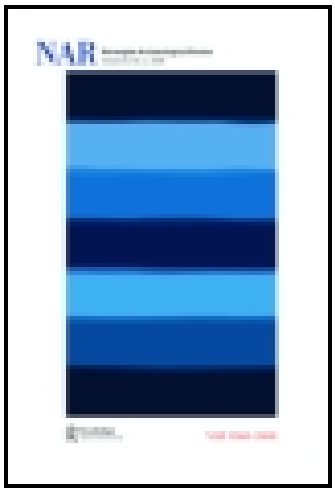
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Writing systems: A case study in cultural evolution

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Writing Systems: a Case Study in Cultural Evolution

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The history of writing, which is both a technology and a symbolic system, provides an informative case study of the evolution of material culture. Writing systems in various parts of the world display a tendency to develop from a semasiographic (ideographic) form, through logography (word or morpheme signs), to increasing use of phonography (sound signs). However, not all early civilizations developed written forms of recording, and increasing technological and social complexity is not accompanied by equal abandonment of logography in favour of phonography. This suggests that the technological advantages of phonographic, and in particular of alphabetic, scripts have been ethnocentrically overrated. Furthermore, while purely phonographic scripts require the prior existence of more logographic ones, they have never evolved directly from such scripts but were created on the margins of societies that used them. There is considerable evidence that stability and change in writing systems are influenced by religious, political, ethnic, professional, class, and cultural values to a much greater extent than by practical considerations. This suggests that in order to understand change in any form of material culture it is necessary to determine empirically the relative importance of practical and cultural considerations in bringing about such change. This may vary greatly from one category of material culture to another.

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Today the concept of sociocultural evolution is widely condemned as erroneous and unethical. It is asserted that, among its many shortcomings, it minimizes the extent of variability in human behaviour, encourages acceptance of a mechanistic, ecological determinism, denies human agency, and ignores the symbolically mediated nature of cultures. It is also objected that it privileges change at the expense of stasis instead of treating both equally. Finally, sociocultural evolution is condemned for allegedly supporting a variety of right-wing political agendas, including economic exploitation, colonialism, disempowerment of ethnic minorities, and promoting, or even trying to naturalize, gender conflict (Diamond 1974; Freidel, Schele & Parker 1993; Giddens 1984; Johnson 1996; Mann 1986; McGaw 1996; Rowlands 1989; Shanks & Tilley 1987; for more on sociocultural evolution, Trigger 1998).

Since the decline of culture-historical archaeology in the 1960s, little attention has been paid to the study of innovation and diffusion (a recent exception is Barnett & Hoopes 1995). Neoevolutionism viewed cultural change as a response to external, ecological factors and assumed that people were able to use their powers of observation and reason to adapt in a relatively straightforward and unproblematical fashion to new conditions (Binford 1962; Watson, LeBlanc & Redman 1971). Postprocessualism often focuses on traditions and cultural constraints and hence tends to emphasize stasis (Hodder

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1991). As a result, neither approach has encouraged the empirical investigation of cultural innovation and the nature of cultural change, the study of which has become retarded by comparison with many other subjects of archaeological concern.

Grammatology, the study of writing systems, offers a useful way to evaluate evolutionary approaches to understanding change in cultural phenomena. Because of writing's role as a recording device, its development is historically better documented than is that of many forms of material culture. Writing, like languages and symbolic systems generally, requires an inner ordering to be effective. In a fully developed writing system, a finite, and hence learnable, set of symbols must be capable of recording an unlimited variety of utterances. Yet, as a form of technology, scripts are also subject to some degree of material constraint. Some systems may be more easily learned, written, or read than others and, as demands for the use of such systems grow and technologies for handling print communication diversify and change, such developments should favour the creation of more efficient writing systems (DeFrancis 1989:262–269; Rogers 1995; Sampson 1985:18–19).

EVOLUTIONARY GRAMMATOLOGY

Writing has been associated with evolutionary theorizing since the 18th century. It has long been posited as the primary innovation distinguishing civilization from barbarism (Childe 1950; Gelb 1963:221; Goody 1986; Morgan 1907:12; Sjoberg 1960:32–34, 38). Yet writing, as distinguished from various other mnemonic devices, such as knotted ropes (Ascher & Ascher 1981) or collections of tokens (Schmandt-Besserat 1992), was not present in the indigenous civilizations of Peru and West Africa. Nor was a system capable of recording connected speech present in the central highlands of Mexico at the time of the Spanish conquest. Yet it is impossible to maintain that the Inkas were not civilized while the Old Kingdom Egyptians were, or that the lowland Mayas, who possessed a fully developed writing system, were more advanced than the Aztecs, who did not. In ancient Egypt, Mesopotamia, China and among the Mayas, writing variously was used to record economic transactions, convey messages, record ritual texts, celebrate the deeds of rulers, and preserve medical, calendrical, and divinatory knowledge (Postgate, Wang & Wilkinson 1995). Yet, in these societies, even specialized knowledge remained closely linked to oral traditions, and distinctive literary forms and devices for organizing and conveying knowledge did not develop to any considerable degree until a much later period. For that reason writing's impact on thought in the early civilizations was much more limited than Jack Goody (1986; 1987:300) and others have proposed.

In a formal, organizational sense, writing has long been thought to develop through a unilinear evolutionary sequence. In the late 19th century, Isaac Taylor (1883, 1:5–6) proposed that writing progressed from pictorial and then pictographic (semasiographic) communication, both of which used visible marks to express meaning without systematic reference to linguistic elements, through verbal (logophonic) and syllabic forms of writing, to a final and supremely efficient alphabetic system. Taylor's scheme was systematized by Ignatius Gelb (1963), who linked it with his 'Principle of Unidirectional Development' which postulated that all writing systems had to develop through these successive stages and that it was not possible for any system to reach a more advanced stage without having passed through all the preceding ones (Gelb 1963:205, 252).

The logic underlying this scheme was the observation that phrases, morphemes (minimal meaningful semantic units: words or parts of words), syllables (speech segments consisting of consonants and accompanying vowels), and phonemes (minimal culturally meaningful units of sound) represent in-

creasingly basic and esoteric levels of analysis but at the same time offer ever more efficient means by which to record speech. Linguists agree that it would be impossible to learn to read or write a script that had a separate sign for each sentence or phrase (Unger & DeFrancis 1995). On the other hand, it is believed that morphemes, or words, are more obvious units for recording speech than are sounds and that it is easier to invent symbols to represent many morphemes than it is to devise ways to represent either syllables or phonemes (Sampson 1985:36). Nevertheless, it is also recognized that, given the nature of language, it is impossible to represent speech without employing some purely phonetic elements (DeFrancis 1989). Therefore it is believed that scripts evolved from largely logographic beginnings in the direction of increasing reliance on writing sounds. It has also been assumed that, because it is easier for linguistically unsophisticated speakers to distinguish among syllables than among individual sounds, phonography moves through a syllabic phase to an alphabetic one. David Diringer (1962:17) has encoded the development of scripts in a Darwinian framework by arguing that the 'struggle for survival' is the principal condition for the existence of a particular script and that, barring the 'severe interference' of religious, cultural, or political factors, scripts will evolve in the direction of simplicity and utility. It is widely assumed that the basic principles of alphabetic writing, which have not changed for the past 2500 years, represent the ultimate development of writing systems and that the adoption of this kind of script is necessary for civilization to enjoy 'its full potentialities of progress' (Huxley 1960:30). In the 19th century, it was widely assumed that the Chinese and Japanese scripts, with their large numbers of logograms, made low levels of literacy inevitable and that their survival reflected the general inertia and backwardness of East Asian societies. It was frequently asserted that these societies would have to adopt alphabetic scripts as a precondition for modernization and industrialization. This argument has become increasingly hard to sustain as a result of the vast economic and social progress that has transformed China, and even more dramatically Japan, in the course of the 20th century but not induced them to abandon their traditional writing systems.

