جامعة نيويورك أبوظبي

NYU | ABU DHABI

PSYCH-UH 2218: Language Science

Class 11: Writing Systems

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Psychology

Writing Systems

A writing system is a method of **representing** a language visually on a physical medium (paper, papyrus, clay, stone, etc).

Three linguistic questions we can ask about writing systems:

1. How many times has writing been invented?

   (And what does this tell us about the relationship between language and writing?)

2. How many different kinds of writing systems are there?

   (And how do they relate the linguistic representations that we have been studying in this course?)

3. How did writing systems spread throughout the world?

   (And how do they interact with the grammars of the languages that adopt them?)

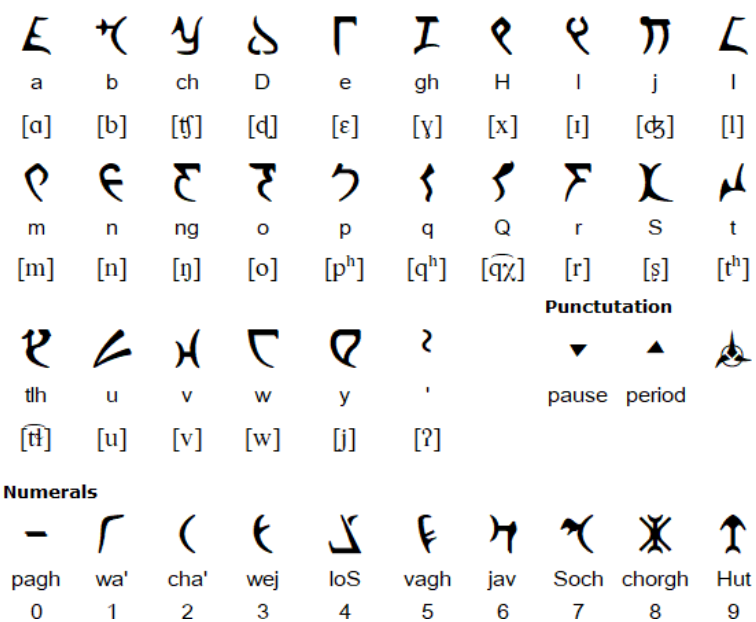
How many times has writing been invented?

Not the invention of a specific system, the invention of the idea

When we ask how many times writing has been invented, we don't mean a specific instantiation of a writing system.

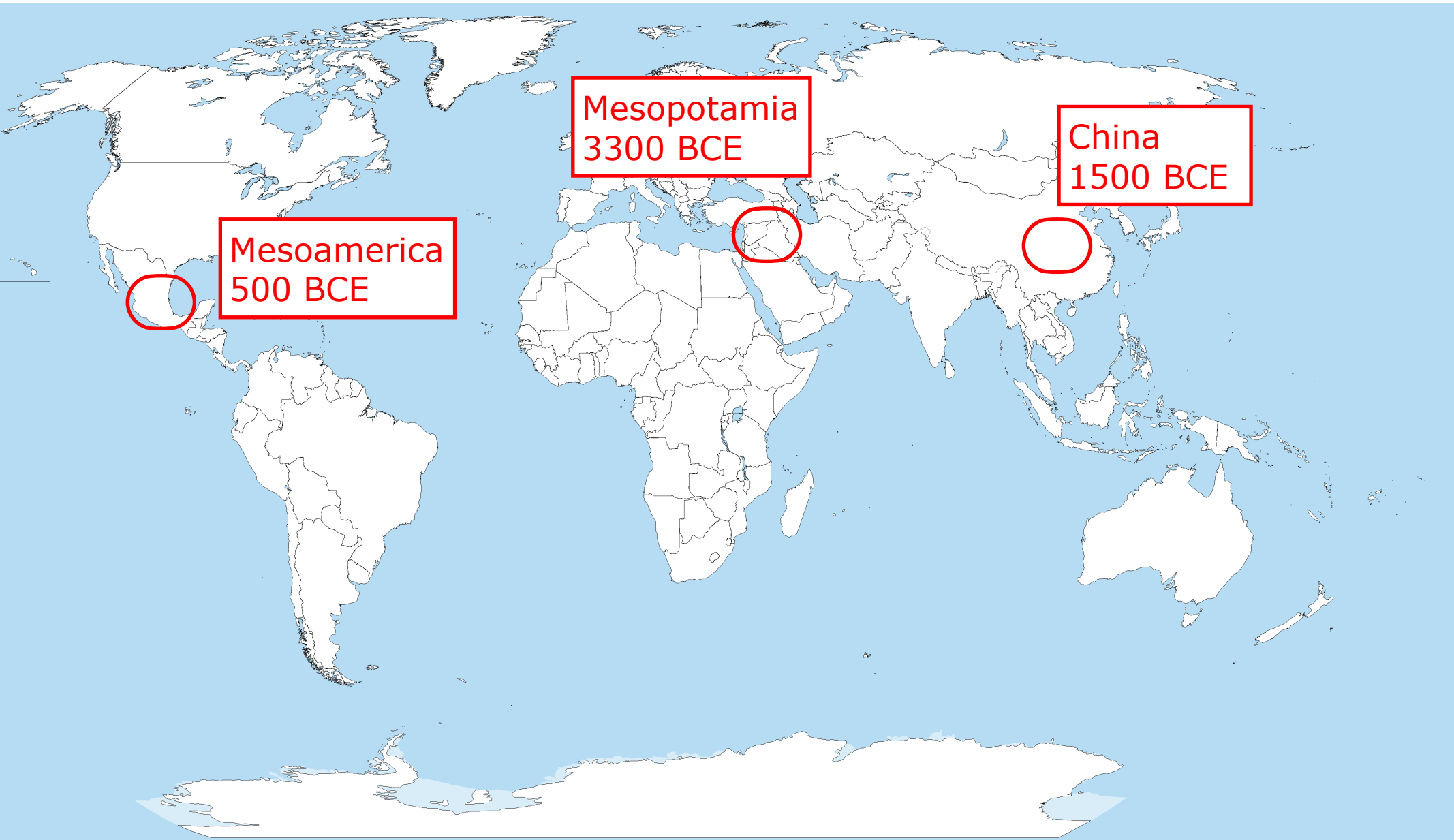
People invent writing systems all of the time. Here are two recently invented writing systems (for constructed languages):

