

The First Information Technology: Writing Systems



InfoSys 103
History of Information
Geoff Nunberg
9/10/07



The First "Information System": Language

Early theories: "bow-wow," "uh-oh," "pooh-pooh," etc.

1886: Linguistic Society of Paris forbids "toute communication concernant l'origine du langage" [All papers dealing with the origin of language]

More recent research on cortical features, articulatory tract, etc.



The First "Information System": Language

Was development of language gradual or sudden?
Does language presuppose neural modification?

language might have emerged w. *Homo erectus*
(1.5 m years)

Or with mod. *Homo sapiens* (ca 100-150k
years)

Or with Upper paleolithic tool-making (ca. 40-45
k years)

Methodological difficulties:

When does a system become "language"?

There are no extant "primitive" languages

language emerges suddenly in social groups
(creoles, etc.)



Types of detachable signs



3 Types of signs (after Charles Peirce):

Index: stands in causal/spatial relation to the signified (pawprint to bear, blaze on tree to act of marking, thermometer to temperature)

Icon: relation of resemblance (more-or-less) to signified. E.g,

Symbol: arbitrary relation of sign to signified. E.g., written word *cat*, spoken word /kæt/.

But types are often mixed in practice.



Types of detachable signs

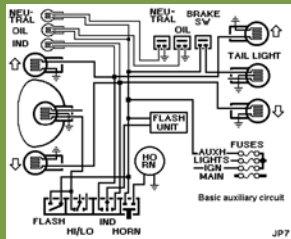


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Types of detachable signs



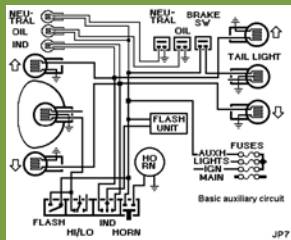
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Types of detachable signs



3 Types of signs (after Charles Peirce):

Index: stands in causal/spatial relation to the signified

Icon: relation of resemblance (more-or-less) to signified. E.g,

Symbol: arbitrary or conventional relation of sign to signified. E.g., written word *cat*, spoken word /kæt/.

But types are often mixed in practice.





The emergence of detachable signs: Tally marks

Earliest signs are mnemonics for record-keeping, genealogy, etc. (Tallying systems)

Knotted rope, notched stick or bone, etc.
(Possibly) notched bones go back 400,000 years.

Become frequent in upper paleolithic



Notched Bone, England, upper paleolithic, 12,000 years old



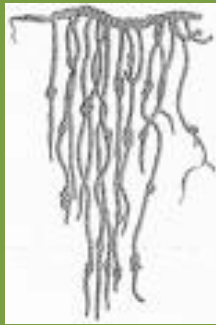
Notched Bone, Turkey, ca 3000 BC



Notched bone, Congo, ca. 25,000 BC -- may. represent lunar calendar



An elaborated tallying system: Inca Qipu (quipu, khipu)



Knots of varying colors in llama or alpaca hair;

Sequences recorded population, taxes, geneology, astronomy (and possibly names) in decimal system. System maintained by knot-keepers.

Limits: can record only quantity and category; requires extensive convention for intepretation



Beginnings of Iconic Representation



"Venus of Tan-Tan," Morocco, possibly 250k years old, but may be a naturally occurring object.



Cave paintings, Lascaux, France: ca 15-13,000 BC (others perhaps to 30,000 BC)

Man's first affirmation of himself, and expression of his own newness--when, by the ways and means of art, he entered into contact with the power, brilliance, and joyful mastery of a force that is essentially the force of a beginning. . . ." Maurice Blanchot