Yet unilinear evolutionary studies of scripts also displayed significant non-evolutionary tendencies. As late as the 1960s, it was widely assumed that all early scripts probably were derived from the Sumerian writing system that had developed in southern Iraq beginning in the late 4th millennium BC. This was, and remains, the oldest known script, and the fact that it appeared to have taken longer to develop than any other was interpreted as evidence that it had evolved locally (Gelb 1963:219; cf. Gaur 1987, 1995; Kroeber 1948:514; Pope 1966:23). It was argued that knowledge of writing had diffused along with various other cultural traits from Sumer to Elam, Egypt, the Indus Valley, and eventually northern China, giving rise to the oldest scripts in each of those regions. The geographically remote Maya script, which was then undeciphered, was debarred from consideration by alleging that it was merely an example of semasiography, not writing (Gelb 1963:51–59). Study often was restricted to those scripts that clearly were related to ones that had originated in the Middle East (Pope 1966, 1975).

The Middle East also was lauded as the region where older and more cumbersome writing systems had evolved into the consonantary script that the Greeks in turn had transformed into a true alphabet by adding vowels. It was further suggested that, just as the idea of writing had been invented only once, so the alphabet had a single origin (Kroeber 1948:509). This diffusionist scenario corresponded with more general Eurocentric beliefs that, while Western civilization had begun in the Middle East, it

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had been perfected in Europe (Childe 1925; Montelius 1899). It also accorded with a long-standing idealization of Greece as a font of cultural perfection and the equating of major cultural achievements with Aryan, or Indo-European, peoples (Bernal 1987).

Various arguments, in addition to the claim that basically logographic scripts and alphabets each had a single origin, contradicted the evolutionary notion of gradual, parallel development in different parts of the world. It also was maintained that, because the effectiveness of a writing system depends on its systemic properties, writing would have had to develop rapidly and that the transformation from one type of script to another would have had to occur quickly (Boltz 1994:38; Michalowski 1996:35–36). Kurt Sethe (1939) argued that there was no evidence that a syllabary had ever evolved into an alphabet, as these are traditionally defined, and maintained that syllabic writing was an evolutionary blind alley. To counter this claim, Gelb claimed that the West Semitic consonantal scripts, from which the Greek alphabet was derived, were really syllabaries in which a consonant could be followed by any vowel. Thus, on the basis of a single example and a novel definition, Gelb (1963:211) argued that 'an alphabet could not develop from anything else but a syllabary'.

Finally, much attention was paid to how scripts diffused from one culture to another. Most often an existing script was adapted to write another language. This might result in varying degrees of remodelling, but even when the changes were extensive the historical relations between the two scripts remained obvious. In other instances a new script might be devised by individuals who were familiar with an existing writing system but created one that either was based on different principles or at least did not visually resemble the original. In these cases some combinations of signs and meanings or sound values still tended to be shared, even if in general the scripts were functionally or formally dissimilar. Finally, there were examples of scripts devised by people who knew about writing but were themselves non-literate. These scripts, which constitute examples of what Alfred Kroeber (1940) called stimulus diffusion, might copy signs from existing writing systems but without knowledge of their semantic meaning or phonetic values. The basic organizing principles of such scripts were also likely to bear little resemblance to those of the one being emulated. Gelb (1963:210–211) maintained that all such scripts had to be created at the semasiographic level but quickly evolved into syllabaries, which he regarded as the form of script ideally suited for 'primitive societies'.

A unilinear evolutionary approach to studying the development of writing uncritically incorporated many Eurocentric prejudices into untested deductive schemes concerning how this development ought to have occurred. These schemes were modified by concepts that were unrelated or antithetical to an evolutionary perspective, but seemed necessary to account for obvious discrepancies between evolutionary deductions and factual evidence. Other antievolutionary concepts represented agenda-driven efforts to impose still more Eurocentric prejudices on the study of writing. This mixture was typical of the uncritical approach that characterized most forms of what passed for sociocultural evolutionary thinking in past times (Trigger 1998).

DEFINITIONS AND GENERAL CONCEPTS

There has been a long-standing disagreement about the definition of writing. A broad definition maintains that it is 'a system of intercommunication by means of conventional visible marks' (Gelb 1963:253; Haas 1976; Sampson 1985), while a narrower one restricts writing to being 'a system of more or less permanent marks used to represent an utterance in such a way that

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it can be recovered more or less exactly without the intervention of the utterer' (Daniels 1996a:3). Those who define writing as the recording of speech refuse to recognize semasiography as writing (Bloomfield 1933:283; Coe 1992:13; DeFrancis 1989:20–64; Lounsbury 1989:203; Unger & DeFrancis 1995). It has also been denied that semasiography can develop into more complex writing systems (Daniels 1996a:3; DeFrancis 1989). This debate has grown more heated in recent years as a result of some Mesoamericanists seeking to have highland Mexican record keeping accepted as writing (Boone & Mignolo 1994; Marcus 1992; Smith 1973). Next to whether or not speech is recorded, the most important difference between semasiography and glottography (speech recording) is that a particular semasiographic system only can record information about a specific domain, such as economic accounts or group histories, each of which employs its own conventions, while a system that represents language can record information of any kind (DeFrancis 1989). Hence many maintain that semasiography lacks the generality required to qualify as a writing system.

A broad definition of writing is not inherently objectionable, provided that its use does not obscure important differences between various categories of writing. It would be counterproductive, for example, to ignore the differences between Aztec record keeping, which did not record speech (although it recorded individual names), and the Maya writing system, which did so. In the 17th century, the Huron Indians of Canada left pictographic messages along trails reporting how many people were travelling, by what means, from what villages (identified by their symbols), and some of the problems they might be encountering (Wrong 1939:251–252). Yet they regarded the ability of the French to transmit precise verbal messages over long distances by means of writing as wholly different from anything they could do (Thwaites 1896–1901, 17:135). It therefore might be more informative to refer to semasiography as *recording* and reserve the term *writing* for systems that represent language.

No writing system (thus defined) records all the linguistic structure of speech. Few have developed means for systematically noting the tone, stress, pitch, speed, or loudness of specific utterances. Logographic writing omits the phonemic structure of speech and phonographic writing may omit vowels and fail to distinguish various classes of consonants. Phonographies also represent morphemes with varying degrees of conventionality (Daniels 1996a:11–12). In general, linguistic detail is sacrificed in order to enhance the efficacy with which writing achieves its primary goal, which is to record morphemes, or words, in the order in which they are strung together to form phrases and sentences.

A writing system must be capable of being learned, written, and read with reasonable efficiency. Success in achieving one of these goals does not necessarily imply success in achieving the other two. A limited number of signs must be able to record with minimum ambiguity a limitless number of utterances. Speech can be represented at the morphemic, syllabic, or phonetic level (Rogers 1995:36). The impossibility of using a writing system that would employ a different sign for every different thought ties developed writing systems to the spoken word. But even a logographic script could not handle a different sign for each word, or even morpheme, without a considerable amount of cipherability that relates signs to the spoken language (Unger & DeFrancis 1995:53). This requires incorporating a phonographic element into the script. Hence logographic scripts must always be logophonic, or more precisely morphophonic (morphemic + phonetic signs) (DeFrancis 1989:58; Hill 1967) ones.

With purely phonographic scripts, representing the phonemic rather than the more extensive phonetic properties of language

reduces the number of signs that are required without sacrificing intelligibility. On the other hand, having fewer signs than are needed to approximate the phonemic structure of a language creates problems. The use of single letters to represent more than one consonant in the early modern Arabic script, which resulted from the Arabic language having more consonants than did Aramaic from which its script was derived, eventually required adding dots to distinguish various consonants (Bauer 1996:559). Likewise, the reduction of some versions of the Scandinavian futhark, or runic alphabet, from 24 to 16 letters beginning in the 8th century AD led to the development of 'pointed' or 'dotted' runes to restore clarity (Elliott 1996:336). While it is assumed that alphabetic scripts generally seek to represent the spoken language as closely as possible, the desire to promote easier reading, accommodate dialect variation, and preserve access to records of earlier periods encourages logographic tendencies in such scripts. In English the shared morpheme in *photograph/er* and *photograph/ic* is written but not pronounced in the same manner. Contrariwise, the words *blew* and *blue* or *right* and *rite* are pronounced the same but their semantic difference is emphasized by their being spelled differently. Noam Chomsky and M. Halle (1968) maintain that such deviations from a purely phonemic representation of spoken English enhance the intelligibility of written English. In phonographic systems there is an enduring tension between pure phonemicism and stressing morphemes.