Klingon

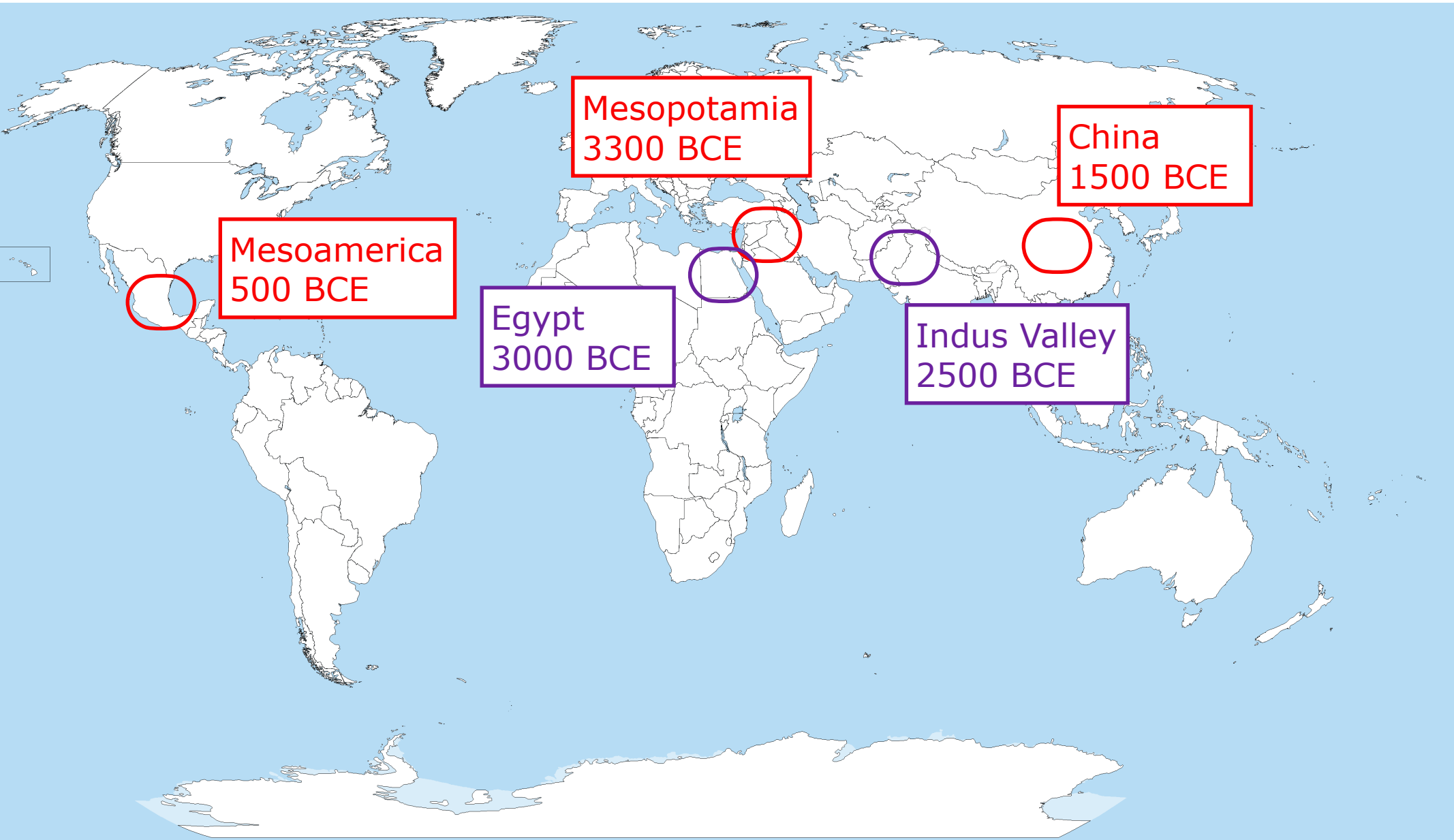


Elvish (Quenya) Tengwar script

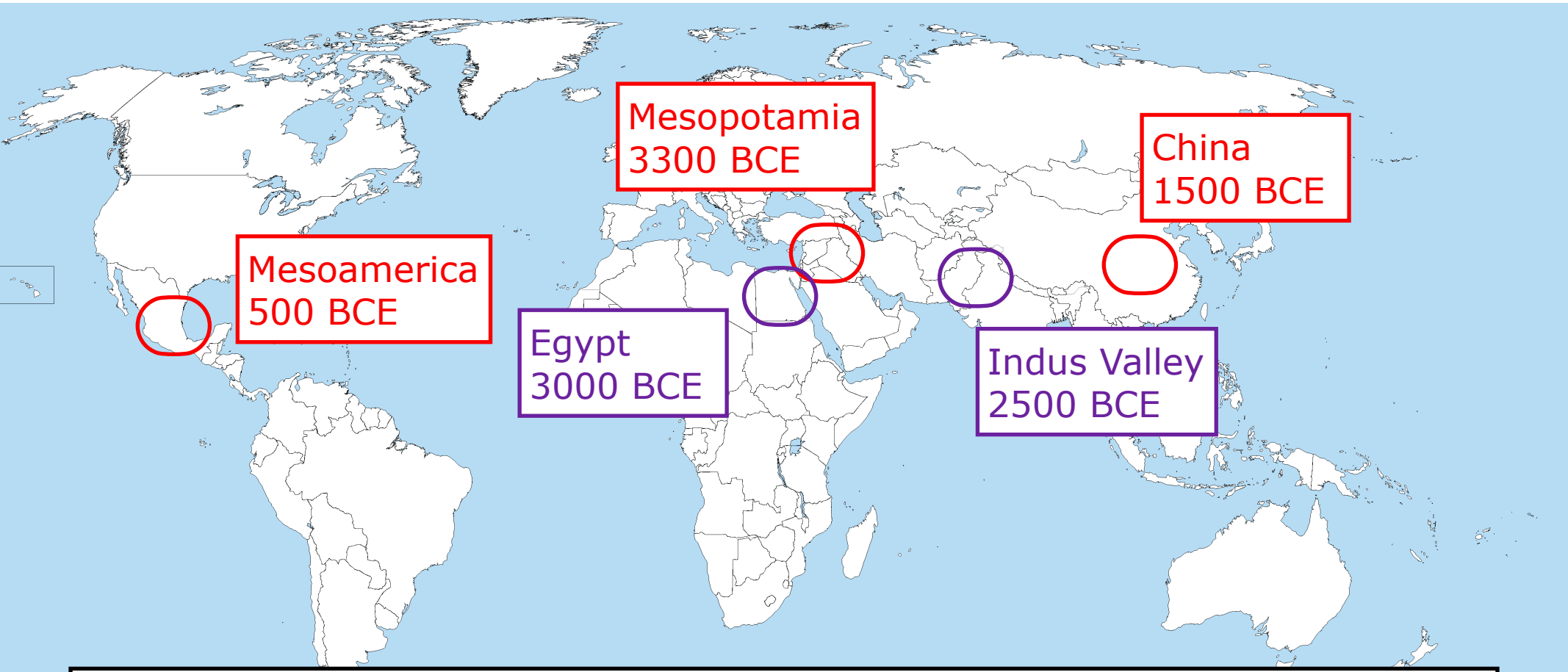
There are 3 undisputed instances of the invention of the **idea** of writing



And 2 instances that are debated
(because of trade with Mesopotamia)