Beginnings of Iconic Representation



Petroglyphs, Bhimbetka,
India, ca 9000 BC



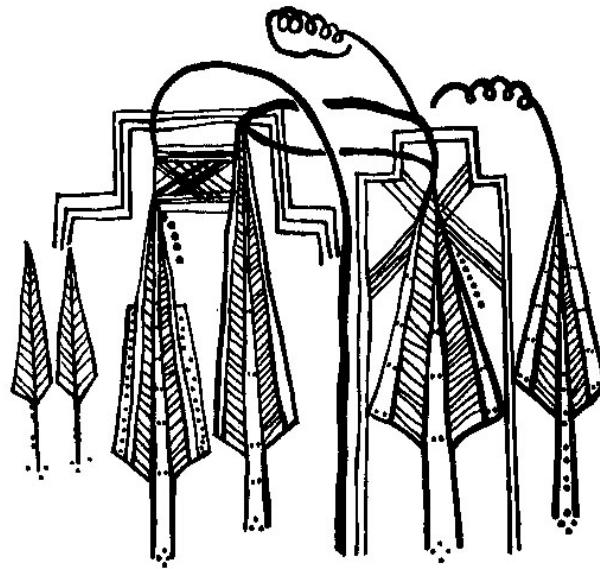
Petroglyphs, Scandinavia, Bronze
Age



Rock carving, Hong Kong
(Kau Sai), 3000 BC



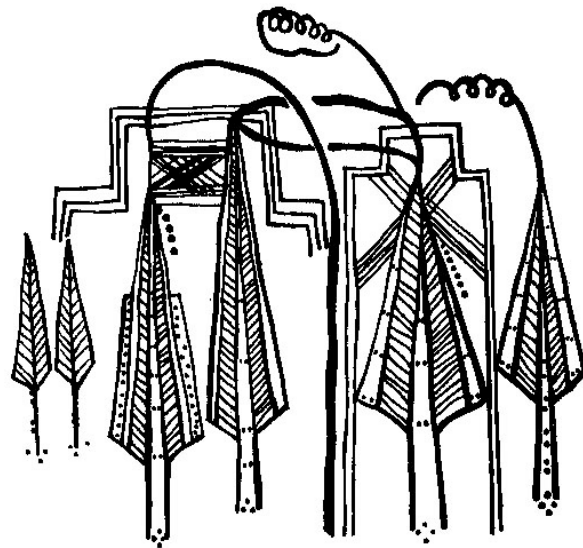
Pictographic Communication Systems



Y



Ideographic (Semasiographic) Systems



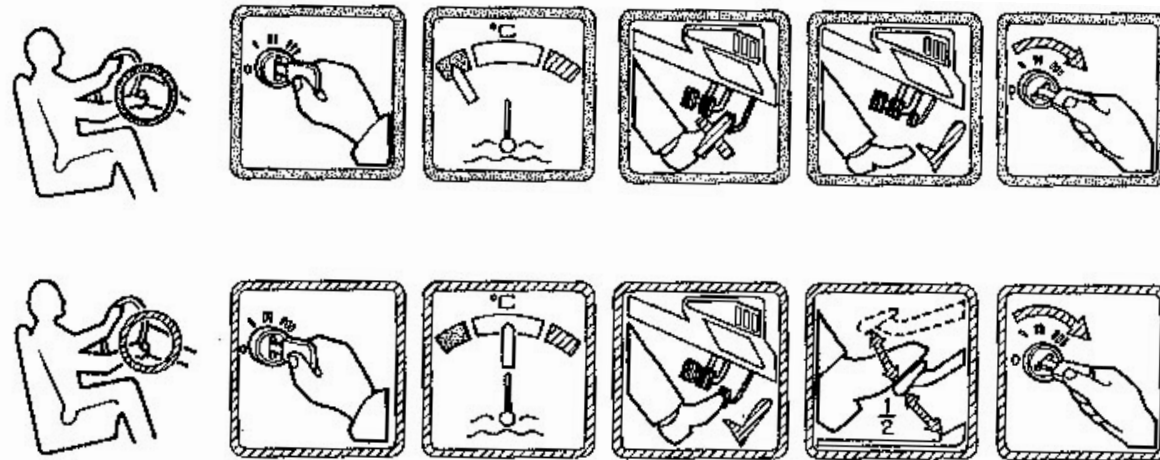
"I know you're fighting with that Russian bitch you broke up with me over. I'm unhappy in my house as I think of you, but you should know there's another dude hitting on me, so get on the stick before I get married and have children, Sparky."

