HOW WRITING REPRESENTS SPEECH

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The history of writing is interesting not just because it marks the evolution of means for preserving or communicating information but also because writing can be taken as representing aspects of language including such structural features as sentences, words, syllables and phonemes. Just how graphic symbols came to represent underlying linguistic constituents is the concern of this paper.[1] As we shall see, the relation betwen speech and writing may be just the opposite of that which is traditionally assumed.

Making marks which can serve mnemonic and communicative purposes is as old as human culture itself. What such marks may be taken as representing by those who make and those who read those marks is the critical question. A glimpse at our own writing system suggests that what a writing system represents is what is said—an ideal writing system is a fully explicit representation of oral language. Indeed, this is the classical view developed by Aristotle and in our own time by de Saussure and Bloomfield. Aristotle wrote in *De interpretatione* (1.4–6): 'Words spoken are symbols or signs of affections or impressions of the soul; written words are the signs of words spoken' (1938, p. 115). de Saussure (1916) attacked as the 'tyranny of writing' the fact that linguistic theory took as its object written language rather than spoken: 'The linguistic object is not defined by the combination of the written word and the spoken word: The spoken form alone constitutes the object' (pp. 23–24.). And Bloomfield identified speech with language and saw writing as 'a way of recording language' (Bloomfield, 1933, p. 21).

of the invention of writing. The evolution of writing systems is simply the history of the attempts to make a writing system which adequately and explicitly represents one's speech practices. Historical developments in the evolution of writing systems—from idea-writing, to whole words, to syllables, to consonants, and finally to consonants and vowels—are seen as reflecting the progressive achievements of the goal of representing the ultimate units of speech. Rousseau's famous claim relating writing development to historical development was among the first to offer this evolutionary perspective:

> These three ways of writing correspond almost exactly to three different stages according to which one can consider men gathered into a nation. The depicting of objects is appropriate to a savage people, signs of words and of propositions, to a barbaric people, and the alphabet to a civilized people (Rousseau, 1791/1966, p. 17).

Thus, the orderliness of this development has led most theorists to see a single evolutionary achievement with the alphabet at the pinnacle. Gelb (1952) distinguished four stages in this evolution beginning with picture writing which expressed ideas directly, followed by word based writing systems, then by sound based syllabic writing systems including unvocalized syllabaries or consonantal systems, and concluding with the Greek invention of the alphabet. And Diringer (1962) saw in the evolution of the alphabet the 'history of

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mankind'. As Havelock (1982, p. 11) put it: 'At a stroke the Greeks provided a table of elements of linguistic sound not only manageable because of economy, but for the first time in the history of *homo sapiens*, also accurate.' Thus, the achievement is seen as one of a series of successes in representing more fundamental aspects of the linguistic system, ultimately phonemes, to make a system which is both economical—employs a small number of signs, and complete—capable of representing anything that can be said. Writing, on this view, is the attempt to represent speech.

Such accounts, which we shall examine more carefully presently, suffer from what I take to be a critical flaw. They assume what they need to explain. Specifically, they assume that the inventors of writing systems *already knew* about language and its structure—words, phonemes and the like—and progress came from finding ways to represent those structures unambiguously. As Harris (1986) points out, such descriptions are misleading in that they take a characterization of the current state (or at least a part of that state) as if it were the goal towards which writing was evolving, that is, as if all attempts at writing, always and everywhere were faltering steps towards or failed attempts at, the transcription of the sound patterns of speech. On the contrary it may be argued, as Harris (1986) and Gaur (1987) have done, that writing systems were created not to represent language, but to communicate information. The relation to language is at best indirect.

There is a second flaw in the traditional assumption that the history of writing is a progressive evolution culminating in the alphabet, namely, the ethnocentrism implicit in such a view (Coulmas, 1989; DeFrancis, 1989). The limitation of the evolutionary theory is that it leads to an underestimation of the optimality of alternative writing systems, such as the *logographic script* employed in China and the mixed logographic and alphabetic script employed in Japan. At the end of World War II, Douglas MacArthur, commander of the Allied forces, was urged by a panel of Western educationists to completely revise the educational system of Japan and abolish 'Chinese derived ideograms' if he wanted to help Japan develop technological parity with the West! (Gaur, in prep.) In fact, an authority on Chinese science, J. Needham (1954–59, 1969) has recently concluded that the Chinese script was neither a significant inhibitory factor in the development of modern science in China nor an impediment to scientists in contemporary China.

The view I shall elaborate in this paper is that writing systems provide the concepts and categories for thinking about the structure of speech rather than the reverse. Awareness of linguistic structure is a product of a writing system, not a precondition for its development. If that is so it will not do to explain the evolution of writing as the attempt to represent linguistic structures such as sentences, words or phonemes for the simple reason that pre-writers had no such concepts. The explanation for evolutionary changes in the writing systems of the world will have to be found elsewhere. The hypothesis I shall examine is that writing systems are developed for mnemonic and communicative purposes but because they are 'read' they provide a model for language and thought. We introspect on language and mind in terms of the categories prescribed by our writing systems. Furthermore, the evolutionary development of scripts, including the alphabet, is the simple consequence of attempting to use a graphic system invented to be 'read' in one language, for which it is thereby reasonably suited, to convey messages to be 'read' in another language for which it is not well suited. In each case the development of a functional way of communicating with visible marks was, simultaneously, a discovery of the representable structures of speech. This, I believe, is the sense in which some radical writers have talked about writing being prior to speech (Householder, 1971; Derrida, 1976).

