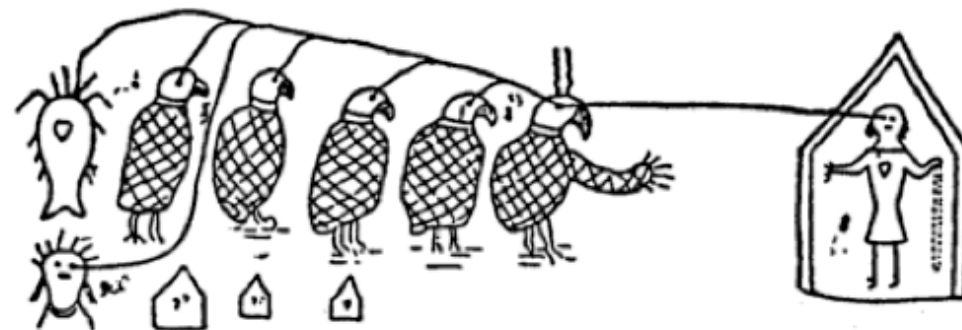
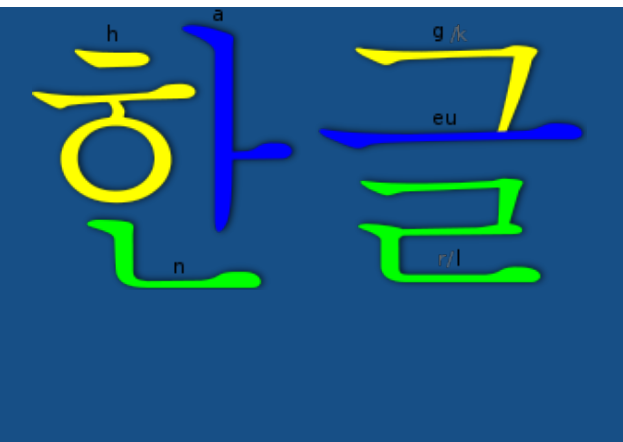


# History of Information

## Writing Systems: The First “IT”

**Geoff Nunberg**

**IS 103  
History of Information  
Jan. 26, 2017**



# Bancroft Tour

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**Sign up on google docs form on bcourses.**

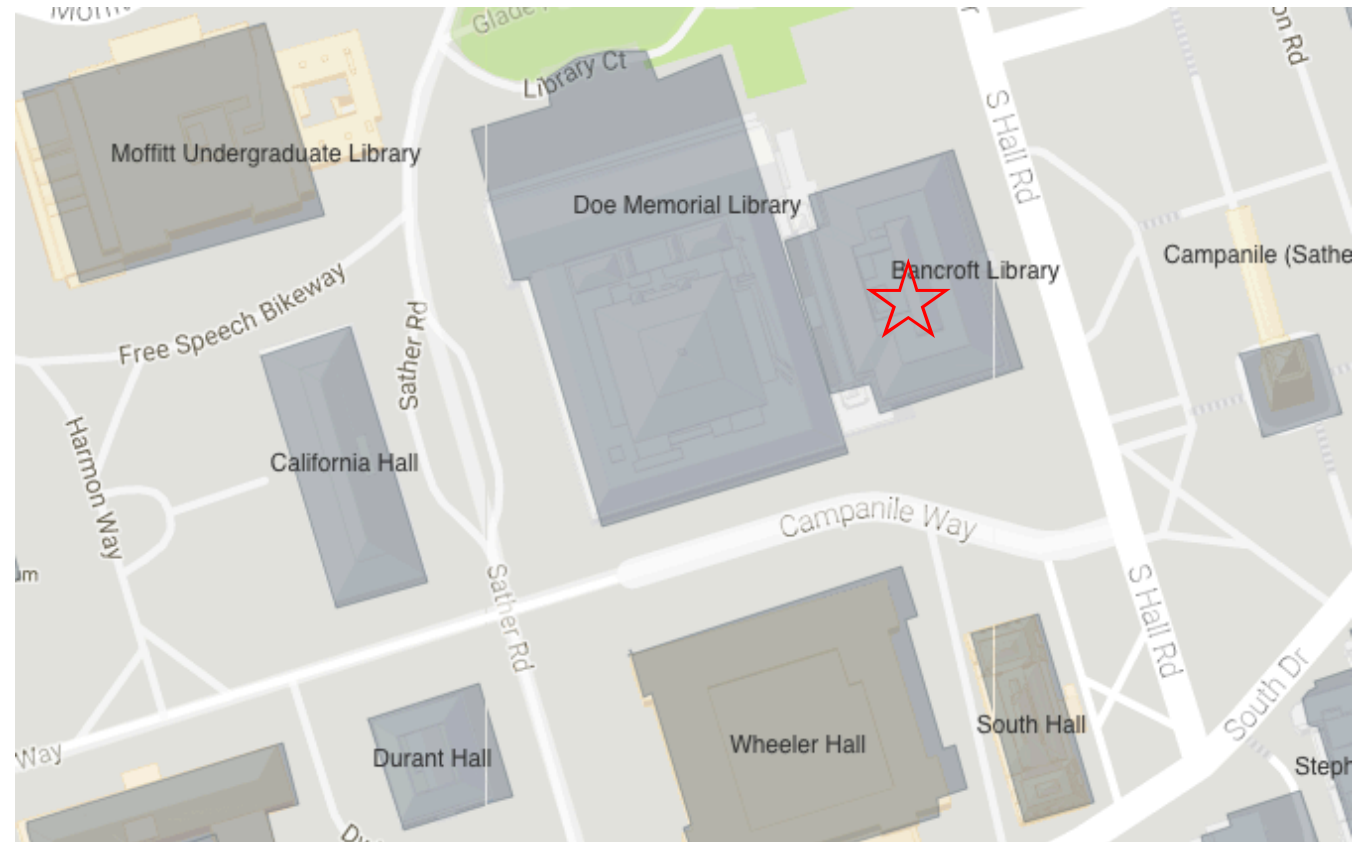
Mon Jan 30, 2:00-3:00

Tues Jan 31, 2:00-3:00

Weds Feb 1, 10:00-11:00 & 12:00-1:00

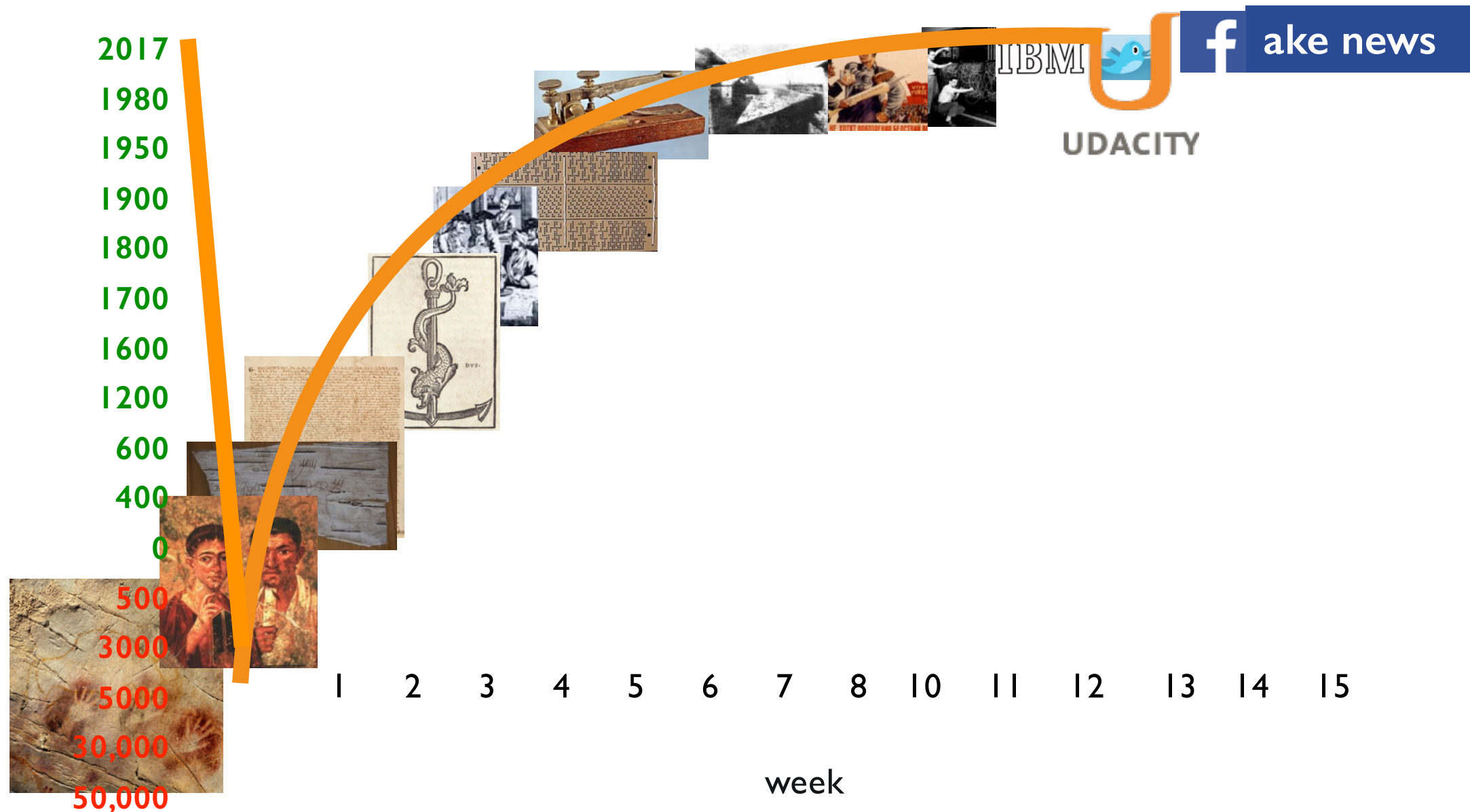
Thurs Feb 2, 12:30-1:30

Note: only paper & pencil allowed;  
bring quarters for locker.



# History of Information

## The Journey Begins



# Itinerary, 1/26

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**The Dawn of Information**

**The Emergence of Representation**

**The Variety of Signs**

**Origins and Development of Writing Systems**

**Types of Writing Systems**

**Independent Inventions of Writing Systems**



# What kind of "information" has a history?

The Beginnings of  
Information

The Emergence of  
Representation

The Variety of Signs

The Origins and  
Development of  
Writing Systems

Types of Writing  
Systems

Independent  
Inventions of  
Writing Systems

... it's always there when we look for it, available wherever we bother to direct our attention. We can glean it from the pages of a book or the morning newspaper and from the glowing phosphors of a video screen. Scientists find it stored in our genes and in the lush complexity of the rain forest. The Vatican Library has a bunch of it, and so does Madonna's latest CD. And it's always in the air where people come together, whether to work, play, or just gab.

What is it that can be so pervasive and yet so mysterious? Information, of course.

John Verity in *Business Week*, special number on the "Information Revolution," 1994

# What kind of "information" has a history?



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John Verity in *Business Week*, special  
number on the "Information Revolution," 1994



# The Emergence of Representation

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# The First "Information System": Language



Psamtik I, 654-  
610 BCE



James V of  
Scotland

The Egyptians...believed themselves to be the most ancient of mankind...This king contrived the following method of discovery: He took two children of the common sort, and gave them over to a herdsman to bring up at his folds, strictly charging him to let no one utter a word in their presence, but to keep them in a sequestered cottage... His object herein was to know... what word they would first articulate. ...