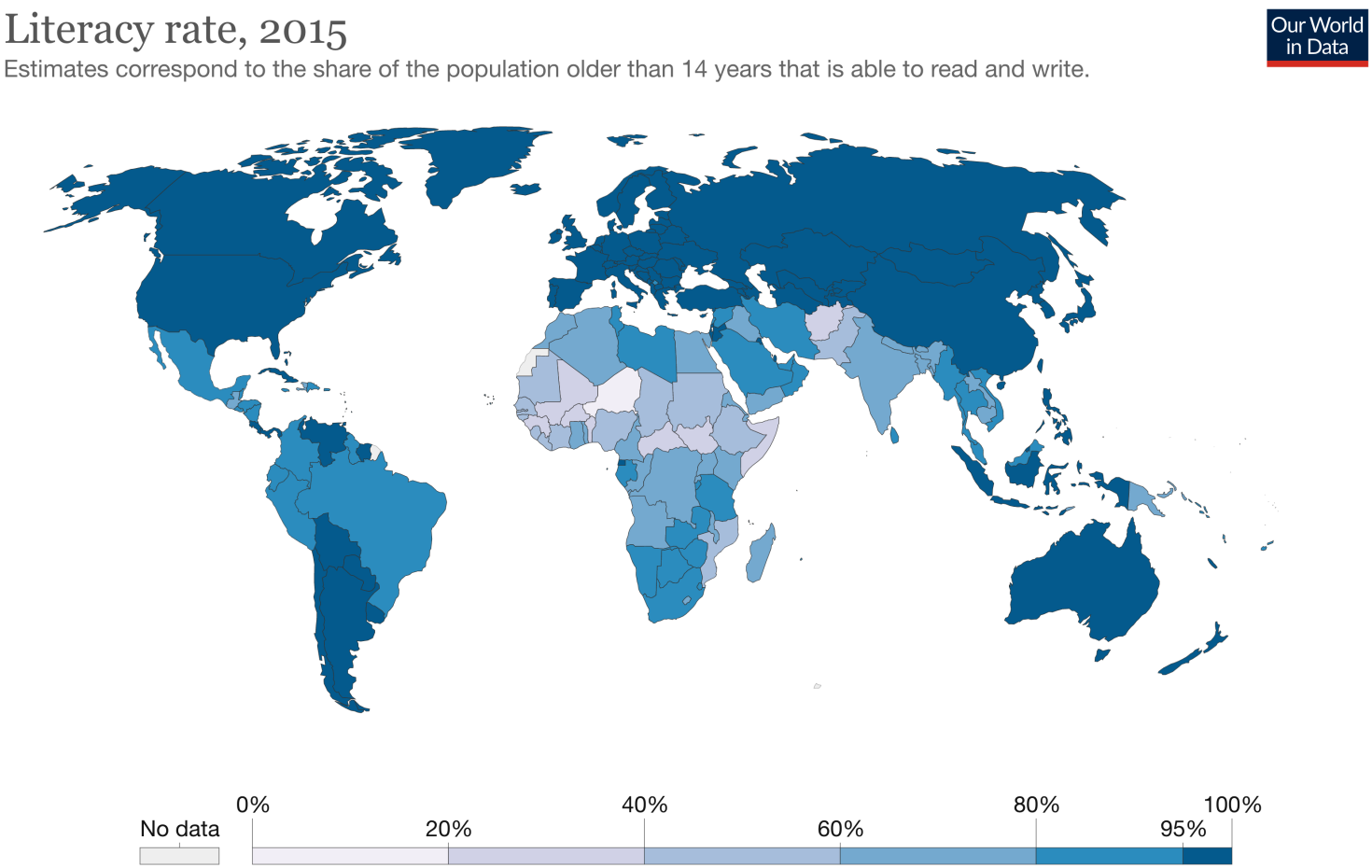
What about all of the other people, and all of the other times that people existed?



Do we think that people did not have language before writing was invented? Do we think that people did not have language before the idea of writing was spread to their culture? No, of course not. **Language predates writing.** This shows us that **language is independent** of writing, but **writing is dependent on language**.

The dissociation between language and writing

The idea of literacy rates is another important piece of evidence that language is distinct from writing. Literacy rates are not 100%. Because reading must be taught explicitly to humans. But have you ever heard anyone talk about "speaking rates"? No, that feels absurd. Because it is always 100% (in the absence of disease, injury, disorder, or abuse).



How many different **types** of writing systems are there?

(This website has lots of information and graphics of different writing systems: https://omniglot.com/)

Let’s think about linguistic levels

If we are going to use symbols to represent linguistic units, we can ask which linguistic level the symbols represent.

Here I am using a hashmark (#) to indicate a unit in each level that a written symbol could represent:

# # # # #	
/raitɪŋ sɪstəmz ɑr kɑmpləketəd θɪŋz/	“words”
#.# #.# # #.#.# #.#	
/rait.ɪŋ sɪstəm.z ɑr kɑmpləket.əd θɪŋ.z/	morphemes
#.# #.# # #.#.#.# #	
/rai.tɪŋ sɪs.təmz ɑr kɑm.plə.ke.təd θɪŋz/	syllables
#.#.#.#.# #.#.#.#.#.#.# #.# #.#.#.#.#.#.#.#.#.#.# #.#.#.#	
/r.ai.t.ɪ.ŋ s.ɪ.s.t.ə.m.z ɑ.r k.ɑ.m.p.l.ə.k.e.t.ə.d θ.ɪ.ŋ.z/	segments (phonemes)

Writing systems are seldom perfectly uniform

This is important to keep in mind. As we look at different writing systems, they will typically be dominated by a specific approach. But they may not be only that one approach. They may mix other approaches. Most writing systems are not perfectly uniform (other than the IPA, which was specifically created by scientists to be uniform).

# # # # #	
/raitɪŋ sɪstəmz ɑr kɑmpləketəd θɪŋz/	"words"
#.# #.# # #.#.# #.#	
/rait.ɪŋ sɪstəm.z ɑr kɑmpləket.əd θɪŋ.z/	morphemes
#.# #.# # #.#.#.# #	
/rai.tɪŋ sɪs.təmz ɑr kɑm.plə.ke.təd θɪŋz/	syllables
#.#.#.#.# #.#.#.#.#.#.# #.# #.#.#.#.#.#.#.#.#.#.# #.#.#.#	
/r.ai.t.ɪ.ŋ s.ɪ.s.t.ə.m.z ɑ.r k.ɑ.m.p.l.ə.k.e.t.ə.d θ.ɪ.ŋ.z/	phonemes

Abjads: segment level, consonants

An abjad is a writing system that only represents consonants. It is named after the first four letters of the Arabic writing system (abjd) because Arabic and Hebrew are two of the most famous abjads.

Here is the Arabic abjad.

Remember that, in practice, no writing system is completely uniform. Many abjads, including Arabic, do include diacritics to indicate vowels in some texts, particularly for religious texts and other texts where ambiguity would be a problem.

ر	ذ	د	خ	ح	ج	ث	ت	ب	ا
راء	ذال	دال	خاء	حاء	جيم	ثاء	تاء	باء	ألف
rāʾ	ḏāl	dāl	ḫāʾ	ḥāʾ	ǧīm	ṯāʾ	tāʾ	bāʾ	ʾalif
r	ḏ	d	ḫ	ḥ	ǧ	ṯ	t	b	ʾ(a)
[r~ɾ]	[ð]	[d]	[x~χ]	[ħ]	[ʤ]	[θ]	[t]	[b]	[ʔ]
ف	غ	ع	ظ	ط	ض	ص	ش	س	ز
فاء	غين	عين	ظاء	طاء	ضاد	صاد	شين	سين	زاي
fāʾ	ġayn	ʿayn	ẓāʾ	ṭāʾ	ḍād	ṣād	šīn	sīn	zāy
f	ġ	ʿ	ẓ	ṭ	ḍ	ṣ	š	s	z
[f]	[ɣ~ʁ]	[ʕ]	[ðˤ]	[tˤ]	[dˤ]	[sˤ]	[ʃ]	[s]	[z]
	ء	ي	و	ه	ن	م	ل	ك	ق
	همزة	ياء	واو	هاء	نون	ميم	لام	كاف	قاف
	hamza	yāʾ	wāw	hāʾ	nūn	mīm	lām	kāf	qāf
		y	w	h	n	m	l	k	q
		[j]	[w]	[h]	[n]	[m]	[l~ɬ]	[k]	[q]

Abjads and templatic morphology

This is the Hebrew Abjad.

Recall that both Arabic and Hebrew are classic examples of languages that use **templatic morphology**.

In templatic morphology, the consonants form the roots, and the vowel tier adds something like inflectional morphology.