Let us examine this hypothesis in the light of the available evidence on the history of writing. It is, of course, impossible to know with certainty what the earliest graphic representations represented. The Neolithic revolution began some 10,000 years ago and was marked by the beginnings of pottery making, food preparation, and domestic agriculture, as well as the psychological developments involved in the ornamentation and burial of the dead. Those developments are more or less contemporaneous with the beginnings of drawing and the use of tallies (Schmandt-Besserat, 1986, 1987; Goody 1987, p. 10). Our question is how do such representational systems develop and how are they 'read'? For how they are read will determine how they come to serve as models of speaking. My account is based largely on the analysis provided by Gelb (1952), Diringer (1968) and the more recent writings of Goody (1987), Gaur (1987), Sampson (1985), Schmandt-Besserat (1986) and Harris (1986). The hypothesis linking speech and writing borrows heavily from Harris (1986).

Although tallies and drawings are both graphic representations and may serve similar functions, historically those functions and structures have tended to diverge, drawings remaining iconic and tallies becoming arbitrary and conventional. But attempts to account for or correctly describe that divergence has remained a major theoretical puzzle. It is an anachronism to attempt to explain the evolution of graphic signs as the attempt to express ideas via *ideographs* for there is no reason to believe that early writers had any clear notion of ideas prior to the invention of writing either.

The earliest writing systems as well as many contemporary ones exhibit these diverse properties and functions. Geometrical signs were used to indicate ownership in Mesopotamia 4 millennia ago in ways analogous to the crests and cattle-brands used to this day; tally sticks were used in Ancient China to keep records of debts or other data and tallies were used in Britain by the Royal Treasury until 1826; knotted cords were used for keeping records in ancient China and elsewhere and reached an extremely high level of complexity in the *quipu* of pre-colonial Peru; and *emblems*, that is, seals, totem poles, coats of arms, hallmarks, banners, and religious signs made up a part of graphic codes in ancient times just as they do today (Gaur, 1987, pp. 18–25).

Some of these graphic devices not only symbolized objects or events but also represented a sequence of events which could be narrated, that is, told rather than just named. Best known is the so-called picture writing, of the type developed by the aboriginal peoples of North America. The Ojibway employed a series of depictions inscribed on birch-bark scrolls to represent the rituals of the culture including the creation of the world and of the Ojibway people. Such scrolls could be interpreted only by the shaman and could be described in quite different ways depending on the narrator's purpose. Similar representational systems were employed in ancient southern Mexico and are employed to this day by story-tellers in India (Gaur, 1987, p. 55) and in Ethiopia (Goody, 1987, p. 9). Such visual graphic systems served as mnemonics by means of which a suitably trained expert could recover important cultural information. To describe the use of such systems as 'reading' perhaps stretches the modern meaning of that term unduly; certainly, in such cases no clear distinction is made between *reading a text* and *describing a picture*. What such graphic systems do is bring the cultural meanings or interpretations of symbols into memory and consciousness but do little to contribute to such notions as language, word or phoneme. Specifically, while such a graphic device would be taken as saying 'the same thing' on each occasion of reading, they would not bring such linguistic notions as a 'word', or 'the same words' into consciousness, for there is nothing in the graphic form that can

be taken as a model for such linguistic constituents; a picture of a dog is simultaneously a picture of a domesticated quadraped, a collie, a pet, man's best friend, and so on.
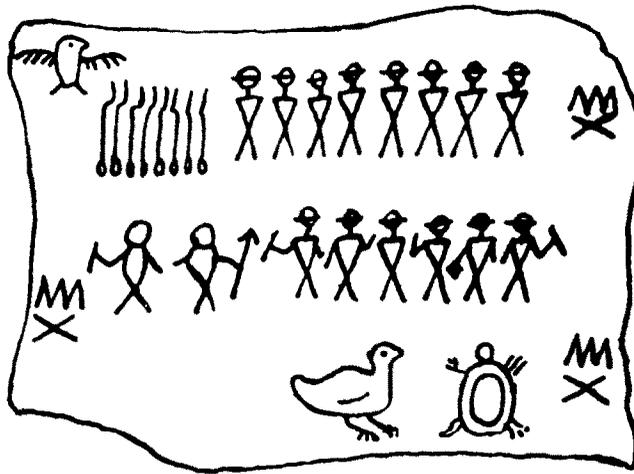

Fig. 1. North American Indian pictorial representation of an expedition.
(From D. Diringer, *The Alphabet,* Vol. 2, p. 15, 1968.)

We may note that emblematic forms of 'writing' such as that involved in the use of visual signs to indicate one's totem or one's tribe, do not create a distinction between the name and the thing; the emblem simultaneously stands for the totem and the name of the totem. Further, one may have a concept of a name without having the concept of a word; a word is a linguistic unit, a name is a property of an object. Emblems represent names not words. Such emblematic symbolism may extend to various gods and spirits and 'is often bound up in various ways with word magic and practices of name-giving. It reflects, fundamentally, a mentality for which reality is still not clearly divisible into language and non-language, any more than it is divisible into the physical and the metaphysical, or into the moral and the practical' (Harris, 1986, pp. 131–132). Of course, a little of that word magic exists in all of us; if not a crime it is at least a sin to desecrate a prayer book.

Similarly, when pre-reading children 'read' logos such as 'Coke' or take the inescapable golden arches as 'MacDonalds' it is unlikely that they take the emblem as a representation of a word rather than as an emblem of the thing. Consequently, there is no reason to suppose that recognizing such logos contributes to children's understanding of what a word is or to their reading skills more generally (Masonheimer *et al.*, 1984).