There are also few, if any, pure scripts. Terms such as logophonic, syllabic, and alphabetic refer to a script's predominant organizing principles. They do not exclude the presence of other forms of recording information. Semasiography abounds in modern Western societies alongside alphabetic writing. As a result of growing multilingualism in cosmopolitan centres, signs that regulate traffic, indicate how to assemble and use equipment, zone smoking, and denote gendered washrooms have become increasingly semasiographic in form (Sampson 1985:30–32). Numerals also constitute an internally highly ordered semasiographic system that can be read in any language. Logograms are used to write words such as *and* (&) or *dollar/dollars* ($). Many of the problems encountered in classifying scripts result from the deductive manner in which such classifications have been conceptualized in accordance with evolutionary preconceptions. As a consequence, stages in the development of scripts have been distinguished in too absolute a fashion and different types of scripts have been merged to form convenient but deceptive evolutionary types: the latter process being most evident in the omnibus use of the term *alphabet* (Diringer 1962; Kroeber 1948). As a result of both tendencies significant variation has been overlooked. On the other hand, cross-cultural regularities have been detected in writing systems that are too specific to be considered in this paper (Justeson 1976).

HISTORICAL SURVEY

This section traces the development of writing systems, paying particular attention to their specific organizing principles and historical relations. By moving forward in time following actual lines of development, we seek to avoid imposing a theory-derived, deductive structure on this presentation.

Semasiography

Whether or not it is classified as writing, semasiography (Gelb's descriptive-representational and identifying-mnemonic devices) has been practised in many parts of the world and in societies at many levels of development. Its principal feature is the use of pictograms or ideograms to represent ideas. A pictogram has a specific meaning but this meaning can be expressed verbally in many ways (Doblhofer 1973:15–29; Gelb 1963:11–12; Sampson 1985:28–30). Plains

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Indian year lists represented the year 1876 by depicting the death of a long-haired American cavalry officer. This could be read as 'The year Long-hair was killed by the Sioux', 'The year we defeated General Custer', or 'When we won the battle of the Little Bighorn' (Nabokov 1996:39–41). Plains Indians also used pictograms to write personal names, such as Red Cloud, Big Bear, and Red-Horn Bull. Thus a logographic element was present even in some of the most rudimentary forms of recording. This supports Gelb's (1963:66) suggestion that the need to represent proper names encouraged the development of logography.

More advanced forms of what might be called semasiologography (Gelb's limited systems) are found in highland Mesoamerican cultures and in Iraq and Egypt at the dawn of civilization. The Aztecs had professional scribes who produced elaborate bark-cloth codices. In some of these books they used standardized symbols to record the migrations of families and ethnic groups and the births, marriages, and deaths of leading individuals. Other books recorded the tribute owing from various parts of the empire as well as divinatory information. The Aztecs also had a well developed system for representing calendar dates. Nevertheless, their codices recorded ideas, not actual sequences of words. Verbal accounts had to be conveyed orally, while the pictograms served to refresh the transmitter's memory. Some pictograms were used as rebuses to suggest the names of people and places, but it is unclear how far the process of phoneticization had developed prior to the Spanish conquest. On the Tizoc Stone, which dates from the 1480s, the town of Tochpan was identified by a rabbit (*tochtli*) and Matlatzinco by a mat (*matatl*), but few phonetic signs were added to specify even common secondary elements such as locatives and diminutives. Phoneticism may have increased in the late prehispanic Aztec recording of proper names and been more common in some neighbouring regions of highland Mexico. There is, however, no evidence of standardization in the writing of abstract concepts (Nicholson 1973:5–6).

An analogous situation is found with Proto-Cuneiform Sumerian texts, which begin to appear in southern Iraq about 3400 BC. These texts itemize goods, names, and quantities but phonetic complementation was rare and no attempt was made to record speech or even to present information in a specific order (DeFrancis 1989:214–216; Nissen 1986). It was only after ca. 2400 BC that the Sumerians wrote extended texts with spoken language determining the order of signs. Even then vital grammatical elements that native speakers of Sumerian could supply from context often were omitted (Cooper 1996:37, 43; Nissen, Damerow& Englund 1993:123; Sampson 1985:50). The ancient Egyptian royal court began to use rebus-like labels to indicate personal names, calendar years, and the contents of jars and boxes in late Predynastic times (ca. 3100 BC). But there is no evidence of continuous texts being produced until ca. 2500 BC. While Egyptians began to use semasiologography later than the Sumerians, they appear to have developed an effective writing system about the same time as, or even ahead of, their Iraqi neighbours (Baines 1983:574–577; Ray 1986).

There is no evidence that at the time of the Spanish conquest highland Mesoamerican semasiologographic recording, which had been employed for a long time, was evolving in the direction of a logophonic system. Only for noting proper names was there a tie between signs and specific languages. On the other hand, in Iraq and Egypt analogous recording systems evolved into true writing systems over the course of 1,000 and 600 years respectively. It is salutory to remember that the early stages of Sumerian and Egyptian recording were basically similar in type to that of highland Mexico, with no effort being made to write phrases or sentences. Yet for Iraq and Egypt this early recording habitually has been

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referred to as writing, while for highland Mesoamerica until recently the term writing generally was avoided. This has given the impression that the recording of speech developed earlier in Iraq and Egypt than it actually did and has diverted attention from two examples of semasiologographic recording systems evolving into true writing. While Sampson (1985:49) has argued that Archaic Sumerian was logophonic because its signs appear to have stood for elements of a spoken language, he concedes that in the absence of full sentences 'the distinction between semasiography and logographic writing tends to dissolve'. The Sumerian and Egyptian examples indicate not only that logophonic writing systems can develop from semasiographic recording but also that this development need not be rapid. The theory of the rapid origin of writing erred in assuming that to be useful recording systems had from the beginning to be able to record everything (Boltz 1986:432; Michalowski 1996:35–36). The latter was an emergent property of systems that at first had recorded information about highly delimited subject matters.

Logophonic scripts

Four early scripts that represented the spoken word are understood well enough to be compared. These are the writing systems of the Sumerians, Egypt, Shang China, and the Mayas of Mexico and Central America. All of them are based on generally similar principles. Signs represented both words or morphemes (logograms) and sounds (syllabograms or phonograms), while in all but the Maya script taxograms that had no sound values were used to classify words. In these scripts only the taxograms stood for 'ideas' independently of language. Chinese has four characters each of which signifies a different word meaning red. Since these terms do not refer to different varieties of red, a recording system that was semasiographic rather than logophonic would have needed only one character (Sampson 1985:149). Logograms that stood for words that could be represented easily (sometimes called zodiographs [Boltz 1994:33, 54]) were extended semantically to represent more abstract concepts. In ancient Egyptian a circle representing *r'* (sun) was also used to write day (*hrw*). Such signs also were expanded phonetically, or in rebus fashion, to indicate homonyms or near-homonyms: Egyptian *nb* (basket) was also used to write *nb* (lord). To reduce the resulting uncertainty about which reading was intended, semantic extensions often were supplied with phonetic complements that provided clues to their pronunciation, while homonyms were distinguished by determinatives that indicated a general meaning class with which the word was associated (in Egyptian *nb* [lord] could be followed by the taxogram for king) (Boltz 1994:12–13).

Despite these highly significant similarities, the four writing systems varied considerably from one another. The Sumerian script was a logosyllabic one. In general, signs were used logographically to write unbound morphemes, such as nouns, verbs, and adjectives, and syllabically to write bound morphemes and provide phonetic complements to clarify the readings of logograms. Sumerian syllables took the forms CV (consonant-vowel), V, VC, and CVC (which often was represented as CV + VC). By 2500 BC, Sumerian employed an informal syllabary of 100 to 150 signs as well as several hundred logograms and taxograms (Cooper 1996:37–45).