It is probably not a coincidence that languages with templatic morphology tend to use abjads as their writing systems. One idea is that the root needs to be represented because it is not predictable, but the inflectional morphology given by the vowels can be predicted from the context of the sentence, so it does not need to be explicitly represented.

א	בּ/ב	ג	ד	ה	ו	ז	ח
אָלֶף	בֵּית/בֵית	גִימֶל	דָלֶת	הֵא	וָו	זַיִן	חֵית
'alef	bet	gimel	daled	he	vav	zayin	ḥet
'	b/v	g	d	h	v	z	ḥ
[ʔ]	[b/v]	[g]	[d]	[h~ʔ]	[v/w]	[z]	[x~χ]
1	2	3	4	5	6	7	8

ט	י	כּ/כ	ל	מ	נ	ס	ע
טֵית	יוֹד	כָּף/כַף	לָמֶד	מֵם	נוּן	סָמֶךְ	עַיִן
tet	yod	kaf/khaf	lamed	mem	nun	samekh	ʻayin
t	y	k/kh	l	m	n	s	ʻ
[t]	[j]	[k/x~χ]	[l]	[m]	[n]	[s]	[ʕ]
9	10	20	30	40	50	60	70

פּ/פ	צ	ק	ר	שׂ/שׁ	ת
פֵּא/פה	צָדִי/צדיק	קוֹף	רֵישׁ	שִׁי֫ן/שׂ֫ין	תָּו/תָּף
pe/fe	ẕadi	qof	resh	shin	taw
p/f	ẕ	k	r	s/sh	t
[p/f]	[t͡s]	[k]	[ɣ~ʁ]	[s/ʃ]	[t]
80	90	100	200	300	400

Final consonants

ךְ	ם	ן	ף	ץ
כַּף סוֹפִית	מֵם סוֹפִית	נוּן סוֹפִית	פֵּא סוֹפִית	צָדִי סוֹפִית
kaf sofit	mem sofit	nun sofit	pe sofit	ẕadi sofit
final khaf	final mem	final nun	final pe	final ẕadi

Common orthography additions (mainly for foreign borrowings)

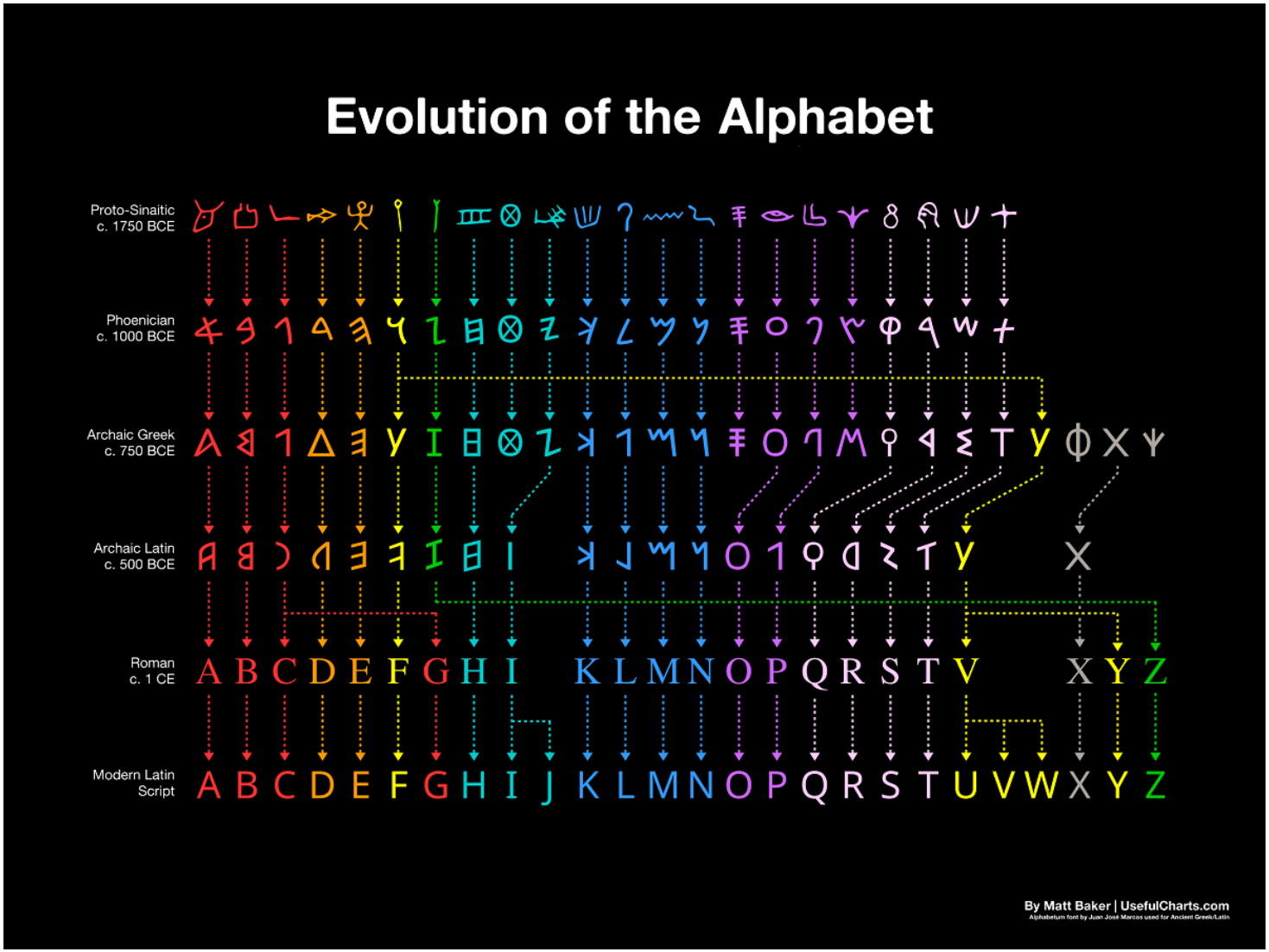
ג׳	ד׳	ז׳	ח׳	ר׳/ע׳	צ׳	ת׳	וו/וי
ǧ	dh	ž	kh	gh	č	th	w
[ʤ]	[ð]	[ʒ]	[χ]	[ʁ]	[ʧ]	[θ]	[w]

Alphabets: segment level, C & V

Alphabets represent every segment - both consonants and vowels. The segments are typically phonemes (not allophones), though this can vary.

We are all familiar with the Latin alphabet, so I've put this cool graphic about its evolution here.

We will talk about the history of writing systems later today.



Syllabaries: syllable level

In a syllabary, each symbol represents a syllable. Obviously, what counts as a syllable is dictated by the phonology of the language: V, CV, CVC, etc.

This is the syllabary for Cherokee, a Native American language.

This syllabary was developed in the early 1800s.

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

Syllabaries: syllable level

This is hiragana, one of the two syllabaries used to write Japanese. It was developed from Chinese characters, called kanji in Japanese. This chart shows a romanized value on the left, the hiragana symbol in the middle, and the kanji symbol that it was likely derived from on the right.