Note level of conventionality; but cf also a sign like



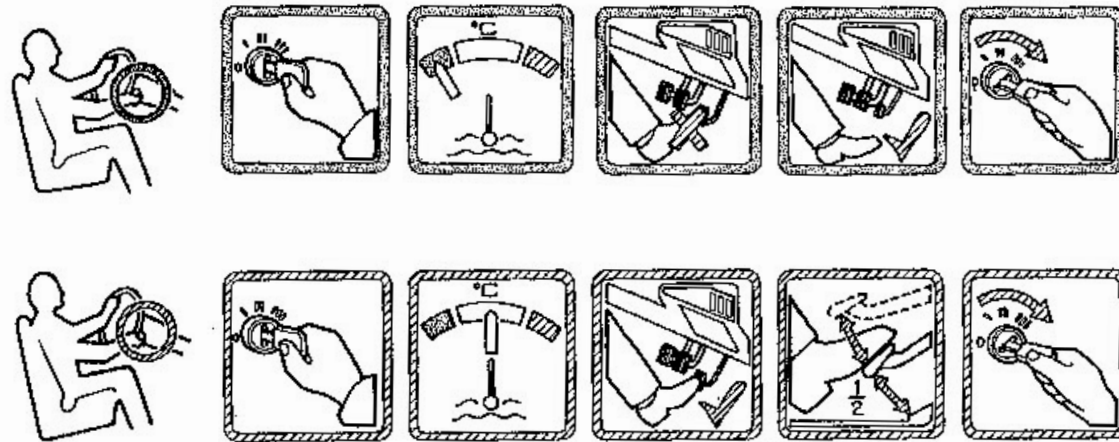


Ideographic (Semasiographic) Systems: the importance of context





Ideographic (Semasiographic) Systems: the importance of context



"Turn the key. If the car is cold, don't step on the gas pedal; if it's warm, depress the gas pedal halfway as you turn the key."



An Aside: The 10,000-year warning

Sandia Labs: warning signs to last 10,000 years for radioactive waste dumps.



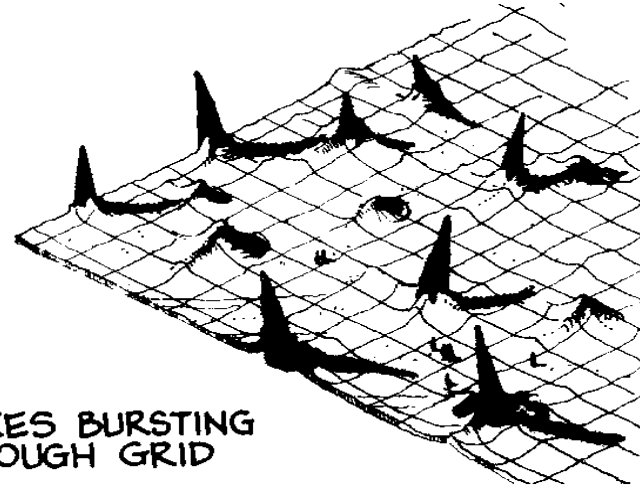
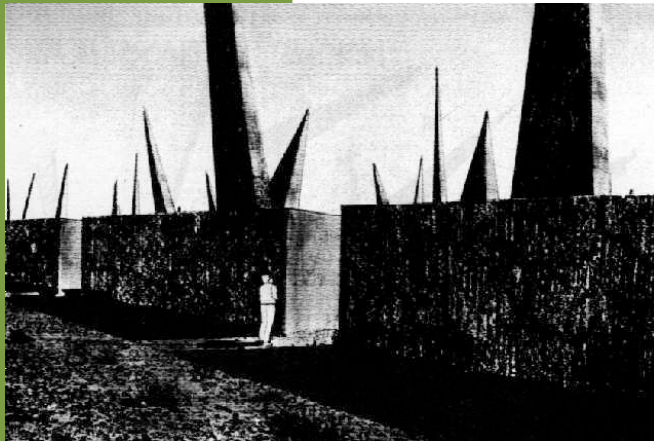
DANGER

POISONOUS RADIOACTIVE  WASTE BURIED HERE
DO NOT DIG OR DRILL HERE BEFORE A.D. 12,000





The 10,000-year warning



SPIKES BURSTING THROUGH GRID





Abstraction in semasiological systems

Extending semasiological systems to deal with abstract or relational notions. E.g., "brother," "go," etc.

A step toward the development of "true" writing:

Form signs for abstract entities by extending or combining signs for concrete things (ca. 3300 BC)

foot = "go, come, walk, etc." Cf use of



person + mountain = "foreigner"

eye + water = "weep" etc.