Ancient Egyptian, by contrast, was a logoconsonantal script. In its phonographic notation vowels were omitted. This was facilitated by ancient Egyptian being an Afroasiatic language in which semantic meaning largely was expressed through consonants and grammatical meaning by means of vowels; hence native speakers normally could supply vowels from context. Most Egyptian words contained one to three consonants and a consonantary was developed consisting of 26 signs representing single

consonants (uniliterals), about 80 signs representing two successive consonants (biliterals), and approximately 70 signs representing three successive consonants (triliterals) (Ritner 1996a). In the Middle and New Kingdoms a special form of full or group writing, which represented vowels as well as consonants, was used to transcribe foreign names (Gelb 1963:168–171). The ancient Egyptians made extensive use of their consonantary to provide phonetic complements for logograms. Throughout most of Egyptian history about 700 signs were used at any one time.

Chinese writing often is described as purely logographic because it provides a separate character for each morpheme. Thus every homonym is represented by a different sign. In the late Shang period, around 1200 BC, when the script is first attested, the vast majority of characters, numbering about a thousand, represented single morphemes, often in recognizable pictorial form. Even then, however, as characters underwent both phonetic and semantic extension in an effort to represent more abstract words, it was necessary to supply clues to pronunciation and meaning in order to maintain their intelligibility. This was done by combining simple characters to create compound ones; one part of which provided a clue to pronunciation, the other an indication of meaning. Gradually the semantic classifying element (or radical) came to be written on the left side of the character and the phonetic indicator on the right.

The fact that most words in Early Chinese were monosyllabic meant there were no syllables and hence no characters *without* semantic meaning. In the Han period, however, scribes began to use alternative homophonous signs to write the same word, thus moving in the direction of syllabic writing. This trend was arrested by imposing semantic classifiers on all characters to ensure that they remained logographic. Thereafter, a limited subset of characters (many otherwise obsolete) were used phonetically only to transliterate foreign words (Sampson 1985: 166–167). The practical reasons for opposing phoneticization are said to have been the increasing homophony of spoken Chinese and the growth of dialects in the Han period. It also has been argued that phoneticization was opposed because it was viewed as threatening a highly valued cultural order in which writing and speech were symbolically dichotomized (Boltz 1994:170–177). Despite the triumph of logography, 66 percent of the characters used to write modern Mandarin are described as 'functionally syllabograms' and 99 percent offer some phonetic specification for their reading (Unger & DeFrancis 1995:52). Because of that, the Chinese writing system has been described not inappropriately as a huge, but imprecise syllabary as well as a logography. Although about 50,000 characters are listed in dictionaries, 2,400 suffice to write 99 per cent of all words (Boltz 1986, 1994).

The logosyllabic Maya script, which is abundantly attested after AD 250, appears to have evolved from the same Olmec(oid) recording system (1100–400 BC) that also gave rise to the semasiographic systems of highland Mexico (Justeson 1986). The Mayas used a large number of logograms to write nouns, verbs, and other unbound morphemes, and a relatively compact CV syllabary to write affixes, to clarify the reading of multivocal logograms, and sometimes to replace logograms. While the Maya script had approximately 800 signs, some 150 of which had a syllabic function, only 200 to 300 of these signs were actively employed at any one time (Coe 1992:262; Justeson 1989).

Each of these early writing systems systematized the use of signs to record speech. To accomplish this, it was necessary to devise ways to represent sound patterns as well as morphemes. Yet these four scripts exhibit radical variations in the way this was accomplished. The two most functionally similar are Sumerian and Maya, both of which are logosyllabic. Yet they are the

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most widely separated in time and space and differ radically in their formal properties. While it has been suggested that there is some evidence of Sumerian influence on the formation of a few Egyptian signs (Baumgartel 1955:48; Diringer 1962:47; Spencer 1993:61–62), it is now evident that Egyptian recording began while Sumerian was still at a semasiologographic stage. Moreover, the overall organization of Egyptian as a logo-consonantal script is very different from that of Sumerian. At most, influences from Iraq might have exerted a minor influence on the development of Egyptian writing, although it is not clear how or when this would have occurred. The Chinese script is unique in its enduring adherence to the principle that each character must have semantic value. Despite its appearance of formidable complexity, the structure of Maya writing was more economical than that of the other three. These differences not only suggest the separate origin of these scripts but caution against following Gelb (1963) and Daniels (1996b:585) in labelling all of them logo-syllabic.

There are a number of other logophonic scripts that could have been original inventions or derived by stimulus diffusion from Sumerian or Egyptian prototypes. These include Proto-Elamite (Englund 1996; Vallat 1986), the Indus script (Parpola 1986, 1996), Cretan Hieroglyphic (Bennett 1996; Olivier 1986) and Hittite Hieroglyphs, which were used to write Luwian (Hawkins 1986; Melchert 1996). The last two scripts may be historically connected. Other logophonic scripts in Western Asia were directly or indirectly derived from Sumerian writing, as it was adapted to write other languages. In general, these scripts exhibit fewer logographs and a greater reliance on syllabic writing.

The first of these adaptations was the Old Akkadian script, which recorded the Semitic language of Iraq beginning in the third millennium BC and developed into the cuneiform systems that later were used to write Babylonian and Assyrian. Old Akkadian developed about the same time that Proto-Cuneiform was being perfected for writing Sumerian. While Sumerian cuneiform remained heavily logographic and made limited use of phonography, in Akkadian almost any word could be written phonographically or logographically, as individual scribes preferred. In discursive texts of all kinds logography rarely exceeded 15 percent (Cooper 1996:52). Moreover, relations between sounds and graphs grew more complex as Sumerian logographs and even words written syllabically in Sumerian were used logographically to write Akkadian equivalents. The values of syllabograms also became increasingly multivalent as Akkadian-derived sound values were added to existing Sumerian ones. This made taxograms more important for specifying correct readings. Yet, at most periods Akkadian scribes used only 200 to 300 signs, while a scholar at the Assyrian court might have had to know the syllabic and/or logographic values of approximately 600 signs (Cooper 1996:45–57; Nissen, Damerow & Englund 1993:117–118; Sampson 1985:56–57). Still later, cuneiform scripts derived from Old Akkadian or Neo-Assyrian, such as Elamite, Hurrian, and Urartian, used a reduced number of logograms and far more limited and systematically organized syllabaries. However, Hittite cuneiform, which recorded an Indo-European language, maintained many of the complexities of Akkadian (Gragg 1996).

Chinese was used as a written language by various neighbouring peoples who did not speak Chinese. Some of these groups created logographic, Siniform scripts, resembling Chinese but employing distinctive characters, to write their own languages. The Tangut script, introduced in AD 1036 to write a Tibeto-Burman language of present northwestern China, had approximately 6,600 characters (Kychanov 1996) and the Yi script of southwestern China is estimated to have used 8,000 to 10,000 (Shi 1996). The Kitan and Jurchin of Manchuria made use of syllabograms and phonemic symbols

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in addition to logograms to write their languages (Kara 1996a).

As the Chinese script was adapted to write Japanese words and then the structurally very different Japanese language, characters (*kanji*) derived from Chinese writing were given both *on*-readings, based on their pronunciation in numerous Chinese loan words, and *kun*-readings, representing the corresponding morpheme in Japanese. In the 9th century, two stylistically different syllabaries (*kana*), which eventually were standardized at 49 signs each, were derived from the *kanji*, either of which would be sufficient by itself to write Japanese. Since then *kanji* have been used to write nouns, verbs, and adjectives, as well as some adverbs, while *kana* are used to write particles, auxiliary verbs, and grammatical elements and to annotate *kanji*. At present about 2,000 *kanji* are being used regularly (Sampson 1985:172–193; Smith 1996). The Koreans added specifically Korean meanings and readings to Chinese characters and invented new Siniform ones to render native Korean words but Chinese writing continued to dominate Korean high culture into the 20th century (King 1996; Sampson 1985:120–144).

In Iraq, Egypt, China, and Mesoamerica logophonic systems, once established, tended to persist unchanged in their general principles over long periods. None of these scripts showed signs of evolving into a purely phonographic one. Nor did the Maya script have any significant impact on neighbouring writing systems. On the other hand, in both Western Asia and East Asia, most scripts derived from, or modelled on, the Sumerian and Chinese ones made greater use of phonological techniques for representing speech and less use of logographic ones than did the parent writing systems. Gelb (1963:196) maintains that 'in all cases it was the foreigners who were not afraid to break away from sacred traditions and were thus able to introduce reforms which led to new and revolutionary developments'. Likewise Kroeber (1948:517) has argued that, even if the ancient Egyptians had realized that they could have written their language using only uniliterals, they would have been unwilling to discard 96 percent of their writing system. East Asian secondary scripts have adhered to Chinese cultural values by continuing to place far more emphasis on logography than is the case in Western Asia and Europe. While Japan has had a potentially self-sufficient syllabic script for over 1,000 years, *kanji* have not been abandoned and in recent decades the use of such signs has been increasing.