平仮名（ひらがな） hiragana

a	あ	安	i	い	以	u	う	宇	e	え	衣	o	お	於
ka	か	加	ki	き	幾	ku	く	久	ke	け	計	ko	こ	己
sa	さ	左	shi	し	之	su	す	寸	se	せ	世	so	そ	曽
ta	た	太	chi	ち	知	tsu	つ	川	te	て	天	to	と	止
na	な	奈	ni	に	仁	nu	ぬ	奴	ne	ね	祢	no	の	乃
ha	は	波	hi	ひ	比	fu	ふ	不	he	へ	部	ho	ほ	保
ma	ま	末	mi	み	美	mu	む	武	me	め	女	mo	も	毛
ya	や	也				yu	ゆ	由				yo	よ	与
ra	ら	良	ri	り	利	ru	る	留	re	れ	礼	ro	ろ	呂
wa	わ	和	wi	ゐ	為				we	ゑ	恵	wo	を	遠

Syllabaries and syllable inventory

Syllabaries require one symbol for each syllable. This means that they will tend to have more symbols than alphabets. This also means that they will tend to work best for languages that have smaller syllable inventories.

We see this with Japanese, which we have already seen has a relatively small syllable inventor (mostly V or CV).

For languages with larger syllable inventories, like many Indo-European languages, alphabets will be a more economical system — otherwise, the number of symbols will grow quite large.

平仮名（ひらがな） hiragana

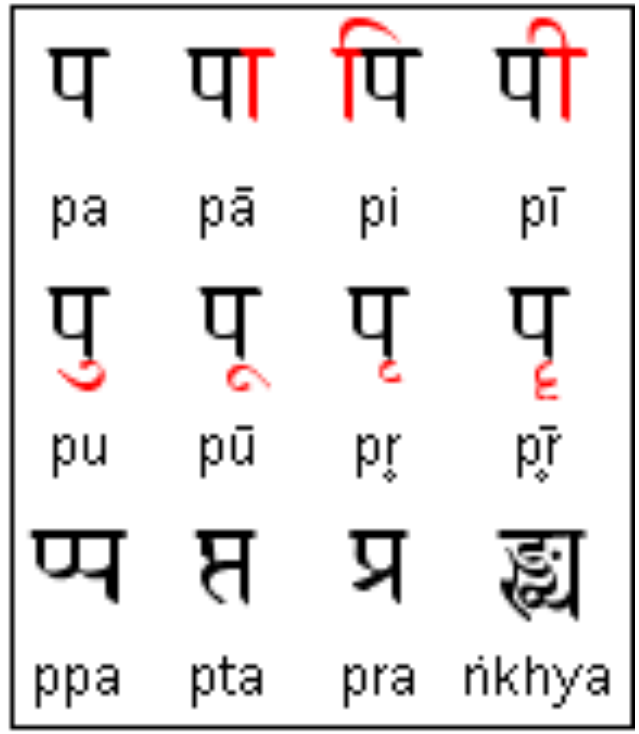
a	あ	安	i	い	以	u	う	宇	e	え	衣	o	お	於
ka	か	加	ki	き	幾	ku	く	久	ke	け	計	ko	こ	己
sa	さ	左	shi	し	之	su	す	寸	se	せ	世	so	そ	曽
ta	た	太	chi	ち	知	tsu	つ	川	te	て	天	to	と	止
na	な	奈	ni	に	仁	nu	ぬ	奴	ne	ね	祢	no	の	乃
ha	は	波	hi	ひ	比	fu	ふ	不	he	へ	部	ho	ほ	保
ma	ま	末	mi	み	美	mu	む	武	me	め	女	mo	も	毛
ya	や	也				yu	ゆ	由				yo	よ	与
ra	ら	良	ri	り	利	ru	る	留	re	れ	礼	ro	ろ	呂
wa	わ	和	wi	ゐ	為				we	ゑ	恵	wo	を	遠
												n	ん	无

Abugidas: between segments and syllables

Abugidas represent both consonants and vowels, but the system is complicated. (The name comes from the first 4 letters of the Ethiopian system: abgd)

The primary symbols each represent a consonant plus an "inherent" vowel. In that sense, the symbols represent syllables.

The non-default vowels are then indicated by diacritics that are added to the primary symbols. In that sense, the symbols are alphabetic.



The vowels can also be indicated with their own symbol when they appear at the beginning of a word (not following a consonant), like an alphabet.

Because abugidas have properties of both alphabets and syllabaries, they are sometimes called syllabic alphabets.

Abugidas: between segments and syllables

An example of an abugida is the Devanāgarī script used to write Hindi and many other languages in south and southeast asia. Here are the vowels:

Primary vowels

	Short				Long				Diphthongs			
	Initial		Diacritic		Initial		Diacritic		Initial		Diacritic	
Unrounded low central	अ	a	प	pa	आ	ā	पा	pā				
Unrounded high front	इ	i	पि	pi	ई	ī	पी	pī				
Rounded high back	उ	u	पु	pu	ऊ	ū	पू	pū				
Syllabic variants	ऋ	ṛ	पृ	pṛ	ॠ	ṝ	पॄ	pṝ				
	ऌ	ḷ	पॢ	pḷ	ॡ	ḹ	पॣ	pḹ				
Secondary vowels												
Unrounded front					ए	e	पे	pe	ऐ	ai	पै	pai
Rounded back					ओ	o	पो	po	औ	au	पौ	pau

Abugidas: between segments and syllables

An example of an abugida is the Devanāgarī script used to write Hindi and many other languages in south and south east asia. Here are the consonants:

Occlusives

	Voiceless plosives				Voiced plosives				Nasals	
	unaspirated		aspirated		unaspirated		aspirated			
Velar	क	ka	ख	kha	ग	ga	घ	gha	ङ	ṅa
Palatal	च	ca	छ	cha	ज	ja	झ	jha	ञ	ña
Retroflex	ट	ṭa	ठ	ṭha	ड	ḍa	ढ	ḍha	ण	ṇa
Dental	त	ta	थ	tha	द	da	ध	dha	न	na
Labial	प	pa	फ	pha	ब	ba	भ	bha	म	ma

Sonorants and fricatives

	Palatal		Retroflex		Dental		Labial	
Sonorants	य	ya	र	ra	ल	la	व	va
Sibilants	श	śa	ष	ṣa	स	sa		

Other letters

ह	ha	ळ	ḷa

Logographic systems…

The name “logographic” means that that each symbol (graph) represents a word or idea (logo).

This idea is very easy to grasp, and very seductive. Here are examples from Egyptian hieroglyphs (top) and Chinese characters (bottom) that illustrate this. There is even a pictographic relationship - the symbol looks like the concept.

But, in practice, what we call logographic systems are often much more complicated.

The symbols for words tend to be **compounds** - made up of multiple symbols.

And when we look inside the compounds, we tend to see both **semantic** and **phonetic** components to the compounds.

m̄a - mother

媽

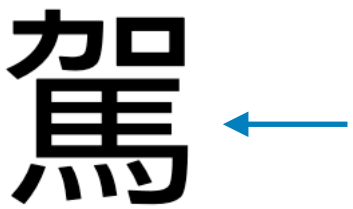
Logographic systems and semantic-phonetic compounds

The precise interaction of semantic and phonetic components varies by writing system (Egyptian hieroglyphs work differently from Mayan glyphs and from Chinese characters). But we can illustrate the general idea with a classic example from Chinese characters.

ma - horse

This is the symbol for horse. It is not a compound. It has the meaning 'horse' (which you can kind of see in the shape) and the pronunciation 'ma'.

jia - cart



This is the symbol for cart. It is a compound symbol. Its phonetic component is 'jia', but it contains the horse symbol as a semantic component.

ma - mother

This is the symbol for mother. It is a compound symbol. Its phonetic component is 'ma', which is signified by the symbol for horse. The other symbol is 'woman', which contributes to the semantic component.