The limits of semasiographic systems

In theory, semasiographic systems could communicate a full range of information without reference to spoken language. Cf mathematical notation:

$$10^9 = 1,000,000,000$$

"Ten to the ninth equals a billion."/ "Zehn hoch neun gleicht eine Milliarde," etc.

$$\forall x (Fx \rightarrow Gx)$$

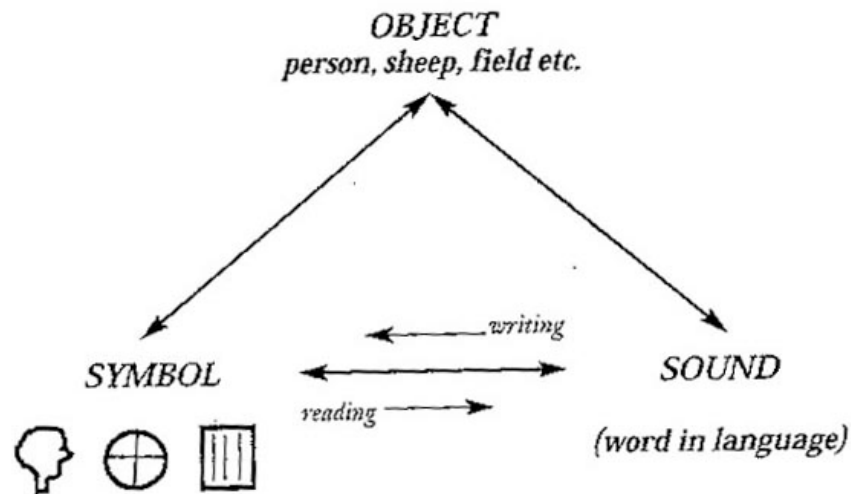
"For all x, if F of x then G of x"
"Everything that is F is G," etc.

But language-independent systems appear inadequate to express the full range of thoughts & information (as opposed, e.g., to artificial languages.)



The origins of (true?) writing

1.



Glottographic writing: rather than referring directly to reference, signs are associated with elements of the language (words, morphemes, syllables, phonemes).

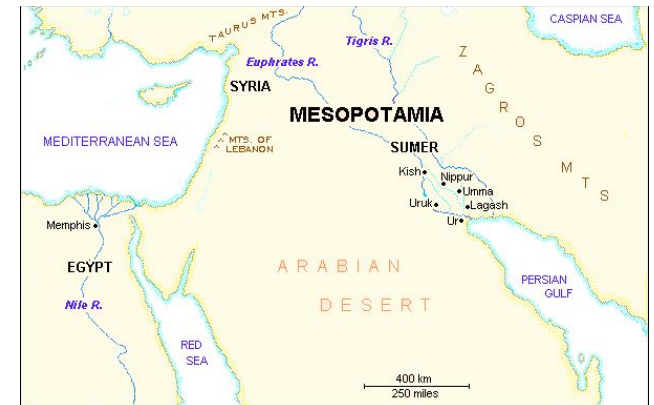


Origins of Writing in Sumer

8-5000 BC -- earliest use of clay tokens.

4,000 BC -- earliest clay bullae

3500-3300 BC -- earliest clay tablets from Uruk.



Bullae and tokens



Early cunieform



Tokens as origins of Sumerian writing?

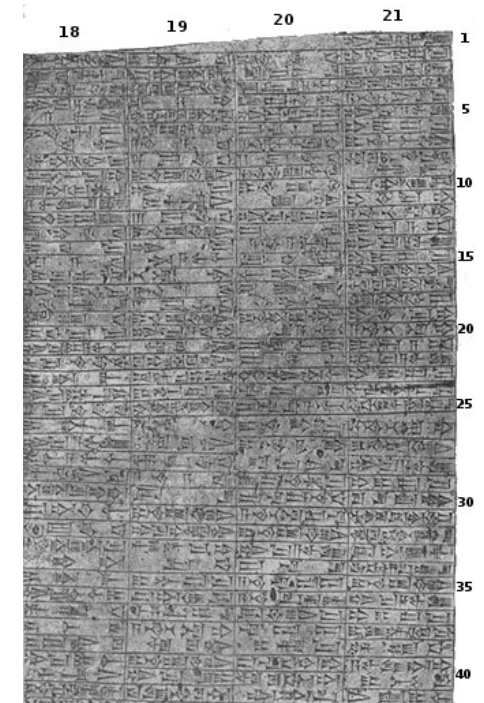
Evolution from Token to Cuneiform Writing					
Token	Pictograph	Neo-Sumerian/ Old Babylonian	Neo-Assyrian	Neo-Babylonian	English
					Sheep
					Cattle
					Dog
					Metal
					Oil
					Garment
					Bracelet
					Perfume



Origins of Writing in Sumer



- 2500 BC -- cuneiform “true” writing
- 2400 BC script used for Akkadian
- 2000 BC script used for Babylonian & Assyrian..
- 1750 BC Code of Hammurabi





Origins of Writing in Sumer

Epic of Gilgamesh

He who saw everything in the
broad-boned earth, and knew
what was to be known

Who had experienced what there
was, and had become familiar
with all things

He, to whom wisdom clung like
cloak, and who dwelt together
with Existence in Harmony

He knew the secret of things and
laid them bare. And told of those
times before the Flood

In his city, Uruk, he made the
walls, which formed a rampart
stretching on...