Phonographic scripts

Historical evidence indicates that scripts that relied almost wholly upon the representation of sounds to record speech appeared later than logophonic ones. Gelb (1963) assumed that the elimination of the logographic element in scripts produced syllabaries and these in turn gave rise to the alphabet. Yet, in addition to the historical problems with this position, the conventional dichotomy between syllabaries and alphabets tends to exaggerate the differences among phonographic scripts. From Roman times into the 19th century reading and spelling were taught syllabically rather than alphabetically; hence it could be argued that alphabets were regarded merely as an economical way of writing syllables (Justeson & Stephens 1993:4–6). On the other hand, the classification of phonographic scripts now recognizes at least four different types: (1) syllabaries, in which signs denote particular syllables and there are no systematic graphic resemblances among characters representing phonetically similar syllables; (2) consonantaries, or *abjads*, in which the signs indicate individual consonants only; (3) alphabets, in which the signs denote individual, usually phonemically significant, vowels and consonants; and (4) alphasyllabaries, or *abugidas*, where each sign denotes a consonant accompanied by a specific vowel (usually *a*) and

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other vowels are denoted by systematic modifications of the signs (Daniels 1996a:4).

There are no clear examples of a functioning syllabic script, as defined above, developing directly from a logophonic one. Mycenaean Greek Linear B was a syllabic script and the earlier Minoan Linear A appears to have been also, although Linear A texts have not been deciphered. Linear A may have developed from Cretan Hieroglyphic but there is no proof of this (Olivier 1986). Neither Linear B nor the related Cypriote syllabary that was used to write Greek between 800 and 200 BC gave rise to any later scripts (Bennett 1996). Japanese writing provides an example of a potentially self-sufficient syllabary being derived from a logophonic script but this did not result in the elimination of logograms. While Japanese writing is often called a 'mixed system' (Sampson 1985), it can be classified more economically as a logosyllabic one with a highly regular and comprehensive syllabary (Coe 1992:264).

On the other hand, when scripts are devised by non-literate groups who have come into contact with peoples who use alphabets or consonantaries, these new writing systems often take the form of syllabaries. A number of scripts of this sort were devised by aboriginal North Americans during the 19th century, most notably the Cherokee syllabary invented by Sequoah, a non-literate Indian silversmith in 1824. Syllabaries inspired by the Roman alphabet were also produced to write the Woleaian language of the Caroline Islands beginning in 1905 and the Ndjuka creole language of Surinam before 1916. Several syllabaries were invented in the 19th and 20th centuries by West Africans who had been in contact with people using the Arabic consonantary (Daniels 1996b; Justeson & Stephens 1993: 7–9, 10–21; Scancarelli 1996; Shingler 1996; Walker 1996). While some of these scripts went through brief periods of experimentation with semasiography and logography before developing into syllabaries, not all did. This disproves Gelb's (1963:206–211) assertion that scripts that arise as a result of stimulus diffusion must pass successively through all the stages through which scripts originally developed before they become syllabaries. It is now being argued that these syllabaries arose as a result of non-literate individuals misconstruing the recitation of the names of letters of alphabets or consonantaries as indicating that these letters stood for syllables (Justeson & Stephens 1993). An early example of this appears to be the syllabic portion of the Iberian scripts that developed in the 7th century BC following Phoenician contact with Spain (Justeson & Stephens 1993:21–30; Swiggers 1996a). Yet, while syllabaries appear to have been devised among numerous groups who were superficially exposed to alphabets or consonantaries but did not understand their basic principles, there is no evidence that syllabic scripts constitute an intermediate stage in the development of writing between logographic systems and purely phonemic ones.

Consonantaries were invented among the Semitic-speaking peoples of the Middle East beginning in the Middle Bronze Age (2000–1525 BC) and were increasingly used in the Late Bronze (1525–1200 BC) and Iron Ages (after 1200 BC). The earliest well-documented example of this type of writing is a cuneiform script consisting of 30 freely-invented letters that were used to record the West Semitic language spoken at Ugarit, Syria, in the 15th and 14th centuries BC. By the beginning of the Iron Age, various poorly attested linear consonantaries dating from as early as 1700 BC had given rise to a cluster of Northern Linear consonantaries of approximately 22 letters that were used to write Phoenician, Old Hebrew, and other West Semitic languages and to a very different 28-letter South Linear consonantary that was used to write North and South Arabic and eventually Ge'ez, a Semitic language spoken in Ethiopia. In these systems each sign represented a single consonant. While

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the Southern Linear consonantaries retained a purely consonantal structure, between the 9th and 5th centuries BC the northern scripts began to use the consonants *'aleph*, *'ayin*, *waw*, and *yodh* to indicate the presence of long vowels. The majority of vowels continued, however, to be omitted. Because so many vowels are not specified, a reader must be familiar with words in advance in order to read them correctly (O'Connor 1996).

It is unknown precisely where in the Levant this form of writing developed, and whether it was invented once or several times. Its creators were almost certainly West Semitic speakers. A consonantal script was suitable for a language in which, as in ancient Egyptian, consonants indicated most of the semantic meaning, while vowels expressed grammar and to a large degree could be inferred from context by native speakers. These consonantal scripts structurally resemble the uniliterals that were employed to indicate single consonants in ancient Egyptian writing, although the shape-sound combinations of the individual letters are totally different. It is possible that one or more individuals with a limited knowledge of ancient Egyptian used the idea of uniliterals to create a simple but comprehensive system for writing West Semitic languages. If so, they effected a radical simplification that seems never to have been contemplated by the ancient Egyptians (Millard 1986).

The Phoenician script gave rise to a distinctive Aramaic consonantary and by 700 BC this Semitic language and its writing system were established as the primary media of communication in the Middle East. Eventually both the Hebrew and North Arabic languages, which were already recorded using the Phoenician and South Linear consonantaries respectively, came to be written in their own versions of Aramaic script. Between AD 600 and 1000, Aramaic, Hebrew, and Arabic developed the use of specialized points or diacritics that could be written above or below consonants to indicate the correct pronunciation of all vowels that were not already indicated by consonants. Pointing was used mainly to resolve ambiguities and ensure the correct reading of religious texts. In secular contexts Arabic and Hebrew continue to be written as unpointed consonantaries (Bauer 1996; Daniels 1996c).

In due course Aramaic scripts were adapted for writing various non-Semitic languages of Central Asia: Persian, Parthian, Sogdian, Bactrian, and Uyghur Turkic (Skjaervø 1996; Kara 1996b). The Hebrew script was used to write Ladino and Yiddish, as well as Judaeo-Arabic (Hary 1996). The Arabic script spread with Islam and was modified to write Persian, Pashto, Urdu, Sindi, Ottoman Turkish, Malay, and other languages (Kaye 1996). While these languages do not share the privileging of consonants found in Semitic and other Afroasiatic languages, the scripts used to write them continue to underspecify vowels. In many languages using these three scripts, Arab, Hebrew, and Aramaic loanwords are written in their original, rather than their locally adapted, forms. Everywhere the Arabic script has been adopted to write local languages, the active use of the Arabic language and texts is closely associated with Islamic religious practices.

The first alphabet was developed among Greek speakers, probably between 800 and 775 BC. Close similarities in forms, names, and values of letters confirm that the Greek alphabet was derived from the Phoenician consonantary; letters that were not needed to write Greek consonants being used to write vowels, which in Greek, unlike Phoenician, occurred at the beginning of words (Swiggers 1996b; Voegelin & Voegelin 1961:63–65). In Archaic Greek writing, vowels were sometimes omitted postconsonantally when they were the same as the vowel following the consonant in that consonant's name (Justeson & Stephens 1993:5). Eventually, however, all vowels were indicated consistently.