But the puzzle remains as to how such tokens and emblems which represent things ever turn into signs which represent words and consequently how their recognition could ever turn into reading as we know it. Historical evidence may help to provide the needed clue. One extremely important graphic form from which most Western writing systems may have evolved is the token system developed for accounting purposes in Mesopotamia beginning in the ninth millennium BC. The system, developed by the ancient Sumerians living in what is now southern Iraq, about the time that hunter–gatherer societies were giving way to an agricultural way of life, consisted of a set of clay tokens of distinctive shapes and markings, used to keep records of sheep, cattle and other animals and goods of various kinds such as oil and grain.

About the fourth millennium BC, roughly at the time of the growth of cities, the variety

of tokens increased greatly, presumably because of the increasing number of types of items to be inventoried, and the tokens began to be pierced in such a way that they could be strung together and shortly thereafter they were placed in envelopes or *bullae* which, like the string, could mark off a single transaction. Schmandt-Besserat (1986, 1987) has suggested that the markings on these bullae constitute the first true writing. The connection between the tokens and the writing comes from the fact that the contents of the bullae were indicated on the surface of the bullae itself by impressing the token in the soft clay before baking it. But once the contents are marked on the envelope, there is no need for enclosing the actual tokens. The envelope has become a writing surface, and the shapes of the tokens when inscribed on the surface become the earliest written texts. The tokens which represented units of goods are the origin of the Sumarian signs for representing units of goods. All of the 18 signs denoting commodities such as grain, animals and oil which appear on the earliest tablets derive from tokens.
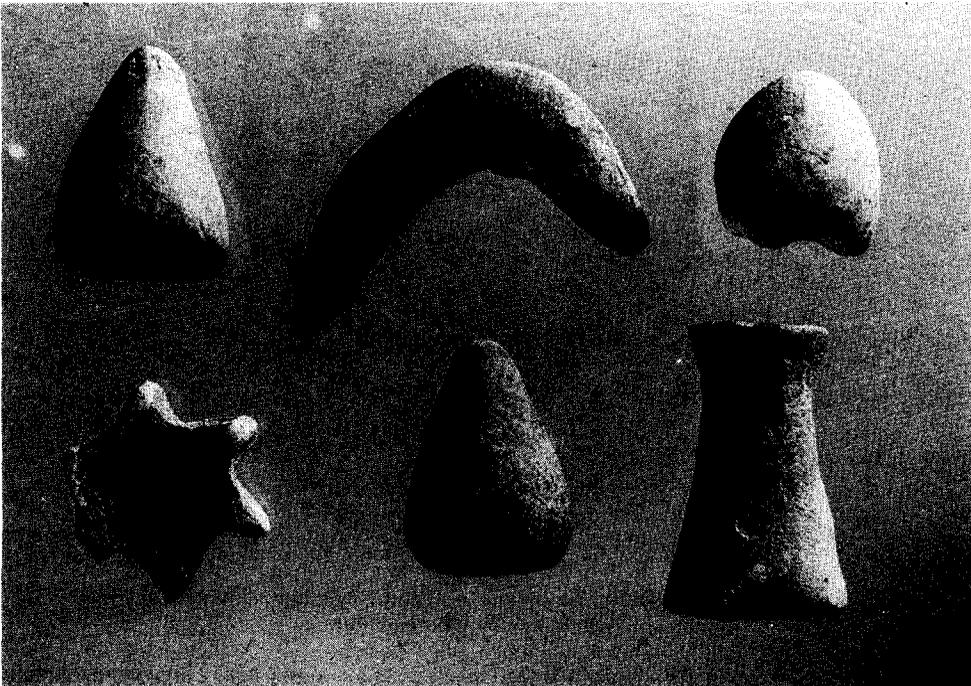

Fig. 2. Clay tokens from Tello, Iraq (some of which correspond to inscriptions on tablets from Uruk) *ca* 3200 BC. (Département des Antiquities Orientales, Musée du Louvre, Paris.)

But were such tokens taken as representing words or things? Have we here taken the critical step towards what we now consider writing to be? Harris (1986) has argued that the decisive step from tokens to scripts occurs when symbols shift from token-iterative to emblem-slotting systems, or what I prefer to think of as acquiring a syntax. A system which represents *three sheep* by three symbols for a sheep (i.e., sheep, sheep, sheep) is categorically different, he suggests, from one which represents the same three sheep by two tokens, one representing sheep, the other the number. Just as syntax is what makes a language a language, it is the syntax which makes a graphic system 'generative' for it

permits the combination and recombination of symbols to express a broad range of meanings.

An example of such a script is that from Ur, dated some 2960 BC and now filed as 10496 in the British Museum, which inventories the contents of a storehouse. The tablet is squared off into cells each of which lists a product and an amount. The symbol for a jar resting on a pointed base stands for beer while the round impressions stand for quantities. Quantity is represented by two shapes, one produced by the end of a round stylus, perhaps representing 10, and the other produced by the edge of the stylus, perhaps representing units. Although much uncertainty as to just what various marks indicate, the cell in question could presumably be read as '23 vats of beer'. Thus this elementary script has a syntax and could represent a statement.

Fig. 3. BM10496 syntactic writing. Tablet from Ur, 2960 BC itemizing contents of a storehouse.
(Courtesy of British Museum.)

But there is no reason for assuming that such graphic signs yet represent a particular word or words in a natural language. The tablet described above could be read out in any language much as the Arabic numeral, 4 can be read out as 'four' or 'quatre'. Yet some of these early tablets use signs on the basis of their phonetic values to represent proper names.