Epic from ca.
1500-1750 BC,
existing tablets
from 600 BC in
Akkadian...



Functions of Early Writing

Writing develops as memorial tool --
things that are hard to remember...

Commercial records

Calendars & dates



Functions of Early Writing

Writing develops as memorial aid -- things that are hard to remember...

- Commercial records

- Calendars & dates

Or that have to be said just so:

- Titles

- Laws

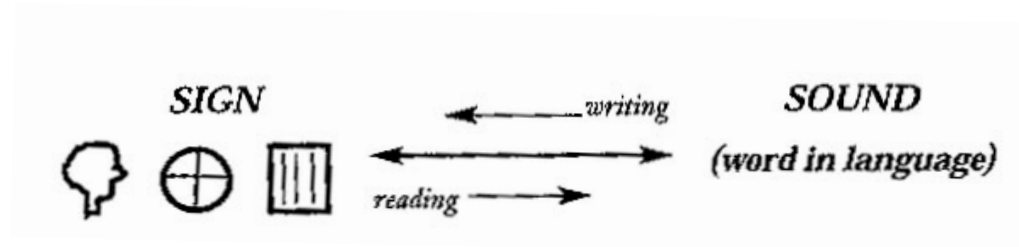
- Liturgical texts

- Poetry



The Origins of "complete" writing

"Complete" glottographic system:
signs denote words of the language





The Rebus Principle



Rebus: Icons of things that stand in for their (phonetic) names



The Rebus Principle



"canting" -- seal of the Borough of
Conleton (Cheshire)=
CONger, LEO, TUN



Rebus principle leads to logography

Rebus principle allows signs to be reutilized to signal abstract words, functional elements, etc.

≡ “water” /a/ → “in” /a/

T “oracle” /me/ → plural suffix /-me/

Accompanied by increasing conventionalization of signs...

Creates need for “determinative” signs to indicate how other signs are being used.

Eg. “marsh plant” (/te/) sign also used for name of goddess assoc. w. marshes /eresh/ -- /u/ “plant” used to indicate “marsh plant” use of sign.



Logography to Syllabic System

Logographs ultimately perceived as having purely phonetic value.

Cf English logographs -- imagine the word *h@b&*

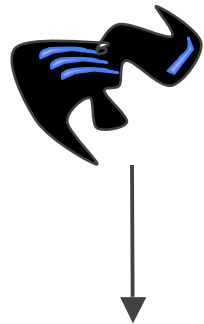
Signs come to stand in for syllables.

Sumerian has (C)V syllable structure.

Sumerian mixture of logographic & syllabic, like modern Japanese.



Development of Written Symbols

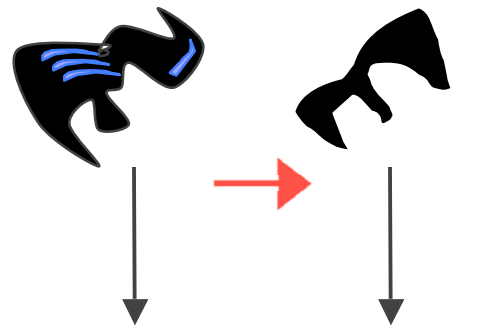


Semasiographic/
ideographic



Development of Written Symbols

Simplification of sign →



Semasiographic/
ideographic



Rebus
extension

Proto-writing



Development of Written Symbols

Simplification of sign →



[ɛlvɪs]