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A western variant of the Greek alphabet soon was transmitted to Italy, where it was used to write numerous languages and its letters developed a new set of forms, names, and values (Bonfante 1996). Hereafter the Greek and Roman alphabets were to dominate European writing.

In ancient times the Greek alphabet spread east to provide writing systems for various languages in Asia Minor: Phrygian, Pamphylian and Sidetic, Lycian, Lydian, and Carian (Swiggers & Jenniges 1996). In the 4th century AD, the Greek alphabet was adapted for writing the final stage of the ancient Egyptian language, known as Coptic. This script continues to be used to record the liturgical language of the Coptic Church. Initially Greek alphabetic writing was employed to specify the pronunciation of magical names written in late ancient Egyptian ritual papyri (Ritner 1996b:287). Later, when it was employed to record whole texts, it clarified the pronunciation of the large numbers of foreign names and terms that occur in Egyptian Christian literature. The abandonment of hieroglyphic and demotic writing marked a clear break with Egypt's pre-Christian past and soon made the reviled non-Christian literature of earlier times totally inaccessible. The Gothic alphabet, which was invented in the 4th century AD to write a Germanic language spoken in Eastern Europe, is now believed to have the Greek alphabet as its only source (Ebbinghaus 1996). The Armenian and Georgian alphabets were freely modelled on the Greek one at about the same time (Holisky 1996; Sanjian 1996). The Greek alphabet spread north with Orthodox Christianity and in its Cyrillic form was used to write a number of Slavic languages: Bulgarian, Macedonian, Serbian, Ukrainian, Belarusian, and Russian. More recently it has been adapted to write a number of non-Slavic languages of the Soviet Union (Cubberley 1996).

The Roman alphabet was used with considerably less variation to write the vernacular languages of the Roman Catholic portions of medieval Europe and has since been spread around the world by European colonists and employed by Christian missionaries to record the languages of many non-literate peoples. A major exception to its latter use was the creation by missionaries in the 19th century of syllabaries to provide writing systems for various Canadian aboriginal languages; a development inspired by the rapid spread of literacy following the invention of the Cherokee syllabary (Gleason 1996; Nichols 1996).

A highly variant form of the Roman alphabet was the runic *futhark*, which appeared in Denmark in the first century AD and spread into Britain, Norway, and Sweden, being used in some areas until the 13th century. While claims of autonomous origin were once made, formal parallels suggest that it was invented in Denmark by someone familiar with the Roman and one or more northern Italic alphabets (Elliott 1996). The Ogham alphabet, which is the earliest known writing system in Ireland, where it was used from the 5th to 7th centuries AD, appears to have been inspired by the Roman alphabet, but differs radically from it in the form, sound values, and sequences of letters (McManus 1996). It may have been based on less knowledge of the Roman alphabet than was the runic one. Both the runic and Ogham scripts seem particularly well suited for carving on wood and stone; a feature they both share with the Aramaic-derived Turkic Orkhon script from 8th-century AD Mongolia (Kara 1996b:536–539).

Although it is frequently claimed that the alphabet was invented only once, this is not the case. Alphabets have been created as a result of the systematic addition of vowels to the Arabic script used to write the Kurdish, Kashmiri, and Uyghur languages (Kaye 1996:749, 753, 759). The Aramaic Uyghur script, which was likewise largely alphabetized, inspired the Mongolian alphabet and it in turn provided the basis for the Manchu alphabet created in AD 1599 (Kara 1996b:545–554). Nevertheless, alphabets

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have not replaced consonantaries for writing many languages for which it is important to specify vowels.

The Korean Hankul script, promulgated in AD 1446 for the use of common people, is a phonemically based alphabet in which consonants and vowels are grouped to form syllable blocks that superficially resemble Chinese characters. While it has been suggested that the inventor of this script was aware of various forms of Mongolian phonographic writing, no available script offered a precedent for the high level of organization and the sophisticated phonological analysis incorporated into Hankul. Hankul continued to be regarded as a low-status script until the 20th century, when a 'mixed script' style emerged in which morphemes of Chinese origin continued to be written in Chinese characters while native Korean words and grammatical endings were written in Hankul. Students in South Korea still learn approximately 1800 logograms (King 1996:219–226; Sampson 1985:120–144).

I have found no evidence of alphabets giving rise to consonantaries or any other form of writing, except in situations of stimulus diffusion when they have sometimes inspired the development of syllabaries or complex semasiographies. In Egypt, alphabetic writing was replaced by a consonantary, but only when the Coptic language was superseded by Arabic. Today, in Tajikistan the Cyrillic alphabet is being challenged by the Arabic consonantary as a consequence of Islamic nationalism, while in some other former Soviet Republics it is threatened with replacement by the Turkish or Roman alphabets (Comrie 1996:783–784).

There are four documented inventions of alphasyllabaries. Old Persian cuneiform, which appears to have been devised for the trilingual inscription of Darius I (550–486 BC) at Bisitun, used 22 signs to signify consonants followed by the letter *a*, and three vowels to write *a*, *i*, *u* in word-initial position, long *a*, and *i* or *u* following any consonant (in which case the *a* that inherently followed the consonant was suppressed). Nine consonants took a different form before *i*, *u*, or both. Old Persian also employed seven logograms and a word divider. This script is thought to have been devised by individuals familiar with the Aramaic consonantary and the Ionic Greek alphabet (Justeson & Stephens 1993:30–36; Testen 1996).

Of much greater historical importance are the South Asian and Southeast Asian scripts derived from Brahmi, which was in use in India at least as early as the 4th or 5th centuries BC (Allchin 1995:176–179; 209–216; 335–337). Some Indian scholars maintain that the Brahmi and closely related Kharoshthi writing systems are of wholly Indian origin and may be derived from the Indus script. Similarities in shapes and sound values between letters in the Aramaic and Kharoshthi scripts, and to a lesser degree in Brahmi, indicate knowledge of Aramaic writing, perhaps derived from Middle Eastern merchants. Nevertheless, the highly distinctive principles that structure these Indian scripts and the extremely systematic development of their sign forms suggest that Brahmi and Kharoshthi were elaborated by Indian scholars. Both scripts consist of a set of basic signs representing consonants and consonant clusters followed by the vowel *a*. These signs are modified by diacritics to represent consonants followed by other vowels or by no vowel. Although the basis of these scripts is an *aksara*, or graphic syllable, the syllables are composed of alphabetic units (Justeson & Stephens 1993:9–10; Salomon 1996). While Kharoshthi was used only in what is now Pakistan and eastern Afghanistan and died out in ancient times, Brahmi became the source of the indigenous scripts used to write all the languages of South Asia, as well as many in Tibet, Central Asia, and Southeast Asia (Burmese, Karen, Shan, Mon, Khmer, Thai, Lao, Malay, Javanese, and some Philippine languages) (Daniels & Bright 1996:384–484).

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Brahmi thus constitutes one of the major 'parent' scripts of the world. In the course of its spread the phonology and writing styles, but not the basic principles, of the script have varied considerably.

The third alphasyllabary is the Meroitic script, which was created in the Sudan in the third century BC to write the principal language of the kingdom of Kush. This script was developed from the Egyptian full or group writing that the Meroites previously had used to write names and words from their own language in texts that they composed in ancient Egyptian. They employed fifteen signs to represent consonants followed by *a*; four to indicate *e*, *i*, and *o* after consonants, as well as word-initial *a*; four to write specific syllables; and a word divider. This was the most economical of all the alphasyllabaries, using a total of only 24 signs (Justeson & Stephens 1993: 39–40; Priese 1973).

The final alphasyllabary was developed in Ethiopia in the 4th century AD from the South Arabian consonantary that was used to write Ge'ez. As the number of people who used Ge'ez as a second language increased and more specification of vowels became desirable, the consonantary was turned into an alphasyllabary by using each of the basic letters to represent a consonant plus *a* and adding diacritics to these basic signs to represent consonants followed by other vowels. This writing system later was used to record other Ethiopian languages, including Amharic (Haile 1996).