The herdsman obeyed his orders for two years, and on one day opening the door of their room, the children both ran up to him with outstretched arms, and distinctly said "Bekos." ...He informed his lord, [who then] learnt that "bekos" was the Phrygian name for bread. In consideration of this circumstance the Egyptians yielded their claims, and admitted the greater antiquity of the Phrygians.

Herodotus, *Histories*, 2.2



# The First "Information System": Language



Psamtik I, 654-  
610 BCE

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]**



# The First "Information System": Language

FOXP2 gene

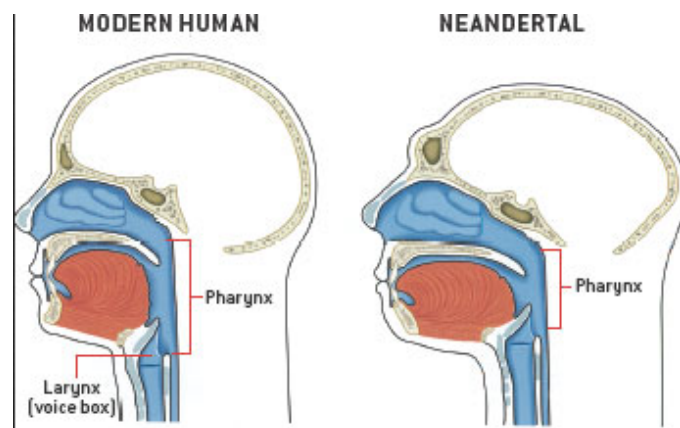


Was development of language gradual or sudden?

*Homo erectus* (1.5 m years)? *Homo sapiens* (ca 100-150k years)? But surely by 60k BP

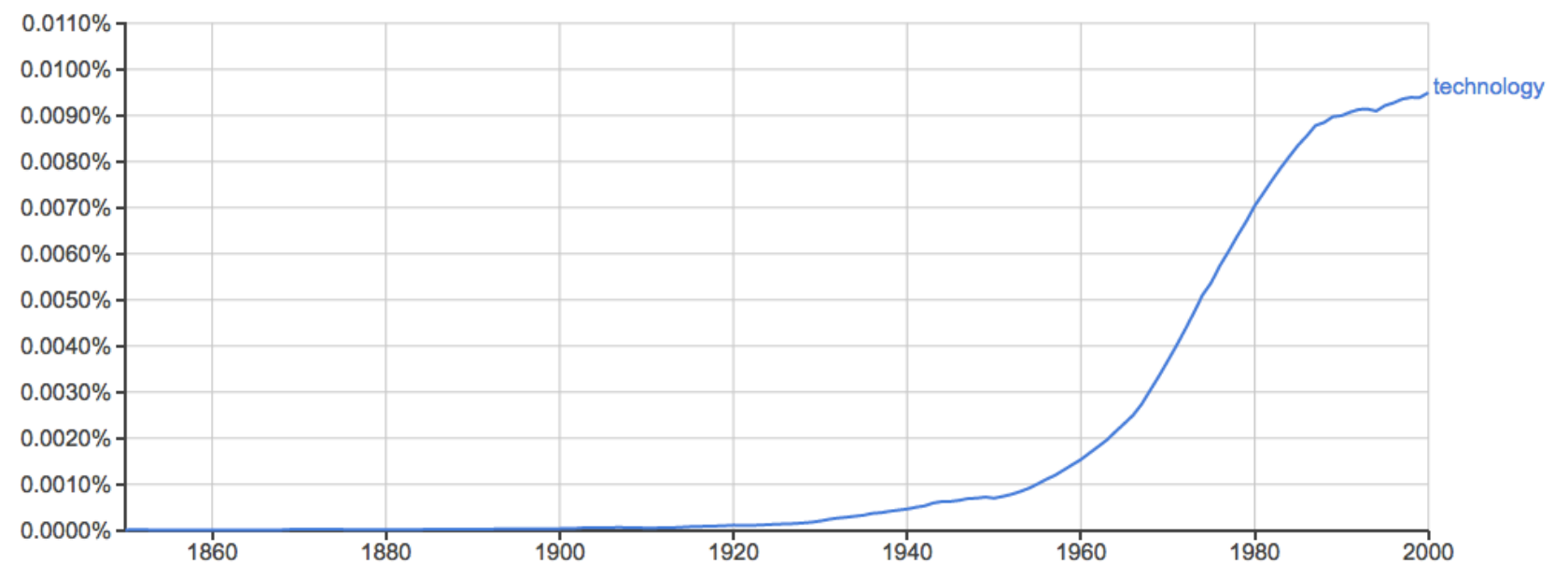
"The momentum we see in cultural revolution after [the dispersion] was no longer genetically based... Darwinian evolution in the genetic sense continued, and underlies the rather superficial differences that are observed between different racial groups today... but the newly emerging behavioral differences between the groups were not genetically determined. **They were learned, and they depended on the transmission of culture.**"

Colin Renfrew



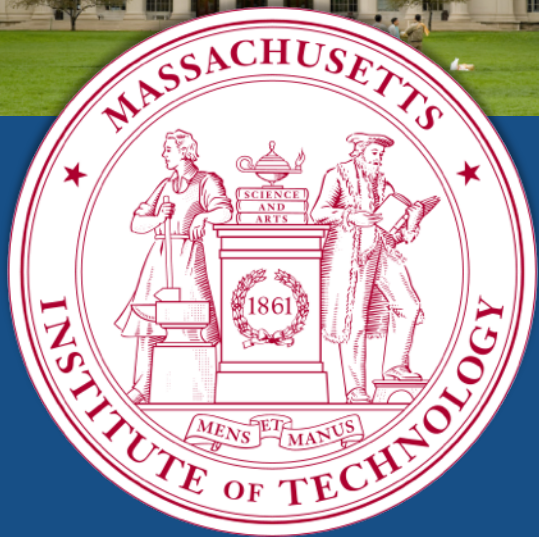
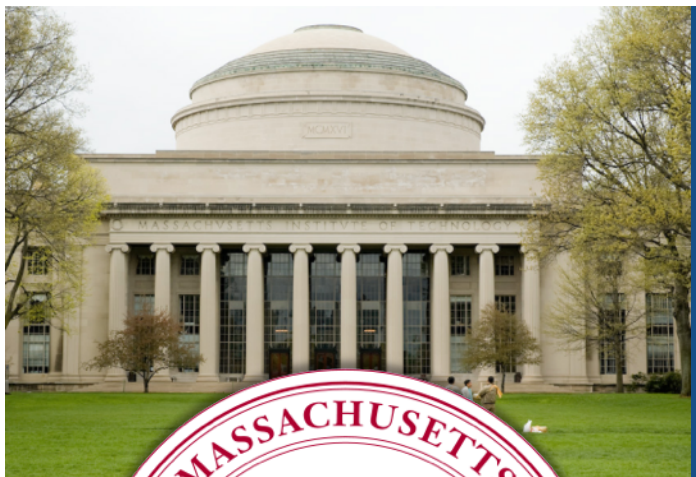
# Representational Artifacts: Displacing Representation

## On “technologies” of information



Relative frequency of 'technology' in Google Books, 1850-2000

Technology: artifacts, systems, settings



# The Varieties of Signs

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The Beginnings of  
Information

The Emergence of  
Representation

**The Variety of Signs**

The Origins and  
Development of Writing  
Systems

Types of Writing Systems

Independent Inventions of  
Writing Systems



Charles Sanders Peirce

# The Varieties of Signs



3 Types of signs (after Charles Peirce):

Icon: sign resembles signified

Index: sign connected to signified

Symbol: sign conventionally attached to signified

# The Varieties of Signs



**Icon:** sign stands in relation of resemblance or similarity to signified (though often only roughly).







# The Varieties of Signs: Indexical

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





# The Varieties of Signs



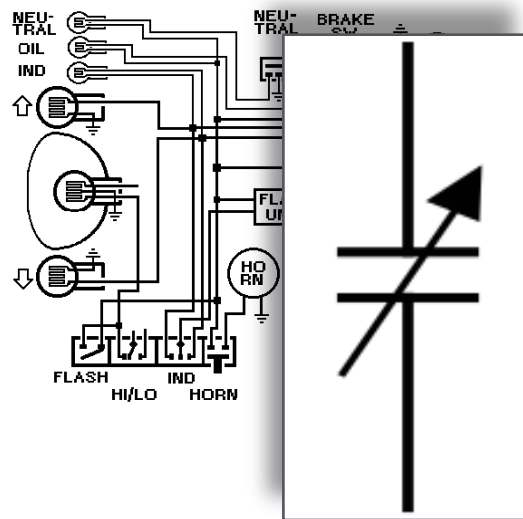
Symbol: Arbitrary relation between sign and thing signified



**tree**

(vs *arbre*, *Baum*, *shù*, *namu* etc)