Semasiographic/
ideographic

Rebus
extension

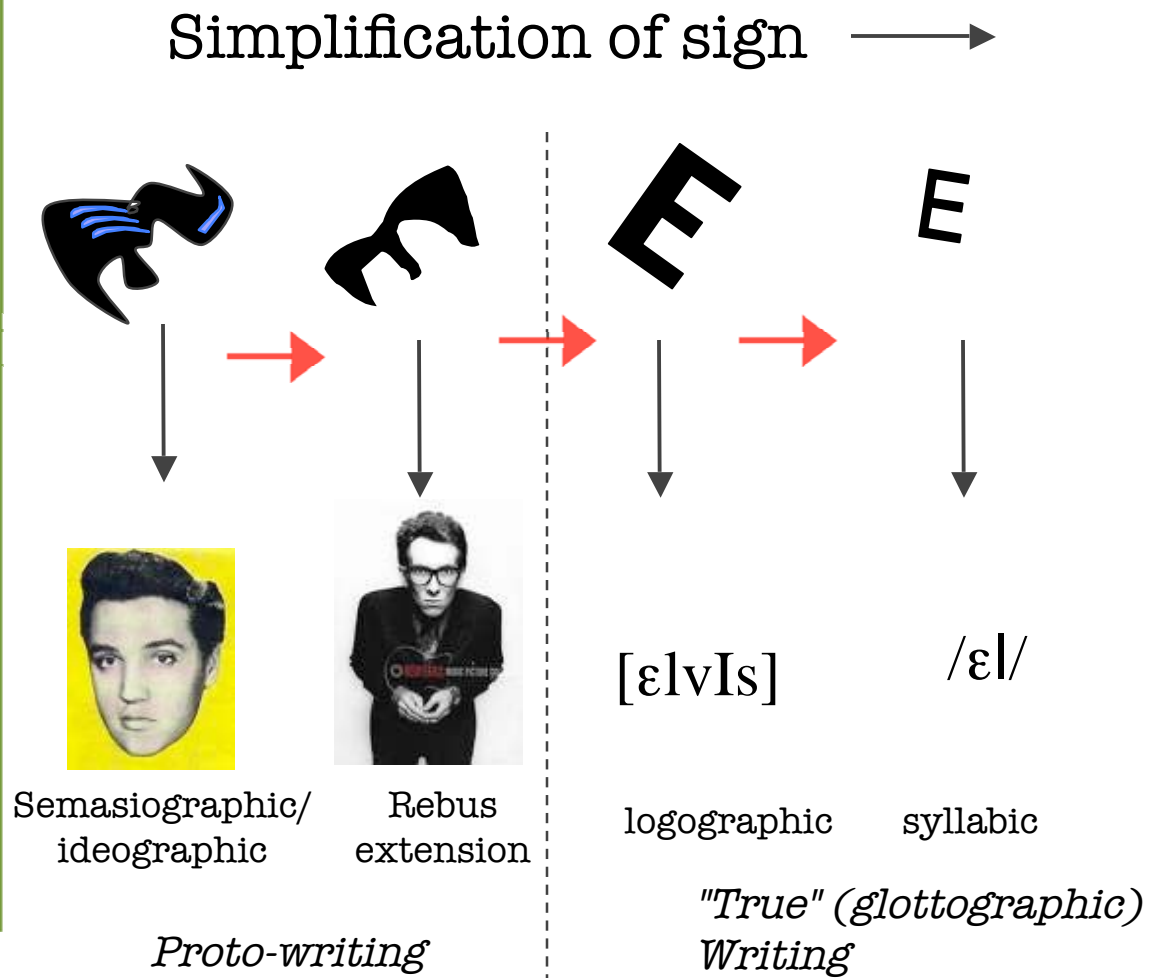
logographic

Proto-writing

*"True" (glottographic)
Writing*



Development of Written Symbols





Development of Written Symbols

Simplification of sign →



[ɛlvɪs]