These four alphasyllabaries, despite their similar organizing principles, cannot be traced back to a common source. Two (Old Persian and South Asian) were developed by scholars who appear to have been familiar with the Aramaic consonantary and it has been suggested that the idea of an alphasyllabary might have been transmitted from India to Ethiopia in the context of the extensive sea trade between those two regions (Justeson & Stephens 1993:10). The Meroitic script developed too late to have been inspired by Persian sources during the Persian occupation of Egypt. Three of these systems represent efforts to supply vowels to new scripts that were being created with consonantaries as a model. The fourth appears to have resulted from extending a specialized syllabary used to write Meroitic words to write the whole language.

DISCUSSION

We can now consider to what extent the development of writing displays some sort of evolutionary patterning. Since the earliest recording by means of visible signs, new writing systems have been created on the basis of varying degrees of knowledge of existing ones. Hence comparing various sequences provides an optimal basis for generalizing about the evolution of writing.

It is now clear that, contrary to what was once widely believed, writing had multiple origins and developed in a far from unilinear fashion. Of the four best-known early writing systems (there may have been a few others), at least three (Sumerian, Shang Chinese, and Maya) appear to have developed completely independently of one another. While Sumerian writing may have influenced the early development of the ancient Egyptian system, these two scripts are based on significantly different principles and evolved slowly in separate cultural contexts. While four independent, or nearly independent, cases do not constitute a large sample of early scripts, comparing them permits more effective generalization about how such scripts were conceived than would be possible if all of them stemmed from a common source.

Semasiography, or the use of signs as mnemonic devices to represent ideas, is widespread in small-scale societies. Some of these societies also use signs logographically to record names. A particular semasiographic system (more than one of which may be used simultaneously) is limited to recording information about a specific cul-

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tural domain. Since such systems record mainly ideas rather than language, their interpretation requires learning in advance and remembering what information was encoded.

As societies grew more complex, some (but not all) developed more systematic semasiologographies to record various categories of information, including numerical data. Some of these systems employed logograms more extensively and extended their use phonetically to clarify readings and record aspects of speech that were difficult to represent logographically. As this occurred, some semasiologographies evolved into writing systems that were capable of recording languages. The now well-documented development of Sumerian-Akkadian and ancient Egyptian writing demonstrates that semasiologographic recording can evolve into logophonic writing systems, but not apparently directly into phonographic ones. This suggests that in the evolution of writing systems the representation of words has cognitive priority over the representation of sounds (Daniels 1996b:585). The argument that semasiographic systems are not forerunners of writing is true only in the sense that systems that record speech are derived from the originally quite restricted logographic, rather than from the mnemonic, components of semasiologographic systems. All comprehensive writing systems are irreversibly committed to the representation of speech.

While each of the early writing systems came to record speech by expanding the use of its signs both semantically and phonetically, the reduction of ambiguity required the extensive use of phonetic indictors. Because of that, these scripts are often called logosyllabic, following Gelb. Gelb's usage disguises, however, the variation inherent in the ways phonetic representation was achieved in these scripts. Two of them, Sumerian and Maya, did use numerous signs to record syllables. Ancient Egyptian, however, disregarded vowels and concentrated on representing consonants, thus producing a logoconsonantary. Chinese created a separate character for each morpheme but to render such a script manageable had to incorporate phonetic indictors into most characters. Chinese is best described as a logographic system with a systematically built-in phonetic component.

It has been suggested that logophonic writing is most likely to develop for languages that have many single-syllable morphemes and much morphemic homophony, such as Chinese and Sumerian, or basic root forms that are readily isolatable, such as Egyptian and Maya (Daniels 1996b:585; Justeson 1986:451–452). It also has been proposed that only an uninflected language, such as Chinese, is likely to be written in a primarily logographic script (Sampson 1985:148). Such arguments do not, however, appear to explain why the Inkas or Yorubas did not develop scripts or why Aztec recording remained at the semasiologographic level (Rogers 1995:37–38).

Scripts that are wholly or predominantly phonographic developed later than logophonic ones. It also appears that phonographic scripts did not develop without some knowledge of existing logophonic ones. Finally, three of the four well-known logophonic systems eventually were replaced by already established phonographic scripts. There also seems to be a general tendency for writing systems to become less logographic and more phonographic when they are used to write new languages. This was true for Akkadian by comparison with Sumerian and still more so for most of the cuneiform scripts that were derived directly or indirectly from Akkadian to write non-Semitic languages. The disjuncture between Egyptian writing and the West Semitic consonantaries that it may have inspired was even greater. In East Asia logographic writing has remained extremely important, dominating Chinese writing to the present and still playing a major role in Korean and Japanese

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scripts, alongside a locally invented alphabet in Korea and syllabaries in Japan.

Despite these trends, there is no evidence that a well-developed logophonic script ever evolved directly into a predominantly phonographic one. Ancient Egyptian hieroglyphic writing, which utilized about 700 signs in the Middle Kingdom, became more esoteric in the Greco-Roman period (332 BC to AD 400), when its signs increased until they numbered over 5,000 prior to the script becoming extinct (Ritner 1996a:74). Reversing earlier trends toward greater phonography, in the late 2nd and 1st millennia BC the use of logograms in Babylonian cuneiform expanded to over 85 percent of words in divinatory, astronomical, and other technical records (Cooper 1996:53). In the 7th and 6th centuries BC the Babylonian language and its cuneiform script were superseded as a *lingua franca* in the Middle East by the Aramaic language and consonantary; although conservative priests and scholars continued to use Babylonian cuneiform into the first century AD.

It is also not true that logophonic scripts develop into syllabic ones and syllabic scripts in turn into consonantaries and alphabets. There is no confirmed example of a logophonic script giving rise to a mainly syllabic one. There are also no examples of syllabaries developing into alphabets, consonantaries, or alphaconsonantaries, supporting Sethe's (1939) conclusion that syllabic scripts represent an evolutionary dead end. In China an informal syllabary was constituted to transcribe foreign words and in Japan syllabaries were invented to help write Japanese more clearly, but in these cases logographic writing did not disappear. In the Middle East the earliest purely phonemic scripts were the consonantaries that appear to have been inspired by the consonantal method of representing sounds in ancient Egyptian. But this development did not occur in Egypt and there is no evidence that Egyptians played any active part in it. Since most purely phonemic forms of writing are derived from West Semitic consonantaries, this raises the question of whether this form of writing eventually would have supplanted logophonic scripts in Egypt and the Middle East had the Egyptian logoconsonantary not existed.

The Aramaic, Hebrew, and Arabic consonantaries have been adapted to write numerous languages in the Middle East, Central Asia, South Asia, and Southeast Asia. Consonantaries have been transformed into alphabets in Greece and Central Asia, and for a few languages written in the Arabic script. Consonantaries have also served as a point of departure for the development of alphasyllabaries in Persia, India, and Ethiopia. The Kushites transformed a highly restricted system for indicating vowels as well as consonants that they used to represent words from their own language in records that they composed in ancient Egyptian into an alphasyllabic script for Meroitic and the Koreans devised an alphabet to write their own language, although this development perhaps was inspired in part by knowledge of Mongolian alphabetic writing. Yet, while consonantaries have given rise to alphabets and alphasyllabaries, there are no examples of alphabets or alphasyllabaries giving rise to consonantaries. This appears to confirm Gelb's (1963:238) argument that vowel indication is superior to consonantaries because it makes it easier to record exact nuances of language, little known dialectical forms, new words, and foreign names and words. All these operations become more important as international communications expand. Consonantaries and alphabets frequently give rise to syllabic writing but only when the inventor of the syllabary does not understand the nature of the writing system that is being replicated.

It is not true that at a given level of social and political evolution different societies possess 'very similar' writing systems (Coe 1992:260–261). Phonography has advanced much further in West Asia and Europe than in East Asia. Today, South Koreans actively are considering the merits of eliminating

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logographic elements from their script. Yet, while some Japanese and Chinese use the Roman alphabet to enter information into computers, neither people is ready to abandon their traditional script. Special reasons, such as a high degree of homophony, the need to access old documents and, in the case of China, radical speech variation are offered as explanations for this phenomenon. Similar practical considerations have prevented the rational phonemicization of many alphabetic scripts, including English. It is also clear that heavily logographic scripts have not impeded the development of mass literacy or, in Japan, the high consumption of published material and the functioning of a modern industrial economy. This supports Unger & DeFrancis's (1995:54–55) argument that the difference between largely logographic and phonographic scripts pales into insignificance by comparison with their similarities.