It is not essential to claim, as do most theorists, that syntactical scripts now represent speech; it is equally true that such a script *is* now a language. That is to say we need not assume that these early writers were conscious of or had a model of language as consisting of words ordered by a syntax which they tried to get their script to represent. Rather, we can explain the relation between language and script by saying that a script with a syntax now provides a suitable model for speech.

Two developments suggest that syntactic scripts are now taken as a model for speech.

The first is that the signs now come to be seen as representing words rather than things. Paleographers (Gaur, 1987; Nissen, 1986) note that by the third millennium (2900 BC) the earliest literary texts written in cuneiform appeared and such scripts give clear indications of reflecting the linguistic knowledge of the writer. That is, the script allows the reader to infer the language of the writer; early tablets, as we have seen, do not. But what, exactly, is involved in this achievement?

The first is the introduction of word signs. The sign for *beer* in the cuneiform tablet in Fig. 3 represents beer not the word 'beer'. Nor does the sign for a *bee* necessarily represent the word 'bee'; it may just represent the object, a bee. But if the sign is now appropriated to represent the verb 'be', the sign has become a word sign, a *logograph*. The principle involved in this case is that of the *rebus*, the use of a sign which normally represents one thing to represent a linguistic entity that sounds the same; this entity is a word. What needs emphasis is that the rebus principle does not merely play upon pre-existing word knowledge; the substitution of the signs on the basis of their sound is what brings words into consciousness. A script which can be taken as representing both syntax and the words combined by the syntax produces a canonical writing system, one which is capable of representing everything that can be said.

Even new words may enter the lexicon this way. Schmandt-Besserat (1986) has noted that the invention of abstract numbers coincides with the invention of such 'syntactic' writing. Early tallies and tokens, as was mentioned earlier, represent number by simple one-to-one correspondence—one token for each object. Four sheep could be represented by four marks on a stick, four pebbles in a pouch or by four sheep-shaped tokens on a string. The ancient Sumerians, with their system of tokens, had distinctive tokens for sheep, cows and the like. But when four sheep tokens are replaced by two tokens, one representing sheep and one representing the tallies, the tallies may be read as a word or as an integer, four, so the invention of syntactic writing would have allowed the invention of the abstract number!

Such scripts provide a model for the language which is now seen as language independently of the things it represents. But a new understanding of language as consisting of words also has conceptual implications. It spells the death of word magic. Words are no longer emblems; words are now distinguished from things so that words come into consciousness. It becomes feasible to think of the meanings of words independently from the things they designate simply because the written form provides a model, the concepts or categories for thinking about the spoken form. To elaborate, when the word is thought of as representing a thing rather than an intrinsic property of the thing, word magic loses its power. An action on the name, as in a *hex*, does not affect the named because the word, unlike the name, is not a part of the thing; it is just a word.

Such a writing system, independently of whether or not it was an alphabet, could have been instrumental in assisting the ancient Greeks bring a new and important set of concepts into consciousness. Havelock (1982) and Snell (1960) noted the ways that notions like *idea*, *mind*, and *word* developed and the ways in which words from the common vocabulary suddenly became the subject of analysis and reflection in classical Greek culture. Whereas for the Homeric Greeks notions like *justice* and *courage* were exemplified in the deeds of gods and hero, for the literate Greeks they became philosophical concepts. The writing system, Havelock argued, was partly responsible. My suggestion is that the graphic system may play such a role by providing a model for language in a way that emblematic symbols never could. Rather than viewing writing as the attempt to capture the existing knowledge

of syntax, writing provided a model for speech, thereby making the language available for analysis into syntactic constituents, the primary ones being words which then became subjects of philosophical reflection as well as objects of definition.

It is interesting to note that in learning to read and write children go through just such a shift in understanding. If non-reading pre-school children are given a pencil and asked to write 'cat' they may write a short string of letter-like forms. If then asked to write 'three cats' they repeat the same initial string three times. Conversely, if such pre-reading children are shown a text which reads: 'Three little pigs' and the text is then read to them while the words are pointed out they tend to take each of the words as a representation, an emblem, of a pig. Consequently, if the final word is erased and children are asked, 'Now what does it say?' they may reply 'Two little pigs'. Alternatively, if each of the three words is pointed to in turn and the child is asked what each says, they reply, 'One little pig; another little pig; and another little pig.' That is, signs are seen as emblems rather than as words (Ferreiro, 1985; Ferreiro and Teberosky, 1982; Serra, 1992).

Once a writing system has a syntax, the emblems or tokens can now be seen as words rather than as emblems and the construction can be seen as a proposition rather than as a list. The structures present in the *script* now provide the categories for the introspection of language. Such scripts are logographic in that the tokens now represent the major grammatical constituents of the language, namely, words. But, to repeat, it does not follow that the inventors of such a script already knew about words and then sought to represent them in the script. The opposite may be true. The scribal inventions dictated a kind of reading which *allowed language to be seen as composed of words related by means of a syntax*. Writing thereby provides the model of the production of speech (in reading) and for the introspective awareness of speech as composed of grammatical constituents, namely, words.

The possibility that graphic systems with a syntax can be read as expressions in a natural language is what makes the written form a model for the spoken. Of course graphic schemes can always be verbalized or talked about; but only when it becomes possible to differentiate the activity of describing what a picture shows from reading what a text says, can the graphic structure be seen as a model for the syntactical properties of language.

Not all graphic features need be verbalized and not all verbalized differences need appear in the script. The decisive factor in the elaboration of the script will not be the verbal models (for as we have noted such models are not available prior to writing) but rather the attempt at a functional, unambiguous representation (Gaur, 1987; Harris, 1986). In English script, a word beginning with a capital letter is not read any differently than one beginning with lower case; the convention facilitates interpretation not pronunciation; it does not follow a verbal model. Similarly, English script does not employ different graphic signs for long and short vowels; both long and short /a/ are written *a*. Again, a script is not initially or primarily an attempt at a complete linguistic representation.