# The complexity of Signs



Many signs combine several types



## Early Indexical Signs

The Beginnings of  
Information

**The Emergence of  
Representation**

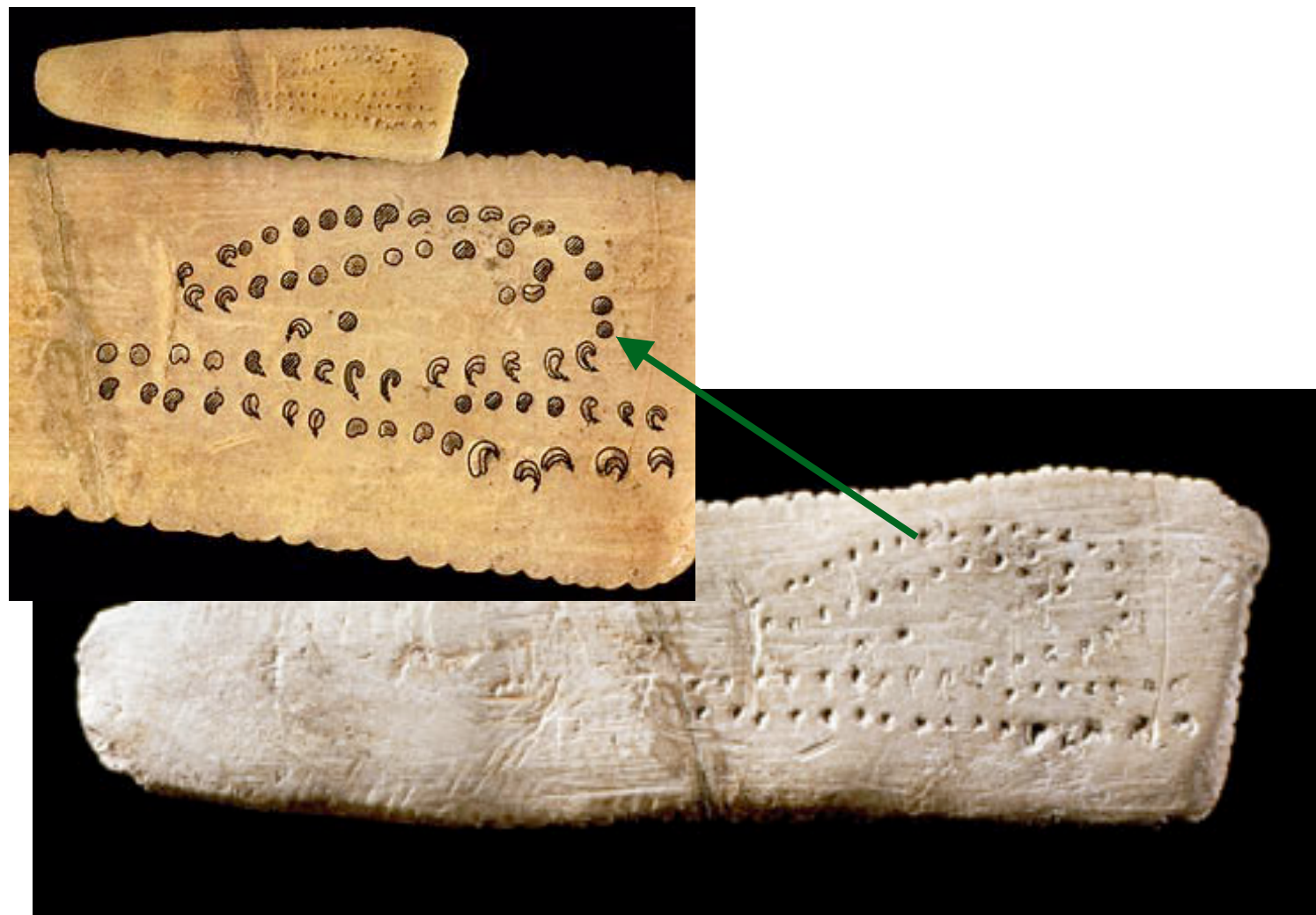
The Variety of Signs

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"... whereas notations of whatever sort were apparently means of recording the passage of time in terms of culturally significant events." Marshack



## Early Indexical Signs

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

"The first step in data processing" Denise  
Schmandt-Besserat



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



Notched Bone, Turkey, ca  
3000 BC



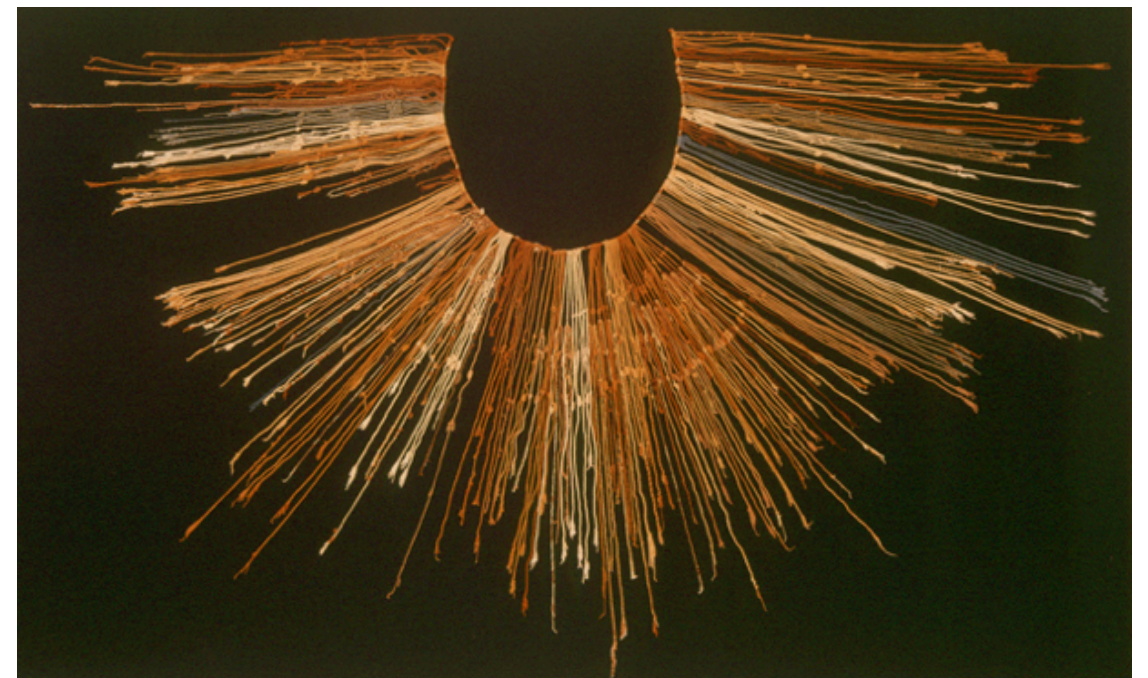
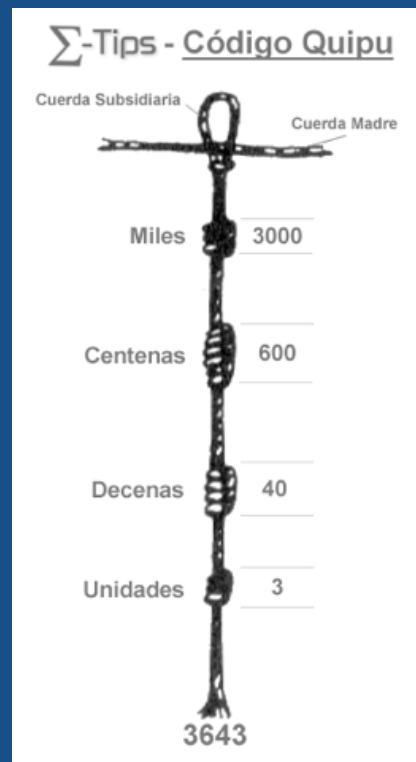
Notched bone, Congo, ca.  
25,000 BC -- may.  
represent lunar calendar





# Elaborated Indexical System: The Inca *quipu*

**Knots of varying colors in llama or alpaca hair**





# Early iconic signs

"Images and symbols... were markers of periodic and continuous cultural processes, of rites, and of repetitive myths and stories..."  
Alexander Marshack



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



Petroglyphs, Bhimbetka,  
India, 9000 BC



Spotted Horses  
Pech Merle, France







# “The Sistine Chapel of Prehistoric Art”

Cave paintings, Lascaux, France: ca 15-13,000 BC

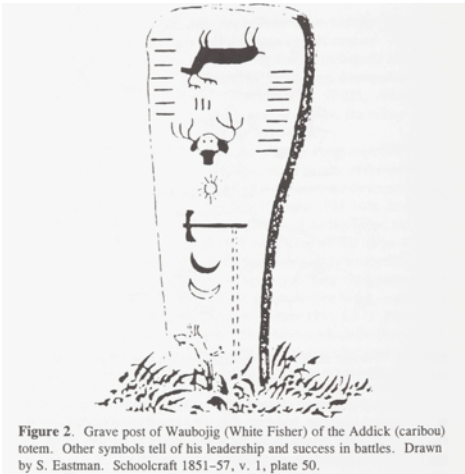


Jacques Marsal & Robot 1940

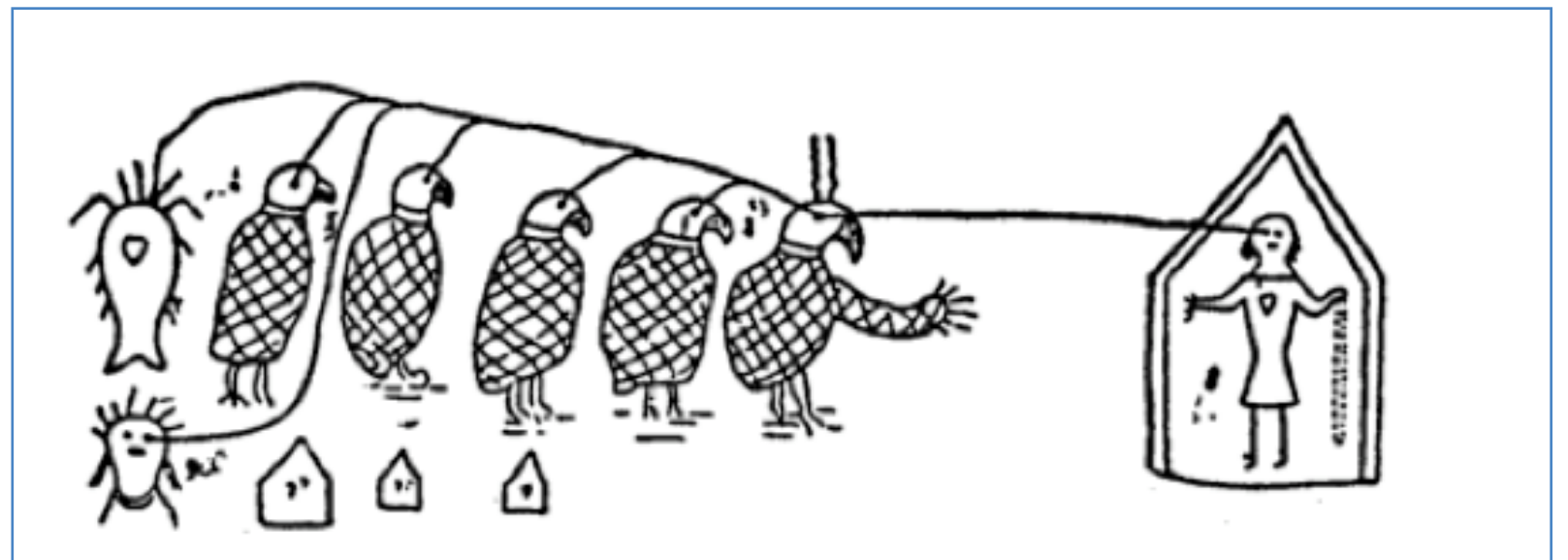
"Man's first affirmation of himself" —Maurice Blanchot

# The Origins and Development of Writing Systems

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# Pictographic (Iconic) Communication Systems

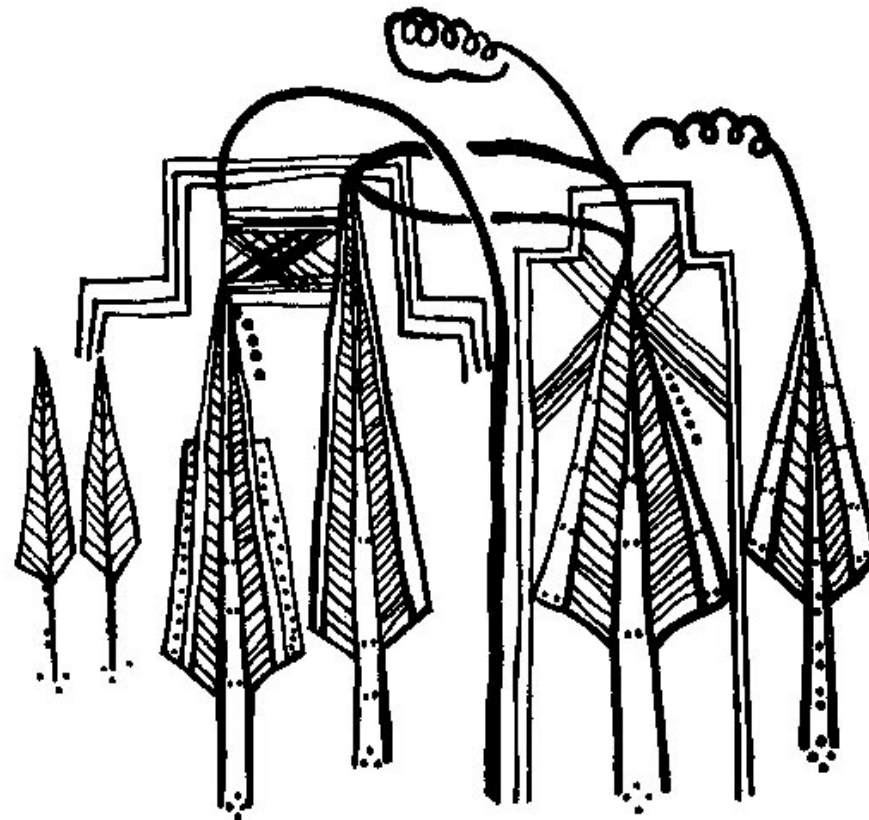


"Letter of credence" presented by Chippewa delegation to Washington, 1849

"The chief salutes the president, and his warriors belonging to the eagle and catfish totems are in harmony with him and are willing to accept the white man's ways."