How did writing systems spread throughout the world?

Sumerian Cuneiform ~3300 BCE

The Sumerians moved into Mesopotamia (Iraq/Syria) around 4000 BCE. They displaced a different people that we know very little about.

They built vast cities and created complex economies!

For example, at one point they started using clay tokens to represent goods that were being bought/sold.

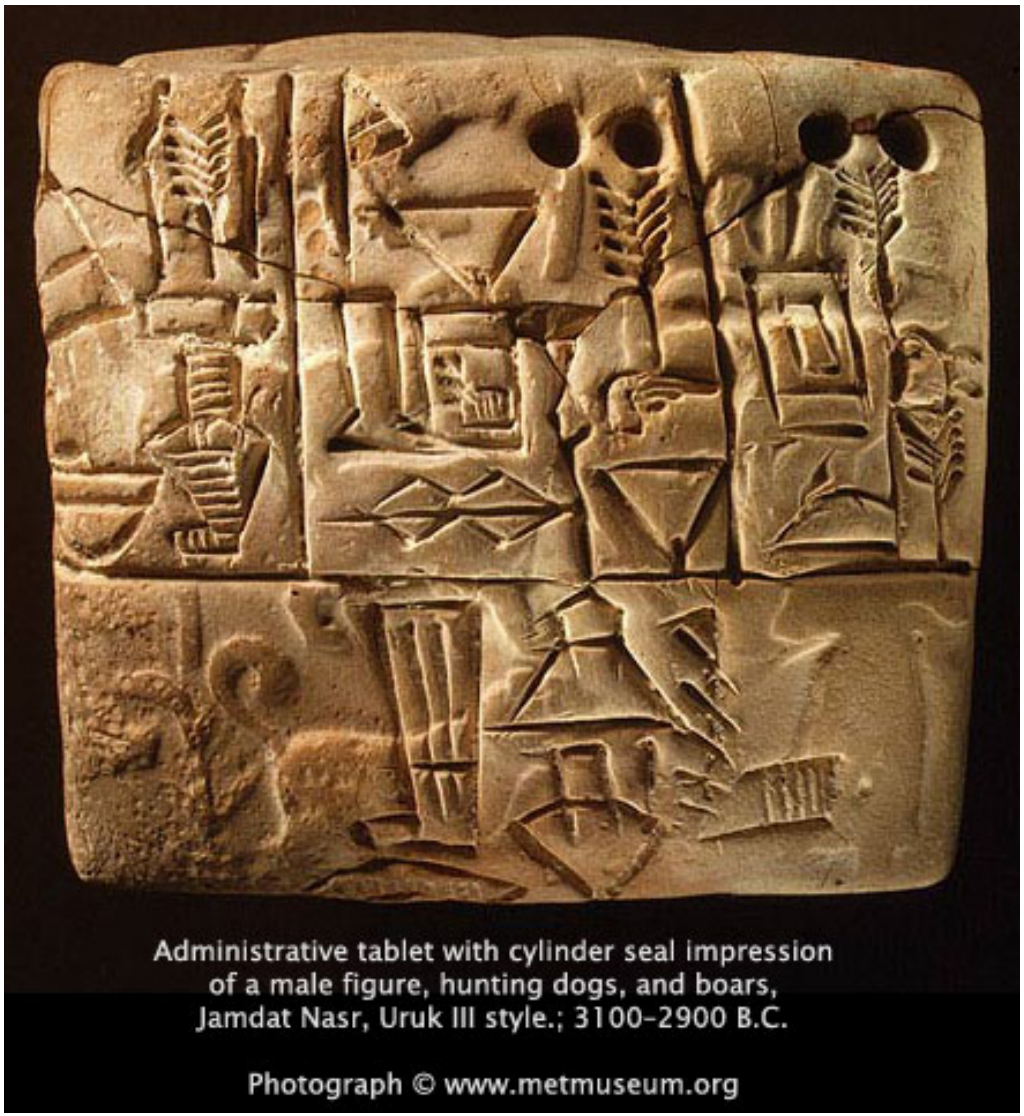
They would put those clay tokens inside of clay balls that acted as sealed envelopes. If the contract came under dispute, they could break open the ball to see what was originally agreed to.

Eventually, thy started imprinting the tokens on the outside of the envelope so everyone could see what was agreed to without actually breaking the ball… and I think you can see where this is going…

MS 4631
Bulla-envelope with 11 plain and complex tokens inside.
Near East, ca. 3700-3200 BC

Sumerian Cuneiform ~3300 BCE

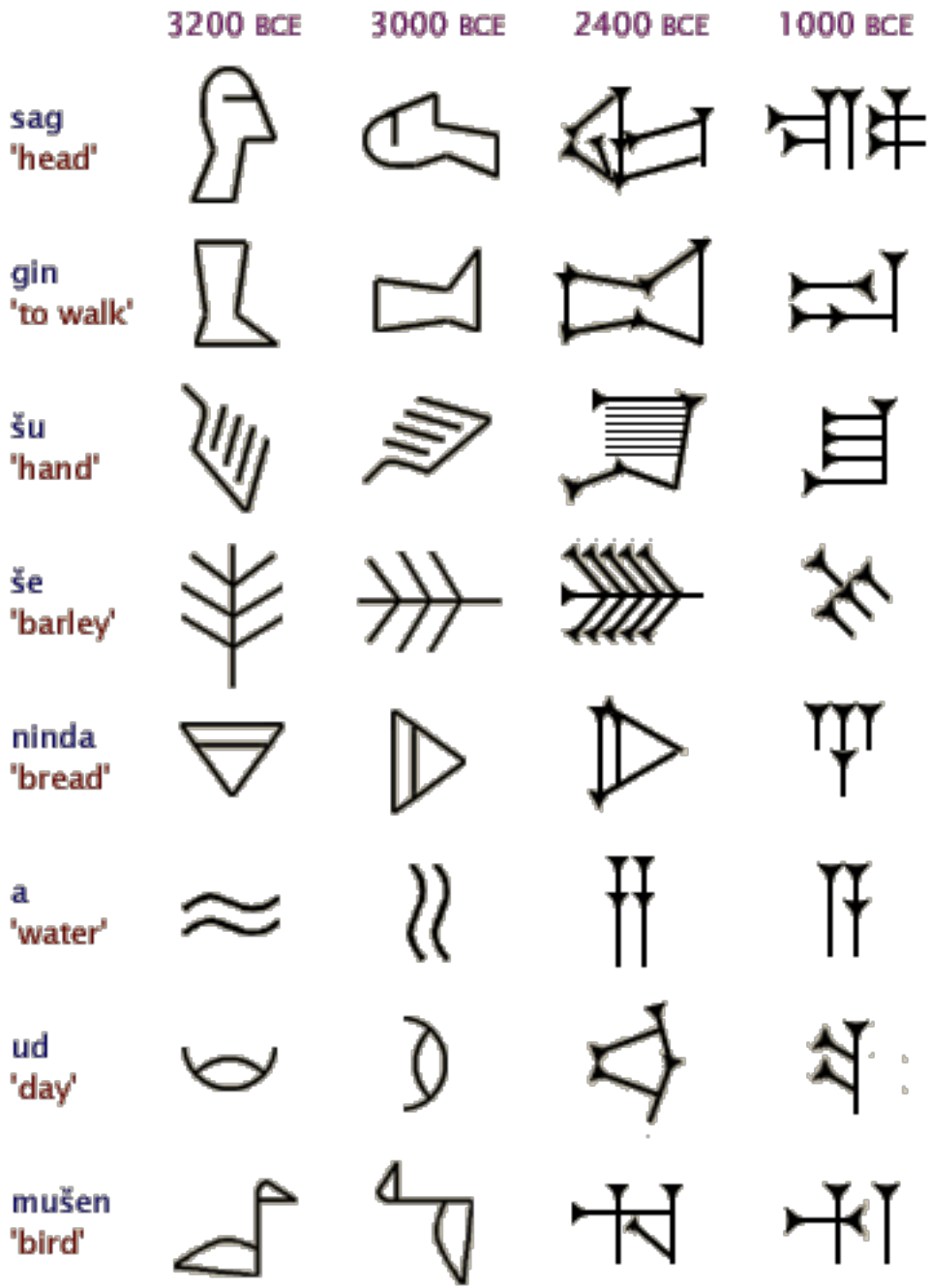
It was a small step from imprinting the tokens on the outside of a ball to simply imprinting the tokens on a flat sheet of clay.