A further indication that writing, rather than being an attempt to represent speech provides a model for that speech, comes from the work of Larsen (1989) who pointed out that Sumerian texts fail to represent many morphological elements and the script offered information which could not be lexicalized. There was no attempt to record verbal statements but rather to fill administrative needs. When literary texts were written, about 2600 BC, they were written in that 'administrative script' and were, therefore, not complete renderings of a text but rather 'an aid for someone who was to give an oral performance' (p. 130).

Is every script with a syntax a writing system? In terms of the history of writing it seems necessary to conclude that when signs acquired a syntax they were writing systems. On that basis we would say that the set of signs for Arabic numerals and operators is a writing system. But is it a logographic script as usually claimed? Not really for as mentioned the signs do not represent words in any particular language. Such a script can be verbalized in more than one way: $3 \times 4 = 12$, can be read as three fours make twelve and so on and they can be lexicalized in any oral language. The way out of our dilemma is to recall that scripts are not primarily attempts to represent 'what is said' but to represent events and some of those representations can be taken as a model of speech. Numerical notations provide one kind of model; logographic scripts another and so on.

Next, let us turn to the historical changes in scripts that led eventually to the alphabet. General purpose logographic scripts can represent anything that can be said. But the device of one token for each expressible semantic difference (essentially one sign for one word or morpheme) would require an extremely large set of tokens. Indeed, modern dictionaries of Chinese list some 50,000 characters. Even then, the principles of character or graph formation included ease of recognition sometimes based on iconic representations of objects—the sun being represented by a circle or waves by a wavy line, an economy— borrowing the sign for an object to represent another word or part of a word with a similar sound, the so-called *acrophonic* or *phonographic* principle, and unambiguity— distinguishing words that sound the same but mean different things by an unverbalized *determinative* which indicates the semantic class to which the word belongs. A logographic script such as Chinese, while cumbersome to Western eyes, is no longer thought of as primitive or limited as it was even two decades ago (Unger and DeFrancis, in prep.). Why then did some logographic scripts give way to the syllabaries and alphabets? Before we attempt to answer that question it is worth noting the clear shift in that direction in the evolution of scripts.

The ancient Sumerian script remained primarily logographic and rarely resorted to phonographic signs. When adopted by the Akkadians in the third millennium BC to represent a somewhat different language, the phonographic properties of the script were greatly expanded giving rise to the Babylonian and Canaanite cuneiform, the best known of such scripts.
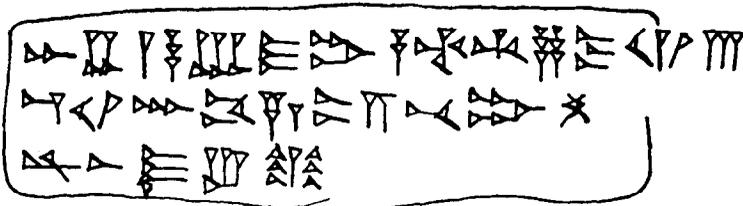
Fig. 4. Canaanite cuneiform; thirteenth-century BC. (From Goody, p. 29, 1987.)

Egyptian hieroglyphic script, which developed around 3100 BC, employed a system similar to that of cuneiform. Simple signs were logographs, the drawing of a leg representing the word 'leg', two legs meaning 'to go' and so on. Complex signs were made by combining simple signs each of which represented a sound drawn from a simple sign along with an indicator specifying the domain to which the word belonged. Thus the sign for *sun* may

be borrowed to represent 'son' on the basis of their similar sound, the latter being turned into a complex sign by the addition of an indicator sign or determinative, say, that of a man (Gaur, 1987, p. 63). The Egyptian hieroglyphic inscriptions on the Rosetta stone which allowed the decipherment of the hieroglyphic code early in the nineteenth century provide a clear illustration of how such a script works (British Museum, 1971). Many of the signs were found to represent semantic values such as the *cartouche* or oval around the royal names including Ptolemy and Cleopatra. Other signs represent sound values corresponding to syllables and to the letters of an alphabet. The first sign in the name Ptolemy is identical to the fifth sign in the name Cleopatra and must, therefore, represent a sound similar to that represented by our letter 'p'. The bird sign in the sixth and ninth position in Cleopatra represents the sound similar to that represented by our letter 'a'. The two symbols after the final bird sign are 'determinatives' indicating that this is a feminine name.
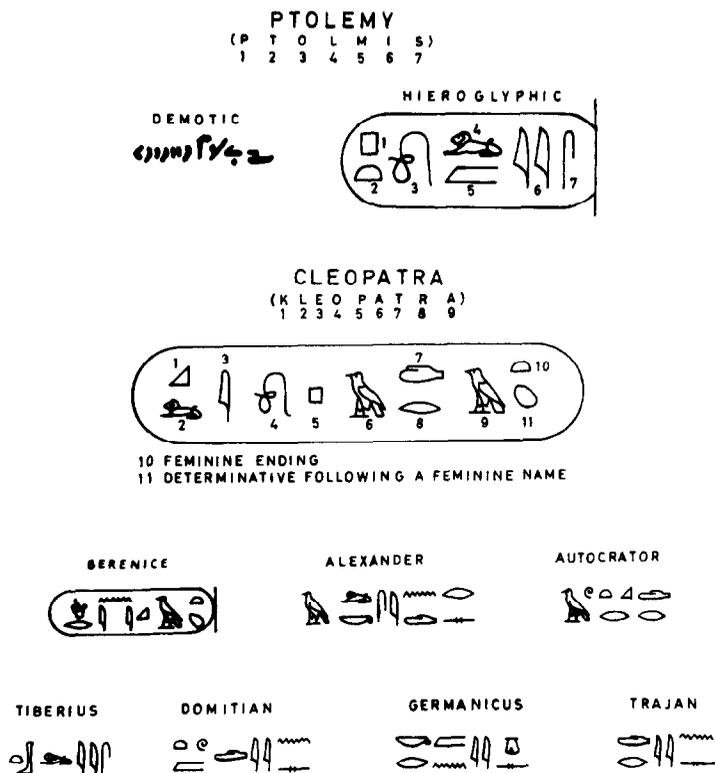
Fig. 5. Ancient Egyptian hieroglyphs representing the imperial names.
(From Diringer, Vol. 2, p. 55, 1968.)