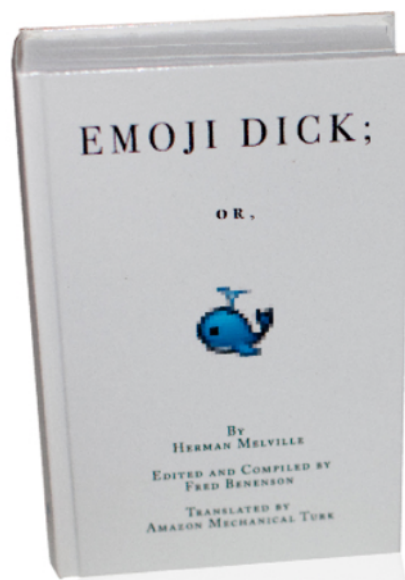
# Pictographic Systems

Yukaghir (Siberia) "love letter," late 19th c.

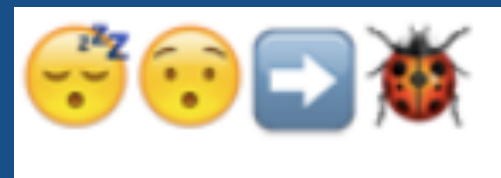
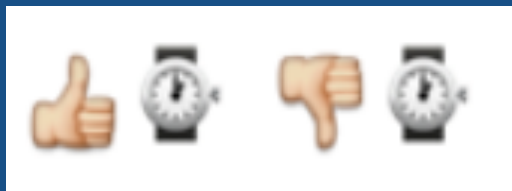


"I know you're fighting with that Russian girl you broke up with me over. I'm unhappy in my house as I think of you, but you should know there's another guy hitting on me, so get your act together before I get married and have children."





# Abstraction in pictographic systems



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

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

foot = "go, come, walk, etc."

person + mountain = "foreigner"

eye + water = "weep," "sad," etc.

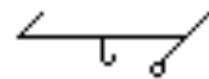
Cf modern use of "metonymic" icons

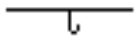


# John Wilkins' universal language



Explaining the symbol



The generic character th signify the genus of space. the acute angle on the left side doth denote the first difference, which is Time. The other affix signifies the ninth species under the differences, which is Everness. The Loop at the end of this affix denotes the word is to be used adverbially; so that the sense of it must be the same which we express by the phrase, For Ever and Ever.

John Wilkins "'An Essay Towards a Real Character and a Philosophical Language' 1668



## The limits of ideographic/semasiographic systems

---

Semasiographic/ideographic system: symbols stand directly for ideas, not for words of a language.

Cf mathematical notation:  $10^9 = 1,000,000,000$

But language-independent systems appear inadequate to express the full range of thoughts & information

# The origins of writing

---



Sequoyah (George Gist) (c.1770—1843)

# The origins of true writing

The Beginnings of Information

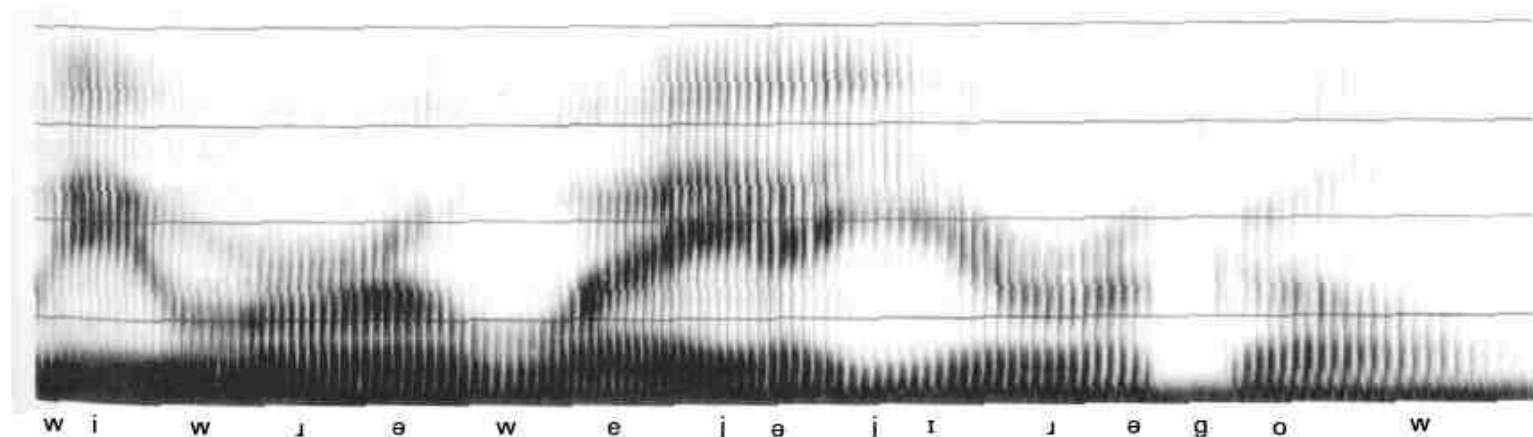
The Emergence of Representation

The Variety of Signs

**The Origins and Development of Writing Systems**

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wiyw3rə'weyə'yirəgow

"We were away a year ago"

# The origins of true writing

The Beginnings of Information

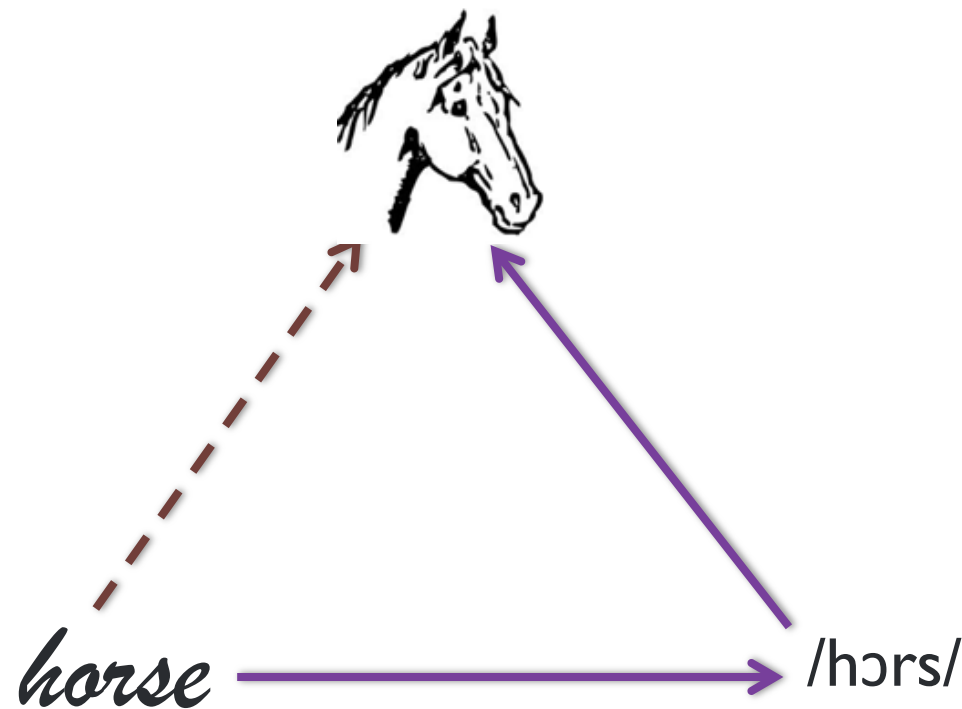
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True Writing: symbols represent elements of language rather than directly representing things in the world.

# The origins of true writing

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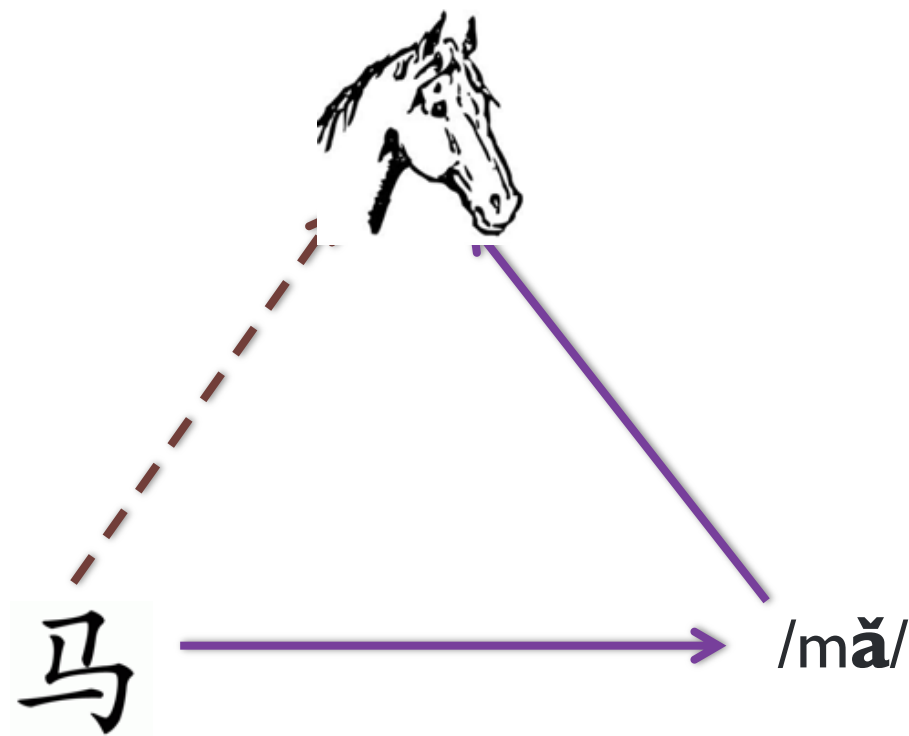
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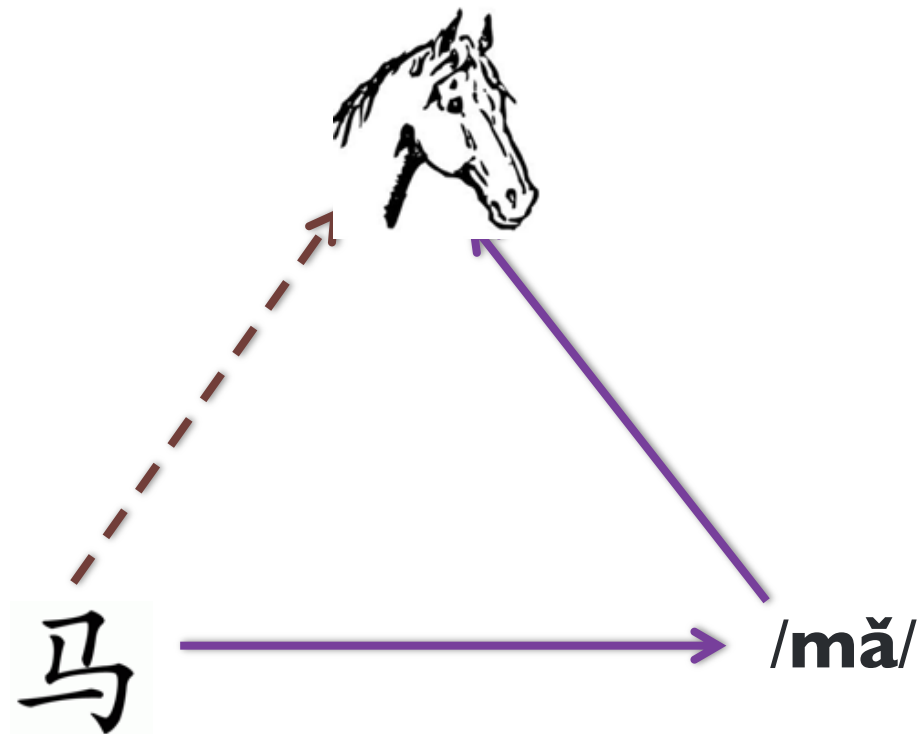
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True Writing: symbols represent elements of language rather than directly representing things in the world.  
i.e. true writing is GLOTTOGRAPHIC