There is considerable historical evidence of cultural conservatism in the use of writing systems. Once formed, scripts tend to persist over long periods without major changes. Gelb (1963:165) has argued that the vested social and economic interests of scribal and political elites in early civilizations may have been responsible for maintaining scripts that were difficult to learn. It has been suggested that the early Japanese 'were not interested in evolving an easy system, or one that could be written quickly or read simply and unambiguously. Such values and goals were totally absent from ancient Japanese society' (Miller 1967:100). Some logophonic scripts were claimed to be divine revelations; hence knowing them was an esoteric privilege that was not to be shared widely (Daniels 1996a:5; Diringer 1962:14; Ritner 1996a:73). In China, Korea, and Japan, more simplified, phonographic versions of scripts traditionally have been regarded as appropriate only for the use of women, children, and the lower classes (Daniels 1996b:583; King 1996:218, 226; Smith 1996:212). Under these conditions, selective pressure was against rather than for simplifying writing systems.

These conservative values may explain why major shifts towards phonographic writing occurred mainly when scripts were adopted by foreign peoples who were not yet bound by firmly established cultural traditions or by social and political interests relating to literacy (Gelb 1963:165). Yet, even if it is true that phonographic scripts are more easily learned and hence more 'democratic' than logographic ones, this does not mean their use is less influenced by cultural considerations. The Indian alphasyllabary diffused with Indian culture and Hindu and Buddhist religious practices throughout Southeast Asia. Arabic writing has spread with Islam and the religious and cultural loyalties of Slavic-speaking peoples have continued to be expressed by their use of either the Roman or the Cyrillic alphabet. Major shifts in the use of scripts in Iran and India generally have accompanied the introduction of new religions. Likewise, whatever the practical advantages of the use of the Roman alphabet for writing Turkish may be by comparison with the Arabic script used previously, its replacement of the Arabic script in 1928 was a symbol of modernization and secularization. Even when major technical changes are not involved, the decision to use a new script or substantially alter an old one involves the negotiation of identity. Scripts may be borrowed with only minimal changes to adapt them for writing another language as a sign of respect for the donor culture. On the other hand, scripts may be altered considerably in outward form to turn them into expressions of local identity. This may have been the case with the Georgian and Armenian alphabets as well as with the runic and Ogham scripts, although in the two latter cases adaptation for writing on a new medium also may have been involved. Scripts are technologies but they are also heavily impregnated with cultural values that do not relate directly to their practical role as a means of communicating.

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Provided it is used with appropriate caution, the development of writing systems offers a model for trying to understand other forms of change in material culture. Writing is more symbolic than most tools and more technologically driven than expressive art. It therefore displays in a balanced fashion the tendencies that are present to varying degrees in all other aspects of material culture. It is clear that the development of writing systems everywhere has been influenced by considerations of efficiency, which have promoted increasing reliance on phonography at the expense of logography. Yet the survival of heavily logographic scripts in modern industrial societies indicates that the superior efficiency of alphabets, and of phonography, has been ethnocentrically overrated by Western scholars. It is also obvious that religious, political, ethnic, and class loyalties, as well as cultural beliefs and preferences, have played an important role in

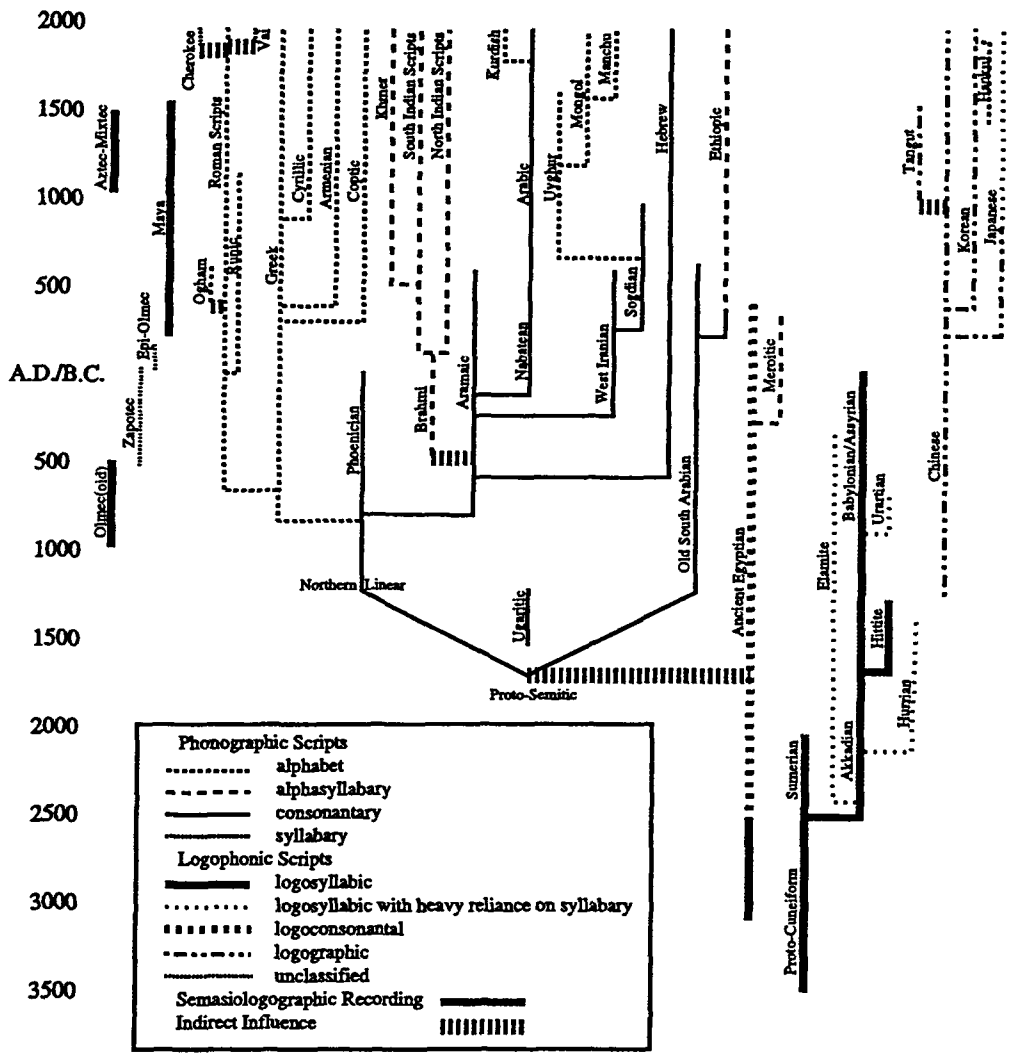


Fig. 1. *Some historical relations among script types.*

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both resisting and bringing about changes in scripts.

This accords with the view that all material culture is a product of knowledge systems that are inherited from the past and transformed as a result of considerations of technical efficiency, social interests, and cultural factors. Except with those aspects of material culture for which practical considerations play a preponderant role in shaping change, choices made in the remote past are likely to continue to influence cultural patterns, often over long periods, until major countervailing considerations come into play (Sahlins 1976). Technological efficiency can only be measured in relation to specific social needs, even if such calculations inevitably must take account of practical considerations relating to energy expenditures. On the other hand, class interests and cultural values also influence cultural change and often play a significant role in blocking it. In the case of writing systems, phonography has sufficient selective value to play an increasing role over time, but not enough importance to ensure that this has occurred equally in each family of historically related scripts. Cultural values have inhibited change sufficiently that most fundamental innovations in the nature of writing systems have occurred when scripts were being adapted for writing new languages.

In other aspects of material culture, the balance between practical and cultural considerations will be different and in each instance it must be determined empirically. This can be done only by comparing the nature of change in a variety of different cultural settings. Nothing is likely to be more detrimental to an objective understanding of change than assuming in advance the extent to which practical and cultural considerations play a role in shaping particular categories of material culture. Doing so is all the more dangerous if these assumptions become incorporated into classifications, which in turn reinforce such speculations.

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