Subsequent developments which gave rise, eventually, to the alphabet have been described as the products of efforts of three kinds. The first, the traditional one that the alphabet is a product of the search for means for representing sound, we have already abandoned. The second is that of economizing on the number of signs required but, to my knowledge,

no major historical revisions of scripts took place for that reason. The third and most promising principle is that of adapting a script to be read in a language other than that for which it was originally developed, an activity that led logographs to be taken as representations of syllables and later for syllables to be taken as representations of phonemes. Let us explore this third principle in detail.

The first syllabary was the result of using Sumerian logographs to represent a Semitic language, Akkadian (Larsen, 1989, p. 131). To represent an Akkadian word such as 'a-wi-lu-um', *man*, with Sumerian logographs, the Akkadians simply took the Sumerian graphs which could be read as 'a', 'wi', 'lu', and 'um', ignoring the fact that in Sumerian 'a' would mean *water*, 'wi' would mean something else and so on. Reading such graphic strings would be a matter of pronouncing this series and the graphs would now be taken to represent syllables rather than words. Note that the argument is not that this use was the product of the application of the acrophonic principle of using signs to represent syllables but rather that the new use of old graphs for a new language produced a script in which the constituents *could be seen* as representing syllables. The syllable is as much a product of the graphic system as a prerequisite for it. To state this point as neutrally as I can, for it remains an open question, the old script is fitted to the new language as a model is fitted to data; the data are then seen in terms of that model. In this case, the model is that of audible constituents and the flow of speech is heard, perhaps for the first time, as a string of separable syllables.

Psychological evidence is also relevant to this point. First, sensitivity to some syllabic constituents, especially those relevant to rhyme and alliteration, pre-exist literacy. On the basis of their comprehensive review, Goswami and Bryant (1990) concluded that although young children are not aware of phonemes they are sensitive to the initial and final sounds of words and phrases, what they refer to as 'onsets' and 'rimes', and this sensitivity may be relevant to early word recognition (see also Treiman, 1991). Consequently, early readers may take even alphabetic signs as if they are representations of syllables and read them as such.

Secondly, syllabic scripts are easily acquired. Scribner and Cole (1981) noted that the Vai learned to read their syllabaries in a matter of weeks, and Berry and Bennett (1991) noted that Cree syllabics could be acquired in a few days. McCarthy (1991) noted that the whole Cree nation became literate in a mere 10 year span in the 1840s. She goes on to suggest that the ease with which such learning takes place suggests that not much has in fact been learned about the structure of language in this case; the mapping from script to syllable is relatively straightforward.

But it does not follow that awareness of language as a string of syllables is completely independent of knowledge of a script. Scribner and Cole (1981) found that Vai literates, familiar with a syllabic script, were much more skilled in integrating separate syllables into phrases and decomposing phrases into such syllables than were non-literates. This suggests that the learning of a syllabary is a matter of coming to hear one's continuous speech *as if* it were composed of segmentable constituents. It is a surprisingly easy task given the dubious status of syllables in phonological theory (Karpova, 1977; Fox and Routh, 1975).

The first writing system based exclusively on such principles was *Linear B* a Mycenaean Greek script developed around 1600 BC and deciphered only in modern times by an English architect, Michael Ventris, in 1952. The script is strictly syllabic, each syllable employing a distinctive graph. The script was apparently abandoned because the Greek language has complex syllable structures (e.g., C–V–C) in addition to those simple syllables (C–V)

represented by the script; consequently the script is thought to have been seriously deficient, that it allowed an unacceptable level of ambiguity.

The immediate ancestor of the Greek alphabet has been viewed by some as a simplified form of syllabary (Havelock, 1982) and by others as an abstraction from a syllabary (Gelb, 1952). The script was invented by speakers of some Semitic language, possibly Phoenician, who lived in the northern part of the Fertile Crescent—that area of arable land connecting Babylonian and Egyptian civilizations. Modern versions of Semitic script include the Hebrew script and the Arabic script.

Semitic languages, however, have the interesting property of carrying the lexical identities of the language in what we think of as consonants; what we think of as vowels were used only for inflections. To illustrate, the string of sounds /k/, /t/, /b/ vocalized in somewhat different ways all convey the basic lexeme *write* with vocalic differences marking grammatical subject, tense and aspect: *katab* 'he wrote', *katabi* 'I wrote', *katebu* 'they wrote', *ketob* 'write', *koteb* 'writing', and *katub* 'being written'. All can be written simply *ktb*.