Now that there were no tokens stored with the contract, they needed symbols to represent numbers - the quantities in the contract.

And once you have numbers and nouns, it is a very small step to imagine adding other types of words like verbs, and representing entire sentences!

Sumerian Cuneiform ~3300 BCE



The Sumerian script began with pictograms, but slowly evolved into the cuneiform that we recognize.

We don't know why they rotated the images 90 degrees at one point.

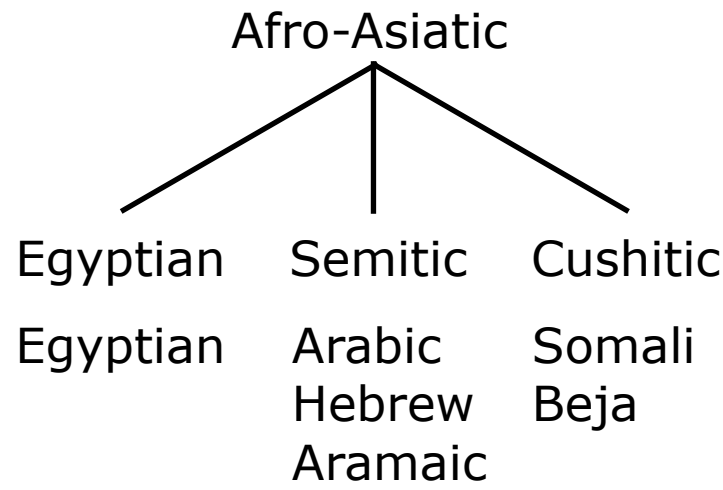
Cuneiform has the distinctive look that it has because the stylus had a triangle shaped tip ("cuneus" is Latin for wedge).

Cuneiform began as a logographic system, but evolved toward a syllabary over time.

We have so much information about cuneiform because (i) clay lasts a long time, and (ii) cuneiform was used until ~1000 BCE when Aramaic became the dominant language in the region.

Egyptian Hieroglyphics ~3000 BCE

The ancient Egyptians spoke a language called **Egyptian**. Current residents of Egypt speak a variety of Arabic called Egyptian Arabic. The two languages are not the same, though they are related, like cousins:



glyph	translit.	phonetic	glyph	translit.	phonetic
	ȝ	[ʔ]		*ḥ*	[ħ]
	i	[i]		*ḫ*	[x]
	y	[y]		*ḥ̲*	[ç]
	ʿ	[ʕ]		*s*	[s]
	w	[w]		*š*	[ʃ]
	b	[b]		*ḳ*	[q]
	p	[p]		*k*	[k]
	f	[f]		*g*	[g]
	m	[m]		*t*	[t]
	n	[n]		*ṯ*	[tʸ], [ʧ]
	r	[r]		*d*	[d]
	h	[h]		*ḏ*	[dʸ], [ʤ]

Egyptian hieroglyphs are unique in their time. The system itself was invented by the Egyptians. But we don't know if they independently invented the idea of writing, or if they got the idea from the Sumerians, and created their own.

Egyptian hieroglyphs, though pictures of objects, represent consonants in the Egyptian language. It is similar to an abjad… but with some complications.

Egyptian Hieroglyphics ~3000 BCE

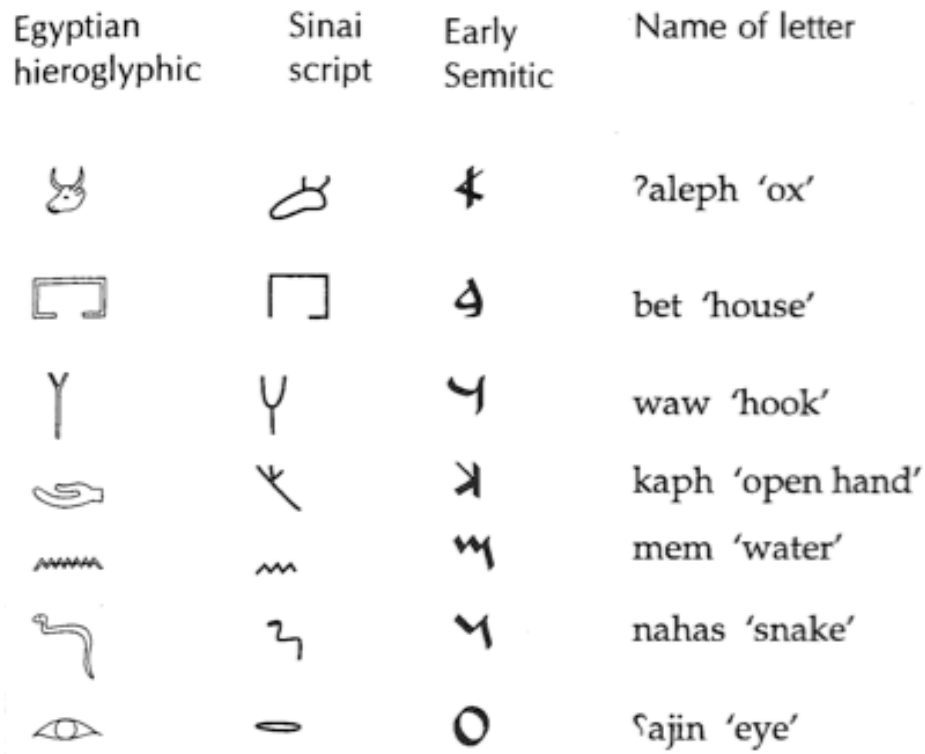
Some glyphs represent two or three consonants. These consonant sequences are roots in the templatic morphology of Egyptian, so the glyphs can look more like logograms than an abjad:

Another complication is that sometimes a 2 or 3 consonant glyph will be followed by a 1 consonant root that repeats the final consonant. This can serve to disambiguate the word in cases where the first symbol could have more than one interpretation.