/ɛl/

/ɛ/

Semasiographic/
ideographic

Rebus
extension

logographic

syllabic

alphabetic

Proto-writing

*"True" (glottographic)
Writing*

Origins of major writing systems

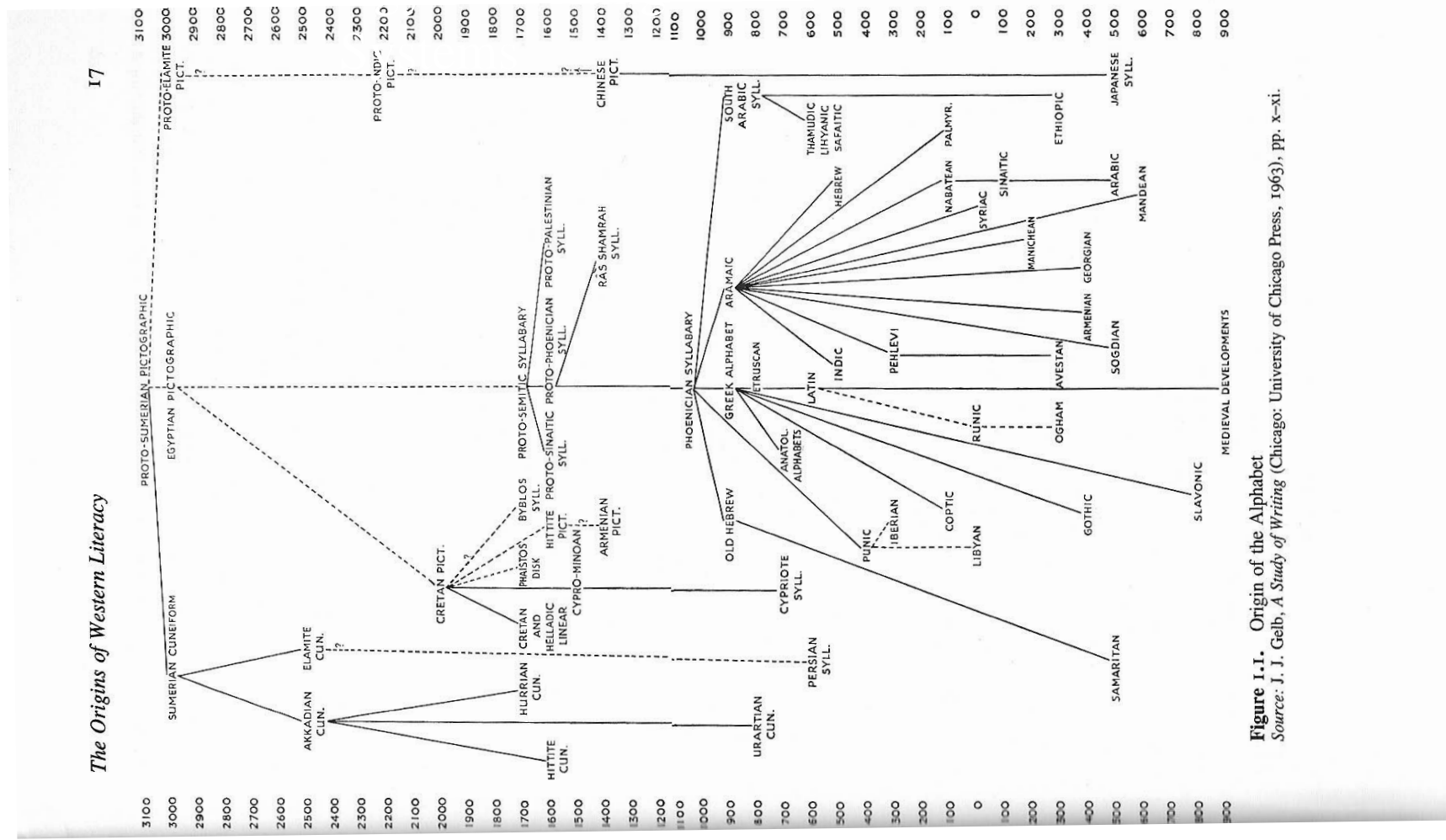


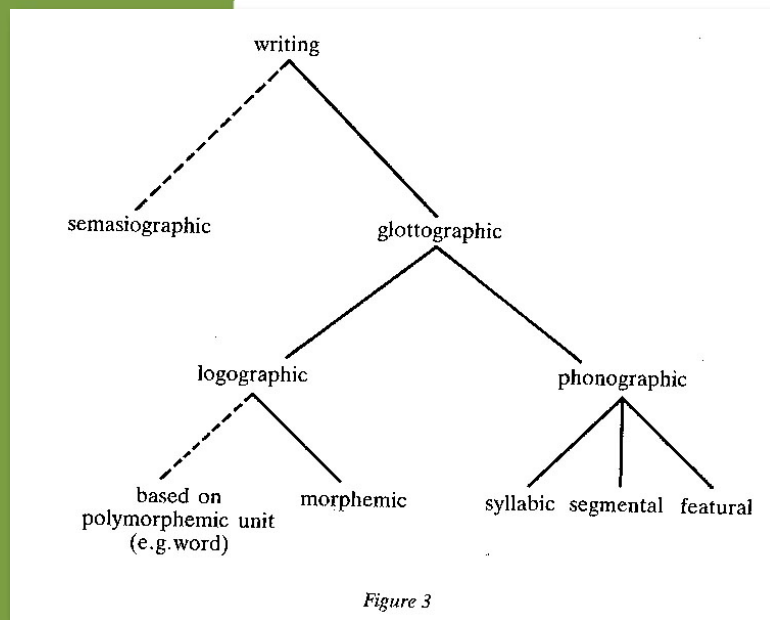
Figure 1.1. Origin of the Alphabet
 Source: J. J. Gebb, *A Study of Writing* (Chicago: University of Chicago Press, 1963), pp. x-xi.