Because the vocalic features provide only grammatical rather than lexical or morphemic information, some Semitic writing systems never develop any device for representing them. This is not necessarily a flaw in the script because inserting vowels would make morpheme and word identification more difficult. Obviously, some semantic distinctions are not marked in the script and must be inferred from context. Some scripts, such as Hebrew, add *matres lectionis*, literally mothers of reading, a pointing system to distinguish vocalic sounds especially for sacred texts in which proper articulation is important, as well as in books written to be read by children. Whether such additions in fact facilitate reading remains an open question.

The major achievement of such scripts, from an evolutionary perspective, is the representation of a group of syllables such as the English *pa, pe, pi, po, pu,* by a single graphic sign, say, *p*. If the discovery of the common property of such different syllables is the product of abstraction it is a remarkable intellectual achievement; that, in fact, is the traditional view. But if it is simply the failure to discriminate them, treating the vocalic variants as of little or no significance and hence disregarding them, then it is the simple product of borrowing, that is, of applying a script to a language for which it was important to mark vocalic differences to a language for which it was not important to mark such differences. In fact, both Gelb (1952) and Havelock (1982) deny that such a script represents consonants, rather, they claim, it constitutes an unvocalized syllabary, a syllabary which simply does not distinguish vocalic differences. Others, such as Sampson (1985), refer to it as a consonantal writing system. In my view, the script is a simplification, a discarding of characters thought to be redundant just as 'going to' gets attenuated to 'gonna' to form 'I'm gonna go home' in vernacular speech. But once so attenuated, the graphic system *can be seen as* a representation of consonants, particularly when, as we shall see, it was borrowed by the Greeks to represent a quite different language.

Regardless of how it was arrived at, the new set of 22 graphic signs with a memorized order beginning *aleph, bet, gemel,* was adequate for representing a full range of meanings and the graphs can be seen as representing not only syllables but the consonantal sounds of the language.

The 'final' transition from consonantal to *alphabetic writing* occurred, uniquely in the history of the world, when the Semitic script was adapted to a non-Semitic language, Greek. The application, bypassing *Linear B*, occurred about 750 BC. Scholars have traditionally

considered the Greek invention to be the stroke of genius. While not minimizing the significance of the Greek achievement, it is now recognized that the development of the alphabet, like the development of the syllabary, was a rather straightforward consequence of applying a script which was suitable for one language, to a second language for which it was not, namely, of applying a script for a Semitic language in which vocalic differences were relatively insignificant to the Greek language in which they were highly significant (Sampson, 1985; Harris, 1986).

Many of the syllable signs from the Semitic alphabet fitted and could be utilized directly for representing Greek; these came to be the consonants. But unlike a Semitic language, Greek, like English, is an Indo-European language in which vowel differences make lexical contrasts—'bad' is different from 'bed'. Moreover, words may consist simply of vowels, words may begin with vowels, and words with pairs of vowels are not uncommon. To fill the gap, six Semitic characters which represented sounds unknown in Greek, were borrowed to represent these isolated vowel sounds. But equipped with such signs representing vowel sounds, the Greeks were in a position to 'hear', perhaps for the first time, that those sounds also occurred within the syllables represented by the Semitic consonant signs. In this way syllables were dissolved into consonant–vowel pairings and the alphabet was born.

Again, the point to note is that such a theory does not require the assumption that the Greeks attempted to represent phonemes; it does not assume the availability to consciousness of the phonological structure of language. Rather, the script can be seen as a model for that stucture. That is, phonological categories such as consonants and vowels need not exist in consciousness to be captured by writing. Rather, writing provides a model for speech; all that is required is that speech is seen as at least roughly fitting that model. This point is relevant to current discussions of dyslexia and learning to read; those who assume that reading is decoding assume, erroneously, that the phonology is available to consciousness; those who assume that reading is meaning detection assume, erroneously, that sound–symbol mapping is either irrelevant or impossible. The way between these extremes is to note that scripts provide a model for speech; learning to read is precisely learning that model.

Such a roundabout explanation of the relation between script and awareness of language is required to explain several facts. First, the alphabet in fact does not constitute a phonological theory. Harris (1986) points out that the Greeks, the inventors of the alphabet, never developed an adequate theory of phonology. The sound pattern described was a direct reflection of the Greek alphabet; 'consequently, the Greeks were led to ignore phonetic differences which were not reflected in Greek orthography' (p. 86). In this the Greek linguists were not different from children who are exposed to the alphabet. Ehri (1985) has shown that children think there are more 'sounds' in the word *pitch* than in the word *rich* even if phonologists inform us that they are equivalent. Obviously, children introspect their language in terms of the alphabet.

Secondly, that the alphabet serves as a model for speech, rather than as a representation of pre-existing knowledge, is shown by the elegant studies on phonological awareness in speakers who are not readers. The studies of segmental or phonological awareness, in particular those conducted with non-literate adults by Sholes and Willis (1990, and in prep.) have established that familiarity with an alphabetic writing system is critical to one's awareness of the segmental structure of language. People exposed to the alphabet *hear* words as composed of the sounds represented by the letters of the alphabet; those not so exposed do not. To illustrate, those familiar with an alphabet are able to delete the sound /f/ from the word 'fish' to yield /ish/ while those not so familiar are not. Morais *et al.*

(1986) and Morais *et al.* (1987) found that Portuguese fishermen living in a remote area who had received even minimal reading instruction some 40 years earlier and who had done little or no reading since, were still able to carry out such segmentation tasks while those who had never been to school could not. Similar findings have been reported for Brazilian non-literate adults by Bertelson *et al.* (1989). Scholes and Willis (1991) found that non-readers in rural parts of the American southeast had grave difficulties with a large variety of such metalinguistic tasks. Even more impressive is the finding by Read *et al.* (1986) who found that Chinese readers of traditional character scripts could not detect phonemic segments whereas those who could read Pinyin, an alphabetic script representing the same language, could do so. To learn to read any script is to find or detect aspects of one's own implicit linguistic structure that can map onto or be represented by that script.