Contrast "5" vs *five*, *cinque*, *fünf*, *wǔ*, etc.

"\$" vs "dollars," etc.

# Origins of Writing in Sumer

---



# 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?



**Figure 7** Pictographic tablet from Uruk, Iraq, late fourth millennium B.C. The account in the upper central case, for example, shows the sign for sheep and five wedges standing for the abstract numeral 5. Courtesy Vorderasiatisches Museum, Staatliche Museen zu Berlin, East Germany.

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

# The Origins of "complete" writing

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## **Glottographic system: signs denote words/signs of the language**

But how to signify "abstract" words? *Creation, after, but, believe, faithful, if*, etc.

Metaphoric extension (cf extended meanings of head, hand, foot, etc.)

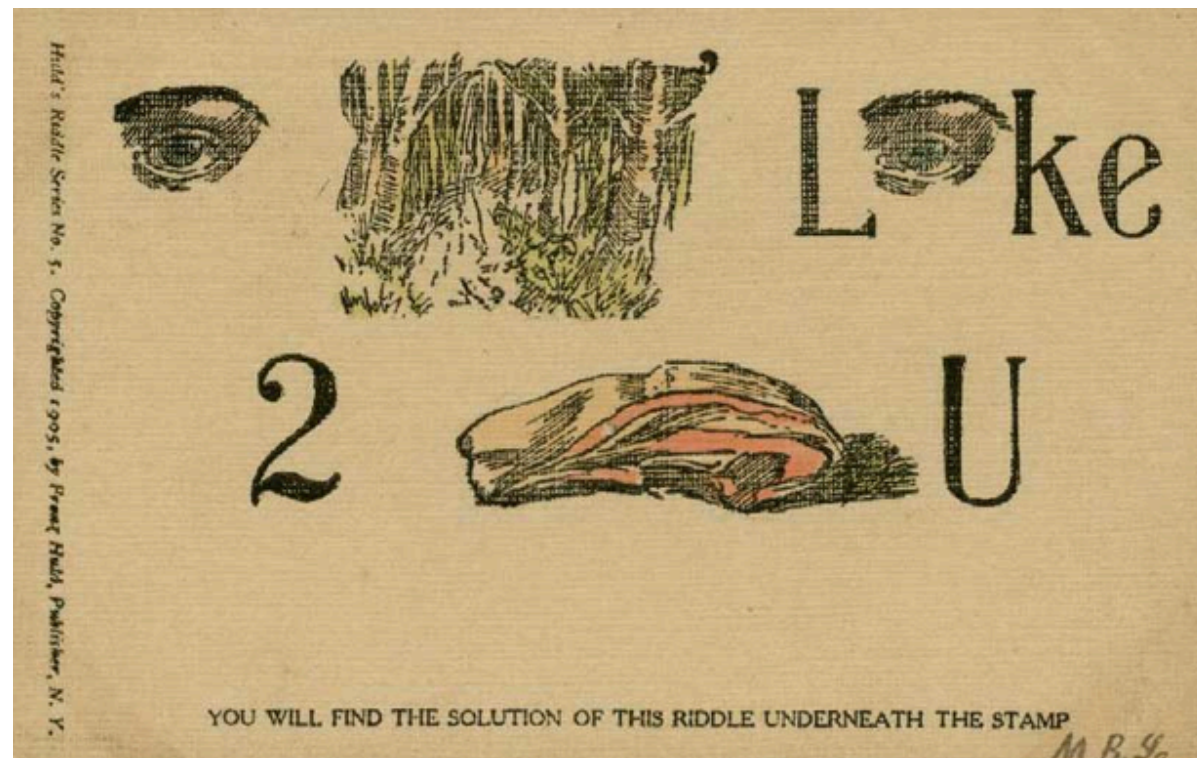




# The Rebus Principle



Rebus for Bishop Hugh Oldham (1452-1510) carved in wall of Exeter Cathedral



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

# Rebus principle leads to logographic system

The Beginnings of  
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Rebus principle allows signs to be reutilized to signal abstract words, functional elements, etc. Signs stand directly for words



“water” /a/ → “in” /a/



“oracle” /me/ → plural suffix /-me/

Cf English logograms &, \$, £, @

# (primarily) logographic systems



Sumerian

Egyptian Hieroglyphs (logograms + determinatives – cf “funny ha ha”)

Chinese

Japanese kanji





# Logography to Syllabic System

The Beginnings of Information

The Emergence of Representation

The Variety of Signs

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**Logographs ultimately perceived as having purely phonetic value.**

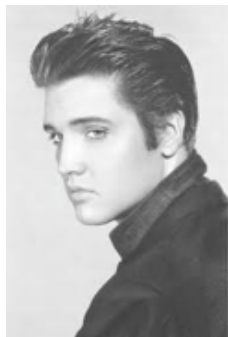
Cf English logographs – @, &, £, ¢  
imagine the word *h@b&*

Texting: CU@\*\$, ne14Xs?

**Signs come to stand in for syllables**

# Development of Written Symbols

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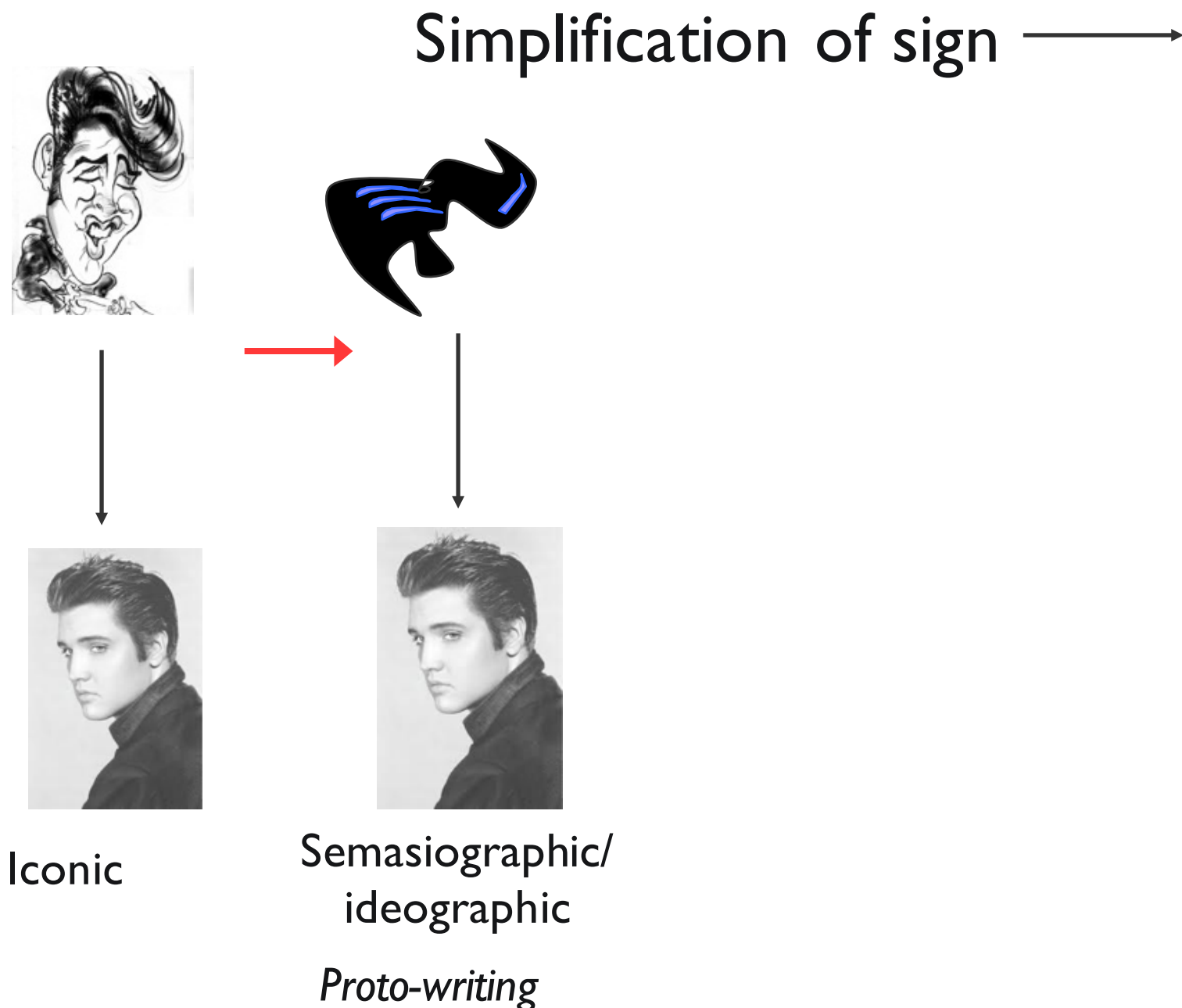