... but not much evidence for a single source (monogenesis)...



Origins of Alphabetic Writing

Alphabetic system derived from application of syllabic system to different phonological structures.



Logographic: mod. Chinese, Japanese (mixed)

Syllabic: Linear B, Cherokee, Korean Hangeul (featural)

Alphabetic: Roman, Cyrillic, Gk, Hebrew, etc,



The abstractness of alphabetic systems

Cf distinct sounds signaled by {t}
in:

time

cut

try

butter

button

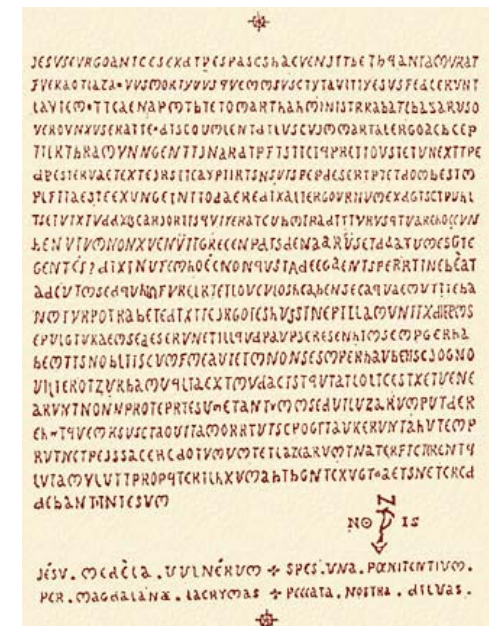
etc.



Later Developments

Subsequent development of further orthographic elements: word-spacing, punctuation, paragraphing, etc.

Not fixed till early age of print. Reduce ambiguity, make writing increasingly accessible in abstract context:





Later Developments

Subsequent development of further orthographic elements: word-spacing, punctuation, paragraphing, etc.

it is of a more henceforth free that I am to write the history of the
civil administration and the conduct of her wars her annually
elected magistrates the authority of her laws supreme
over all her citizens the tyranny of the last king made this liberty
all the more welcome for such had been the rule of the former
king that they might not undeservedly be counted as founders of
parts at all events of the city



Later Developments

Subsequent development of further orthographic elements: word-spacing, punctuation, paragraphing, etc.

It is of a Rome henceforth free that I am to write the history--her civil administration and the conduct of her wars, her annually elected magistrates, the authority of her laws supreme over all her citizens. The tyranny of the last king made this liberty all the more welcome, for such had been the rule of the former kings that they might not undeservedly be counted as founders of parts, at all events, of the city...



Contrasting alphabetic and logographic systems

Ease of learning... Typographic simplicity.

Ease of processing

Symbolic importance for linguistic community -- cf irregularity of English spelling



Next Meeting

Readings:

* Goody, Jack and Ian Watt. 1988. "The Consequences of Literacy," from Jack Goody, ed., *Literacy in Traditional Societies* (Cambridge University Press, 1968). Part 1 and Part 2. Also available at JSTOR in pdf [here](#).

* Scribner, Silvia and Michael Cole. 1988. "Unpackaging Literacy." full text (pdf) at Social Science Information, 17, 1 (1978)



Next Meeting

Assignment 2: Week 3.2 (due 9/12)

In his 1987 study of the cognitive effects of word-processing systems, *Electric Language*, Michael Heim wrote:

The accelerated automation of word-processing makes possible a new immediacy in the creation of public, typified text. Immediacy in the sense of there being no medium quod, no instrumental impediment to thinking in external symbols, but only a medium quo, or purely transparent element. ...
[more]

Reading this passage, would you say that Heim's view of the effects of writing technology comes closer to that of Goody and Watt or of Scribner and Cole? Why? Write a paragraph briefly defending and explaining your view.