This point is nicely exploited in Frith's (1985) three-stage model of learning to read. Frith suggests that early readers treat an alphabet as if it were a logograph, each letter string as a whole representing a word. As they begin to attempt to spell words, they decompose those logographs into alphabetic constituents, each representing a phoneme. At a third stage they begin to see relations between letters and therefore detect morphemes, seeing the 'boy' in 'cowboy' for example.

I have been suggesting that the invention of a writing system does two things at once. It provides a graphic means of communication but, because it is then verbalized (read), it comes to be seen as a model of that verbalization. As scripts became more elaborate they became increasingly precise models of one's speech, of 'what was said'. Thus, cultures differ in the criterion used for deciding whether or not two utterances were 'the same words'. Traditional cultures treat alternative expressions of the same sense as being 'the same'; literate ones using the stricter criterion of verbatim repetition as 'the same' (Finnegan, 1977; Goody, 1987.) This shift in criterion can also be observed in children as they become literate (Hedelin and Hjelmquist, 1988; Torrance *et al.*, 1992). If the analysis I have proposed is correct, these are the products of learning graphic conventions.

Once we recognize that our script provides a model for our speech we are in a position also to detect the advantages and disadvantages of that assumption. One advantage is that as scripts became more elaborate, their lexicalization or 'reading' becomes more constrained. In fact, no script ever succeeds in completely determining the reading—any actor can read a simple statement in many different ways. The script merely determines which variants will be treated as equivalent, as 'the same words'. It seems clear that any phonographically based text, whether syllabary or alphabet, determines in large measure the lexical and grammatical properties of a reading. It is less certain for a logographic script such as Chinese which is designed to be read in quite different dialects and may allow some variability in lexical and grammatical form even within a single community of readers.

How scripts control the reading is nicely illustrated by Boorman (1986) in his discussion of the history of musical scores. In the sixteenth century, composers began to add notations to their scores to restrict performers' autonomy in realizing a musical composition. As a consequence the language of music became more complex. The trend was part of a general reaction against the ambiguity of scribal and early printed forms. Parallel developments occurred in the development of conventions for punctuation (Morrison, 1987).

A second advantage that resulted from taking the script as a model for language was that it allowed the formation of explicit logics, grammars and dictionaries (Goody, 1987). Alphabetic scripts are even, somewhat mistakenly, taken as models of phonology (Harris,

1986). In all cases, the script becomes a useful model for the language, turning some structural aspects of speech into objects of reflection, planning and analysis.

But the fact that alphabetic scripts can be lexicalized in only one way creates a blind spot that we have only recently come to recognize. Because an alphabetic script can transcribe anything that can be said, it is tempting to take it as a complete representation of a speaker's utterance. Just as the readers of a logographic script or a syllabic script may be unaware of what their script does not represent, namely, the phonological properties of their language, so we, alphabetics, may be unaware of what our writing system does not explicitly represent. In fact, our writing system, too, represents only part of the meaning; it is a simple illusion that it is a full model of what is said. An utterance spoken with an ironic tone is represented in writing the same way as the same utterance spoken with a serious tone. Again, a skilled actor can read the same text in many different ways. So the graphic form does not completely determine the reading.

The blind spot which our alphabetic script continues to impart leads us into two kinds of errors. It invites the inference that any meaning we personally see in a text is actually there and is completely determined by the wording—the problem of literalism. Conversely any other 'reading' of that text is seen as the product of ignorance or 'hardness of heart'. How to cope with this interpretive problem attracted the best minds of Europe for a millennium giving rise ultimately to the new way of reading we associate with the Reformation. Secondly, it leads literate people to an oversimplified notion of what 'to read' means. Does 'read' mean to lexicalize or 'decode' a text or does 'read' mean to construct a meaning? It is decoding or interpretation? Battles over the verb 'read' are usually non-productive; what is critical is understanding what a script represents and what it fails to represent.

So what aspects of speech are not represented in a writing system? This too, has many classical answers. Plato thought that it represented the words but not the author. Rousseau (1791/1966) thought it represented the words but not the voice. Some say that it represents the form but not the meaning. I suggest that while writing provides a reasonable model for what the speaker said, it does not provide much of a model for what the speaker meant by it, or more precisely how the speaker or writer intended the utterance to be taken. It does not well represent what is technically known as illocutionary force. Writing systems by representing the former have left us more or less blind to the latter.

I have tried to establish four points. First, writing is not the transcription of speech but rather provides a conceptual model for that speech. Second, the history of scripts is not, contrary to the common view, the history of failed attempts and partial successes towards the invention of the alphabet, but rather the by-product of attempting to use a script for a language for which it is ill-suited. Third, the models of language provided by our scripts are both what is acquired in the process of learning to read and write and what is employed in thinking about language; writing is in principle metalinguistics. And finally, the models provided by our script tend to blind us to other features of language which are equally important to human communication. But our intellectual debt to our scripts for those aspects of linguistic structure for which they do provide a model and about which they permit us to think, is enormous.

Writing systems, then, do represent speech. But not in the way that is conventionally held. Writing systems create the categories in terms of which we become conscious of speech. To paraphrase Whorf (1976), we introspect our language along lines laid down by our scripts.

NOTE

[1]This paper is based on one chapter from my forthcoming book, *The World on Paper*.

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