Iconic



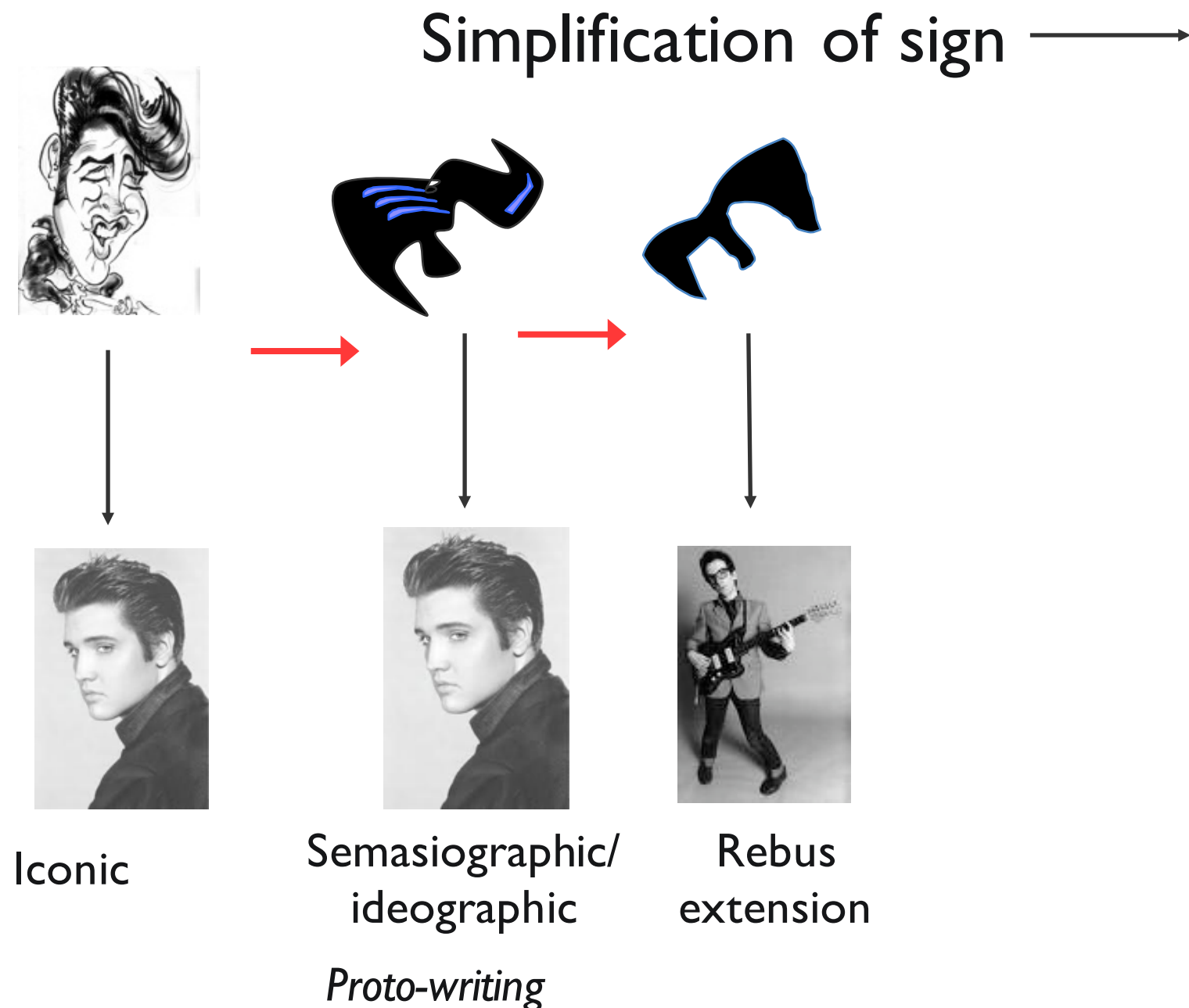
# Development of Written Symbols

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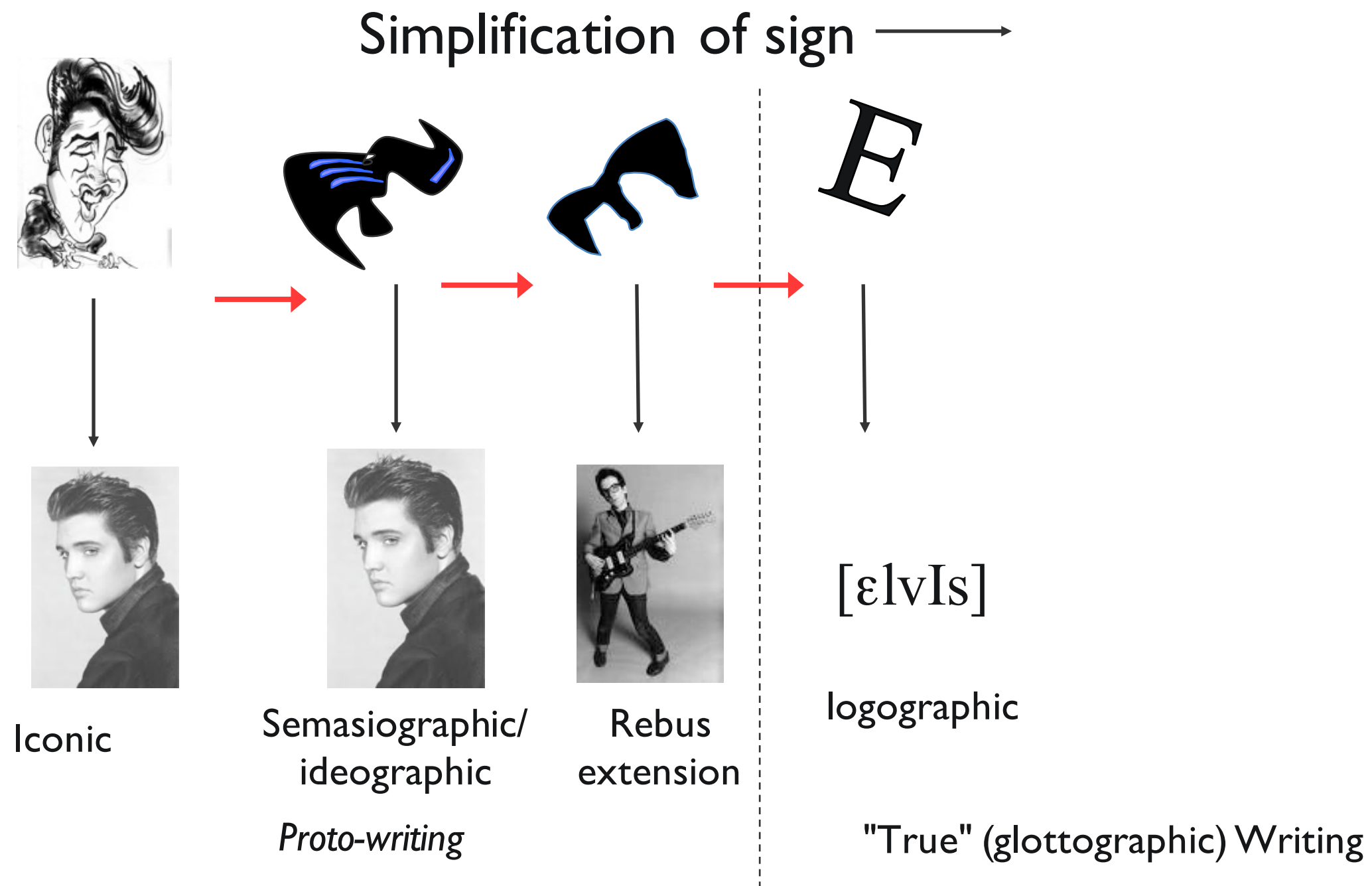


# Development of Written Symbols

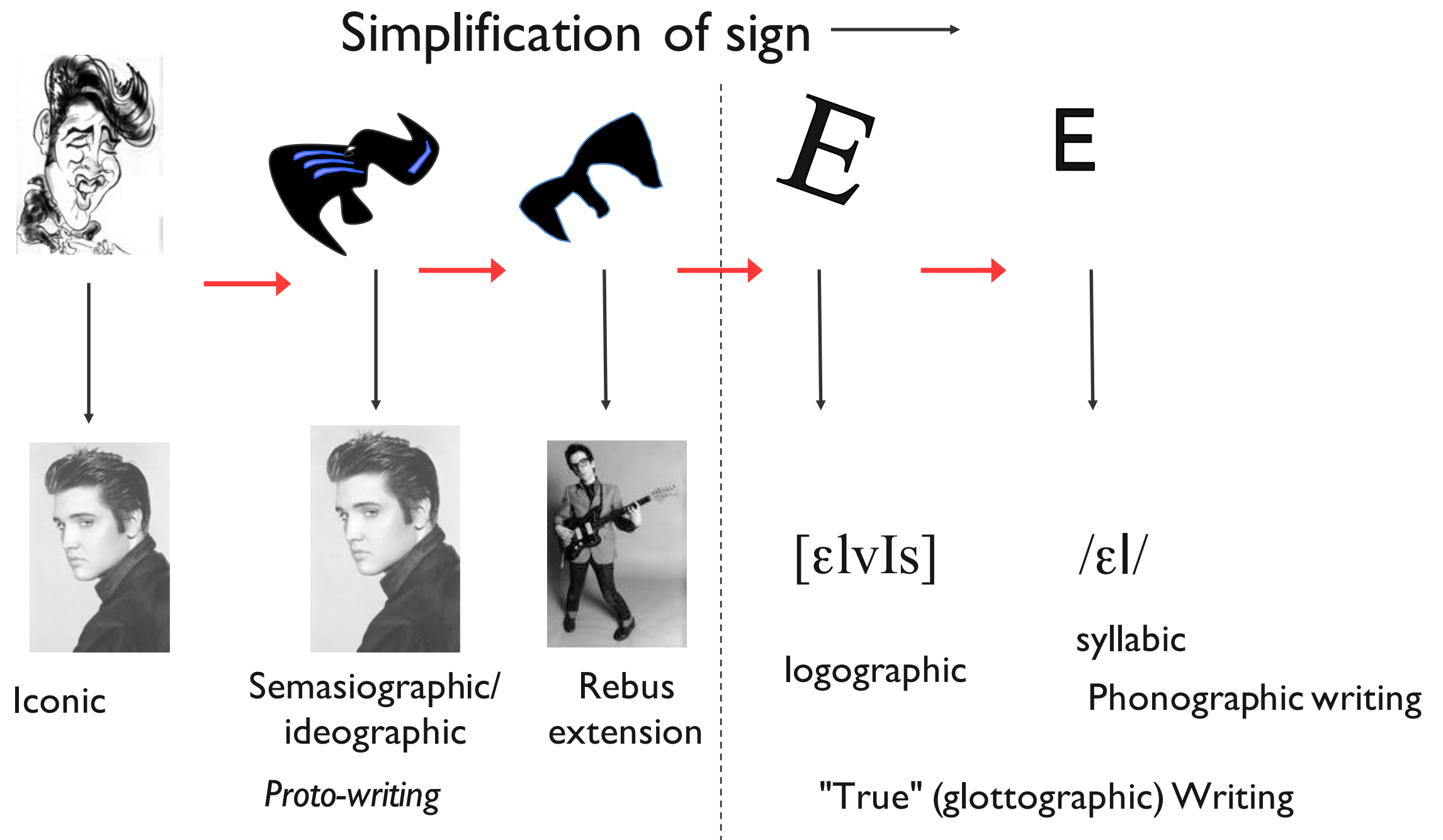
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# Development of Written Symbols

