inventively combined punctuation marks to add emotional or intonational context to a writer's text (such as ":-)" to denote a positive or happy remark). Users of chat rooms and text messaging on cell phones have also developed abbreviations, phonetic spellings (as in English, using "lol" for "laugh out loud," "2" for "to," and "U" for "you"), and logograms that allow them to compress messages. In Japan and China, manufacturers of cell phones have created limited symbol sets built in to phones. In one system, the message "please call me" is displayed with an icon of a telephone, followed by *kure,* which is an abbreviated word for making a request. "Would you like to go out for a drink tonight" is displayed as a picture of a mug or cup, followed by a verb ending that is typically used for extending invitations (French, 2000). These types of unique symbols will continue to evolve, particularly with communication formats and devices that are strongly identified with youth cultures.

Another future development is that more of the world's languages will be written down. According to *Ethnologue* (Grimes and Grimes, 2005), a catalog of the world's languages, there are 6,912 languages spoken in the world as of 2004. Most of these are not written down because no writing systems have been developed or adapted for them yet. Because the writing system most often adapted for them is the Roman alphabet, the future favors the Roman alphabet. Not only is technology available in the Roman alphabet, most of the language workers, many of them missionaries, who are assigning writing systems to language use the Roman alphabet. Widely used in the world already, the Roman alphabet is written by more people in the world than any other.

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