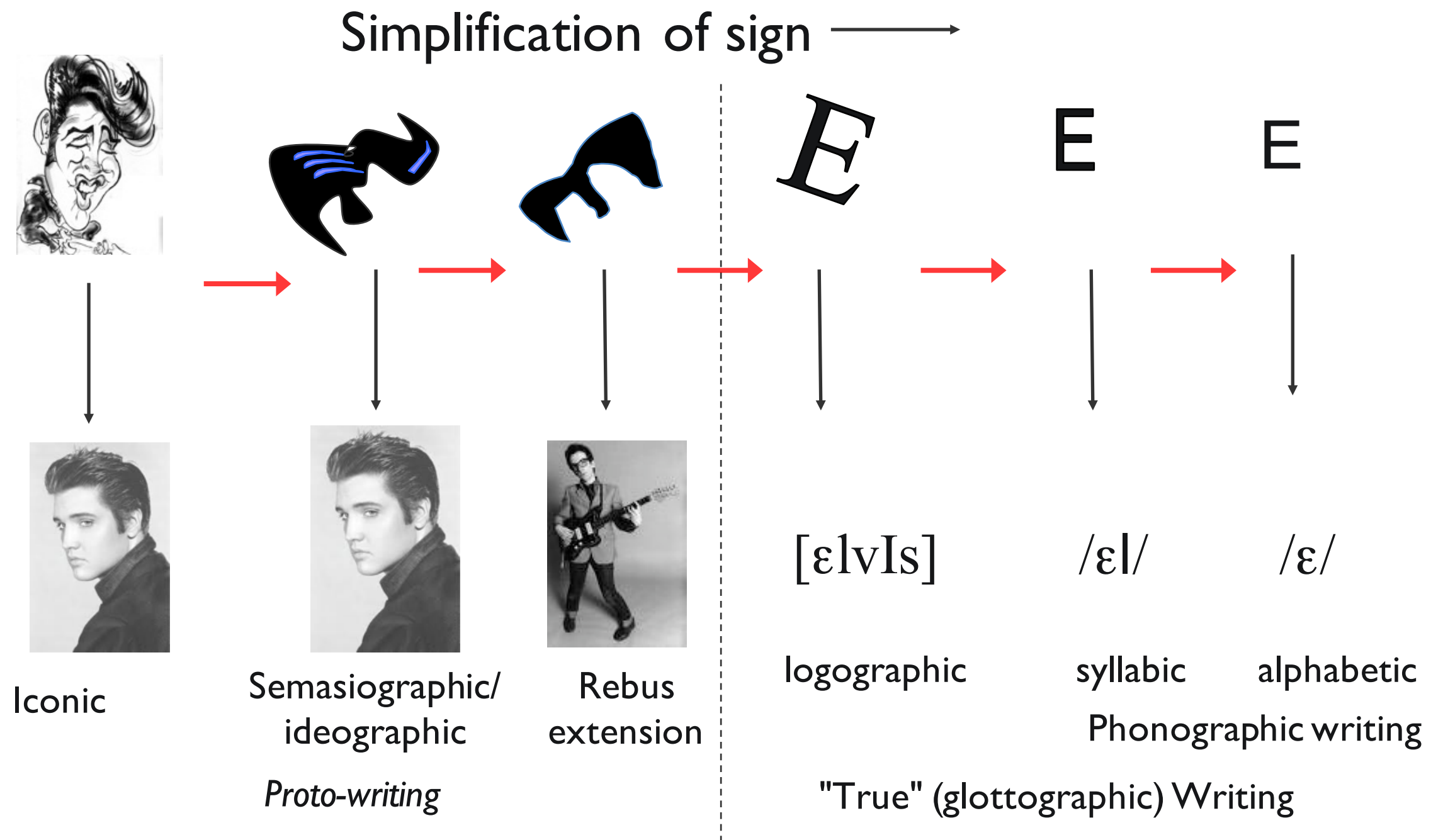


# Development of Written Symbols





# Development of Written Symbols



# Types of Writing Systems

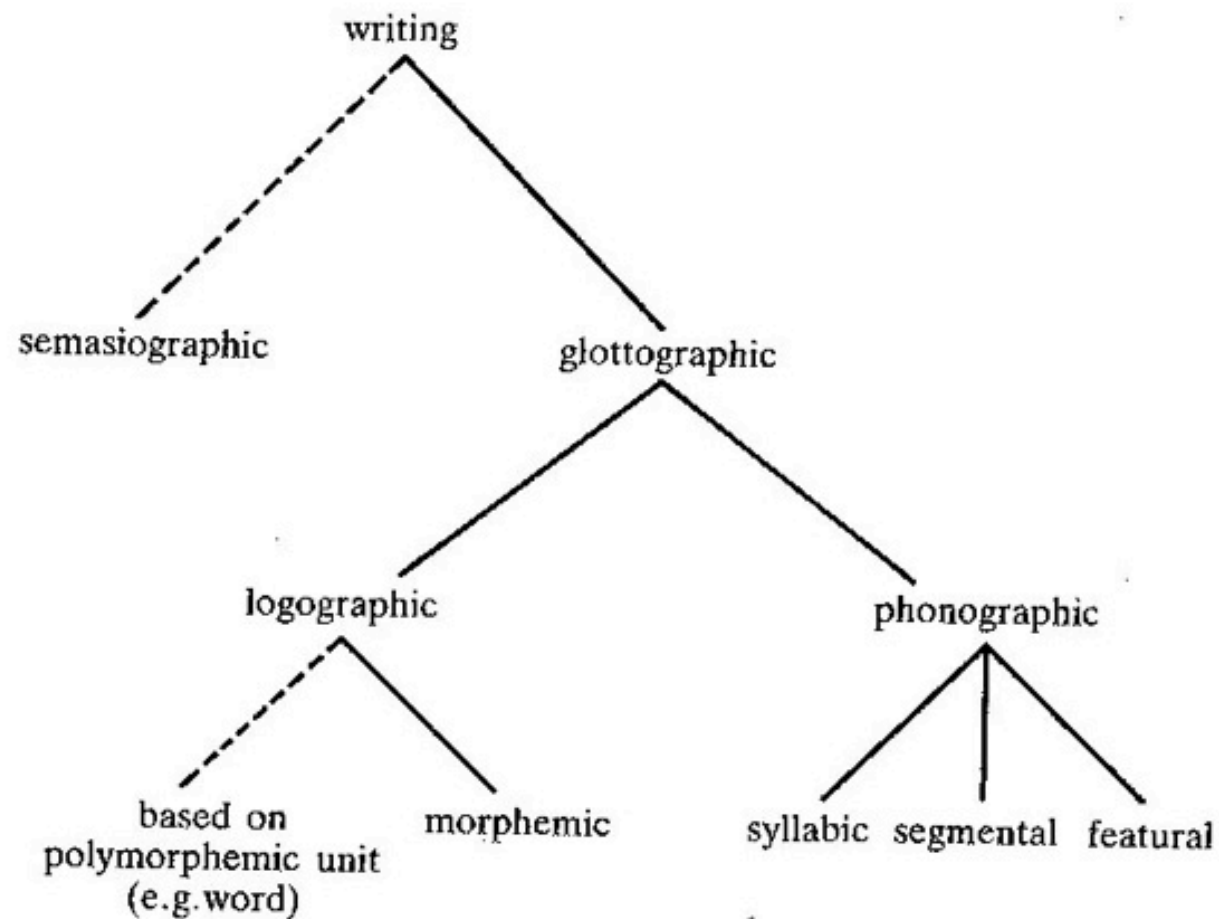


Figure 3

Logographic: mod. Chinese (logosyllabic), Japanese kanji

Syllabic: Phoenician, Linear B, Cherokee, Korean Hangul (featural), Japanese (hiragana & katakana), Bengali, Gujarati...

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

From Sampson, 1990

# Genealogy of Writing Systems

The Origins of Western Literacy

17

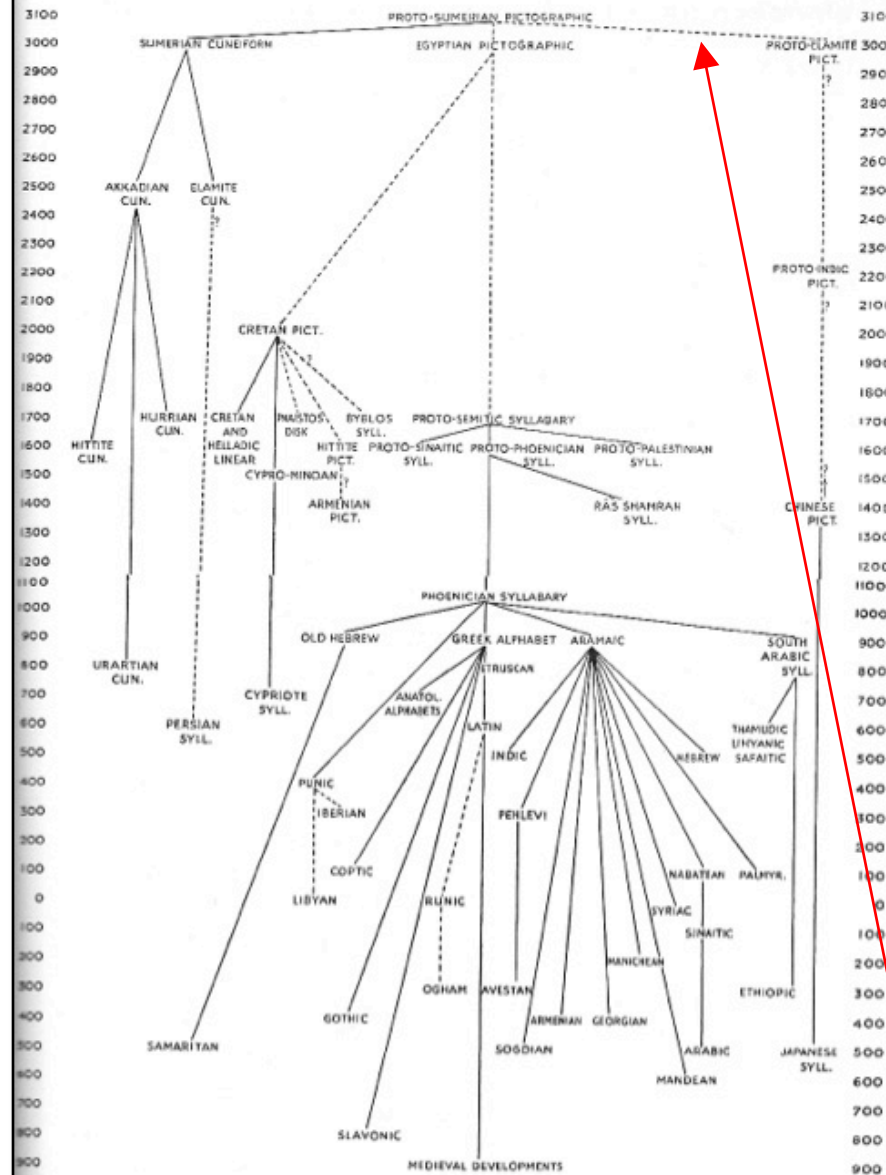
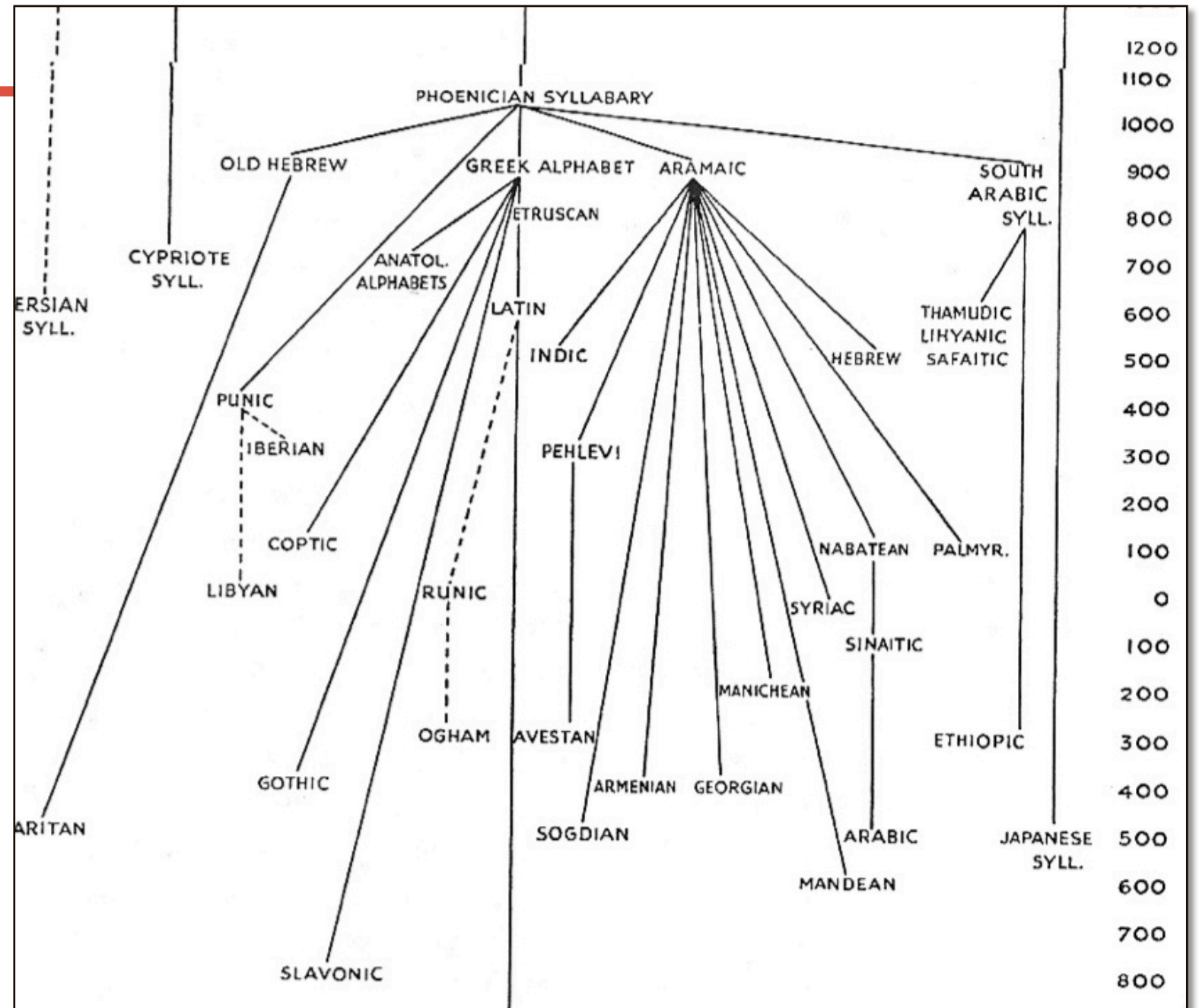


Figure 1.1. Origin of the Alphabet

Source: J. J. Gelb, *A Study of Writing* (Chicago: University of Chicago Press, 1963), pp. x-xi.



# Later Developments

boustrophedon

ΦΑΝΟΔΙΚΟ  
 ΕΜΙΤΟΡΜΟΚ  
 ΡΑΤΕΟΣΤΟ  
 ΠΡΟΚΟΝΗ  
 ΡΗΤΗΡΗΡ  
 ΑΔΕ:ΚΑΙΥΠΟΚ  
 ΡΗΤΗΡΗΡ:Κ  
 ΑΙΘΟΜΟΝ:ΕΠ  
 ΡΥΤΑΝΗΡ  
 ΕΒΩΚΕΝ:ΣΥΚΕ  
 ΕΥΣΙΝ

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# Later Developments



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



# Independent Invention of Writing Systems

---



# Independent writing systems: The Cherokee Syllabary

Sequoyah [George Gist] and the "talking leaves": 1819



a	e	i	o	u	v[ǝ]
<b>D</b> a	<b>R</b> e	<b>T</b> i	<b>Ꭰ</b> o	<b>Ꭱ</b> u	<b>Ꭲ</b> v
<b>Ꭳ</b> ga <b>Ꭴ</b> ka	<b>Ꭶ</b> ge	<b>Ꭷ</b> gi	<b>Ꭸ</b> go	<b>Ꭹ</b> gu	<b>Ꭺ</b> gv
<b>Ꭼ</b> ha	<b>Ꭽ</b> he	<b>Ꭾ</b> hi	<b>Ꭿ</b> ho	<b>Ꮀ</b> hu	<b>Ꮁ</b> hv
<b>Ꮃ</b> la	<b>Ꮄ</b> le	<b>Ꮅ</b> li	<b>Ꮆ</b> lo	<b>Ꮇ</b> lu	<b>Ꮈ</b> lv
<b>Ꮉ</b> ma	<b>Ꮊ</b> me	<b>Ꮋ</b> mi	<b>Ꮌ</b> mo	<b>Ꮍ</b> mu	
<b>Ꮎ</b> na <b>Ꮏ</b> hna <b>Ꮐ</b> nah	<b>Ꮑ</b> ne	<b>Ꮒ</b> ni	<b>Ꮓ</b> no	<b>Ꮔ</b> nu	<b>Ꮕ</b> nv
<b>Ꮖ</b> qua	<b>Ꮗ</b> que	<b>Ꮘ</b> qui	<b>Ꮙ</b> quo	<b>Ꮚ</b> quu	<b>Ꮛ</b> quv
<b>Ꮝ</b> s <b>Ꮞ</b> sa	<b>Ꮟ</b> se	<b>Ꮠ</b> si	<b>Ꮡ</b> so	<b>Ꮢ</b> su	<b>Ꮣ</b> sv
<b>Ꮤ</b> da <b>Ꮥ</b> ta	<b>Ꮦ</b> de <b>Ꮧ</b> te	<b>Ꮨ</b> di <b>Ꮩ</b> ti	<b>Ꮪ</b> do	<b>Ꮫ</b> du	<b>Ꮬ</b> dv
<b>Ꮮ</b> dla <b>Ꮯ</b> tla	<b>Ꮰ</b> tie	<b>Ꮱ</b> tli	<b>Ꮲ</b> tlo	<b>Ꮳ</b> tlu	<b>Ꮴ</b> tiv
<b>Ꮵ</b> tsa	<b>Ꮶ</b> tse	<b>Ꮷ</b> tsi	<b>Ꮹ</b> tso	<b>Ꮺ</b> tsu	<b>Ꮻ</b> tsv
<b>Ꮼ</b> wa	<b>Ꮽ</b> we	<b>Ꮾ</b> wi	<b>Ꮿ</b> wo	<b>Ᏸ</b> wu	<b>Ᏹ</b> wv
<b>Ᏺ</b> ya	<b>Ᏻ</b> ye	<b>Ᏼ</b> yi	<b>Ᏽ</b> yo	<b>᏶</b> yu	<b>᏷</b> yv



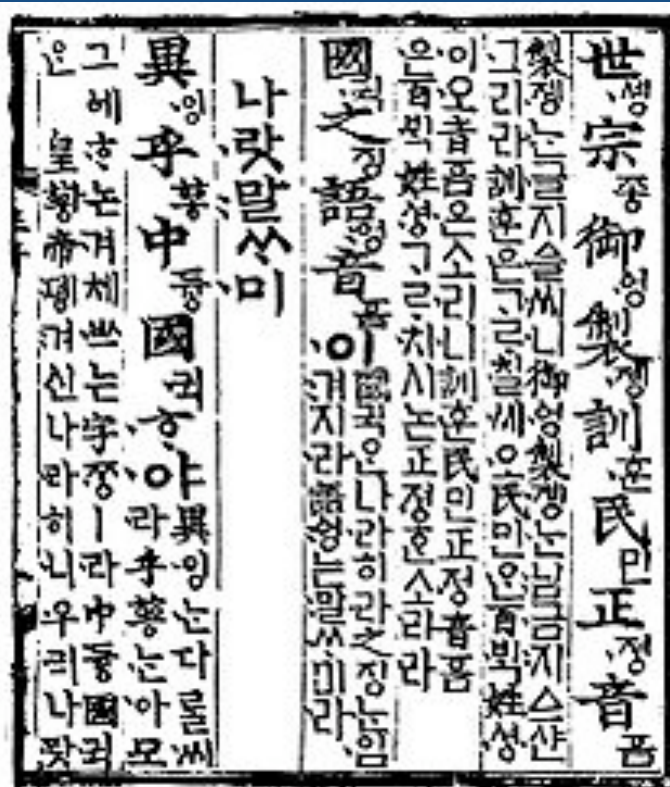






## Independently invented writing systems: Korean Hangul

Writing system invented in mid-15<sup>th</sup> c. to replace hanja (Chinese-based writing system). Invention credited to King Sejong ("the Great"), who introduced it to increase mass literacy



Hunmin Jeong-eum Exemplar  
(1446): Earliest Hangul text

han-geul

The word 'hangeul' in hangul

# Readings for 2/3

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Havelock, Eric, "The Greek Legacy," in David Crowley, ed. *Communication in History: Technology, Culture, Society*. Allyn & Bacon. Pp. 55-62.

Gough, Kathleen. 1968. "Implications of literacy in traditional China and India," In Goody, Jack (ed.). *Literacy in Traditional Societies*. Cambridge: Cambridge University Press, 44-56.

## Additional Materials

Scribner, Silvia and Michael Cole. 1988. "Unpackaging Literacy." *Social Science Information*, 17, 1

All online

# Assignment for 1/31

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## Havelock writes:

The introduction of the Greek letters into inscription somewhere around 700 B.C. was to alter the character of human culture, placing a gulf between all alphabetic societies and their precursors. The Greeks did not just invent an alphabet, they invented literacy and the literate basis of modern thought [55]....It is no accident that the pre-alphabetic cultures of the world were also in a large sense the pre-scientific cultures, pre-philosophical and pre-literary.[58]

Consider just **one aspect or element** of this broad claim. Taking into consideration both Havelock and Gough's articles, evaluate the claim from the point of view of either McLuhan or Williams. (E.g., what would Williams say about the claim that the alphabet was a necessary condition for science? etc.) Be sure to back up your argument with specific references to the texts.

≤ 200  
Words!

## Assignment for 1/31

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