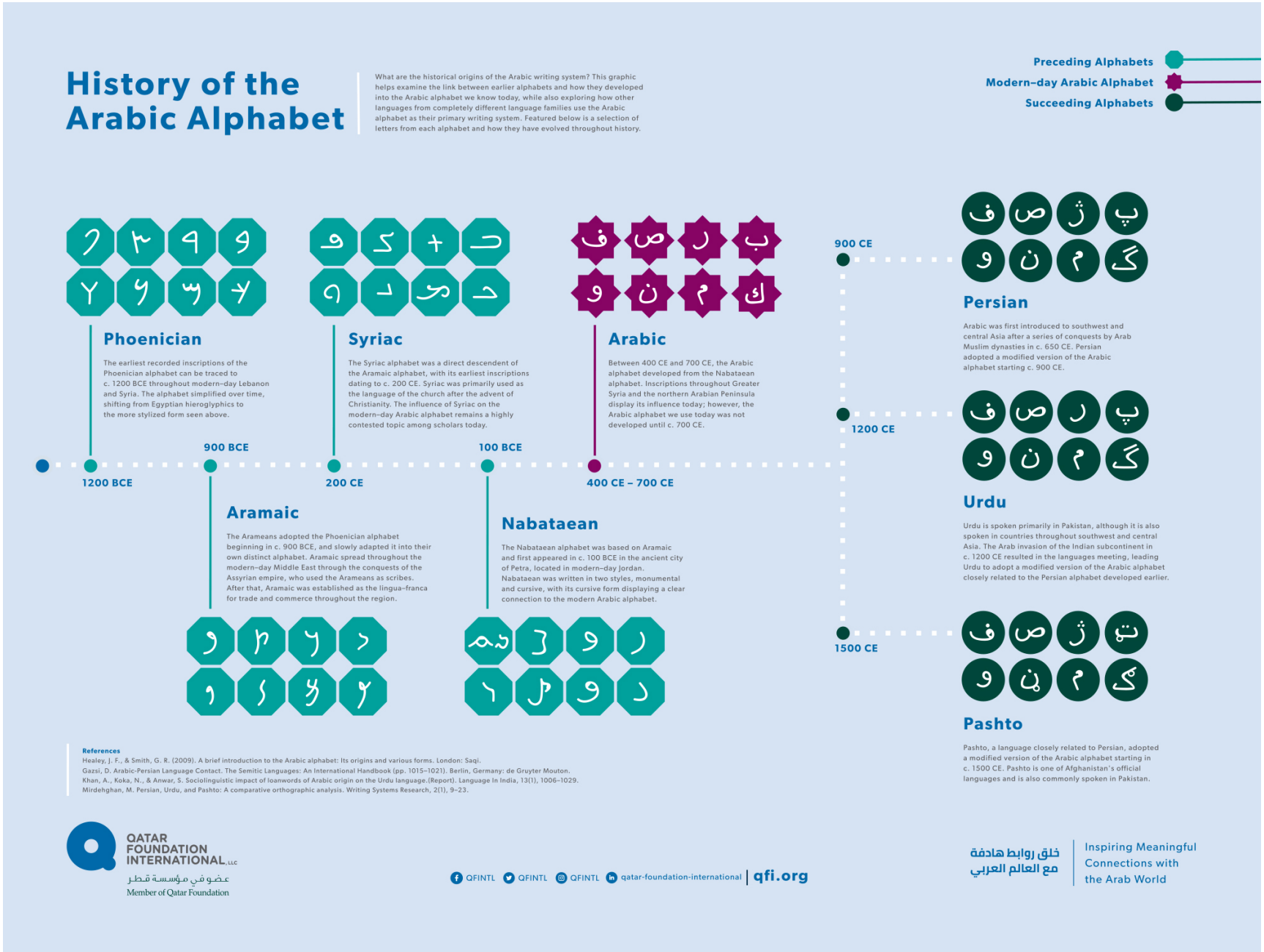
The Phoenicians (Canaan) ~1500 BCE

The Phoenicians (this is what the Greeks called them) get a lot of credit for spreading writing throughout the world. This is because they were major sea-traders throughout the Mediterranean.

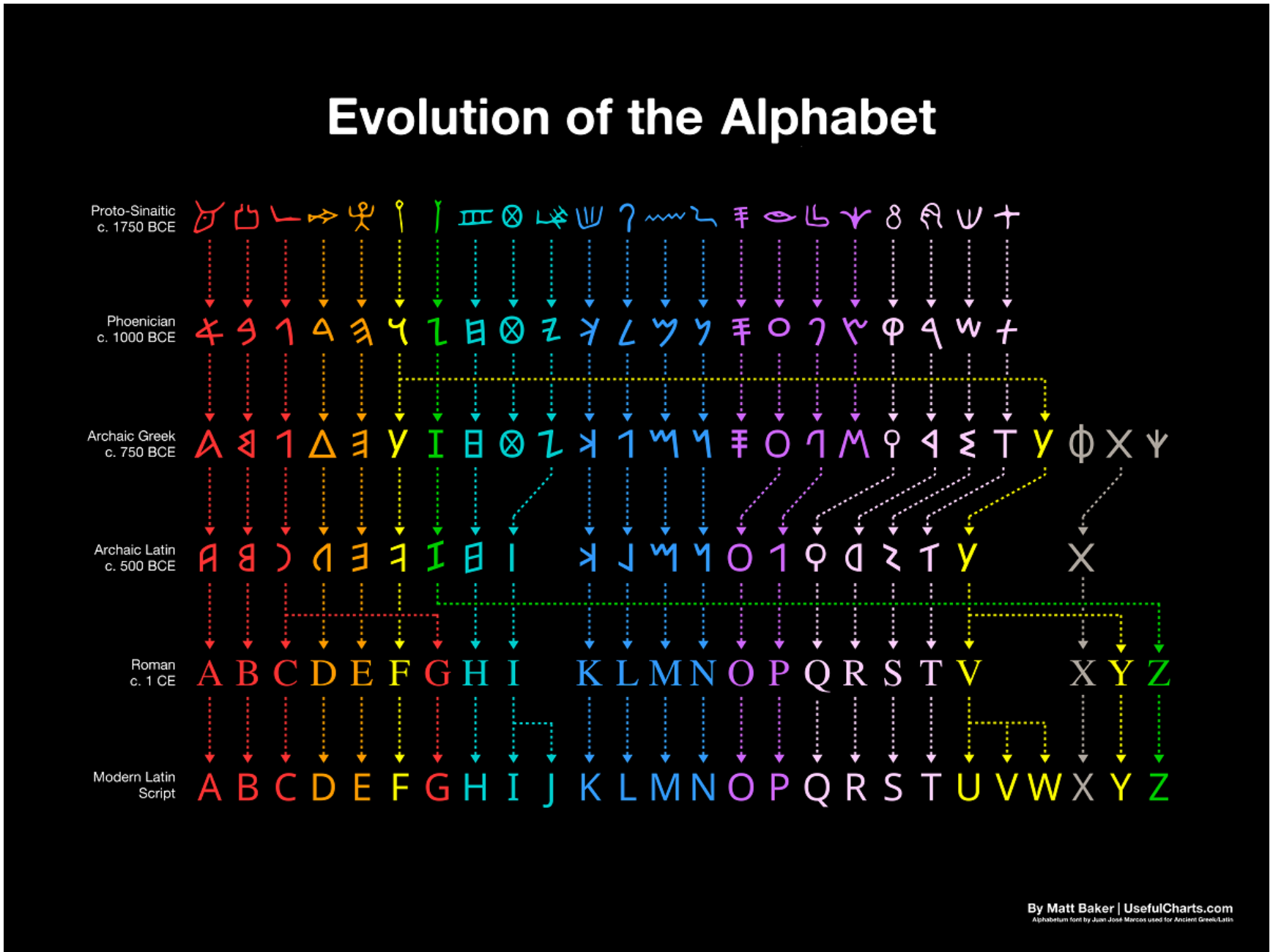
Egyptian hieroglyphs are most likely the source of the Phoenician script. You can see this through a series of links from Egyptian through earlier stages of writing in the area:



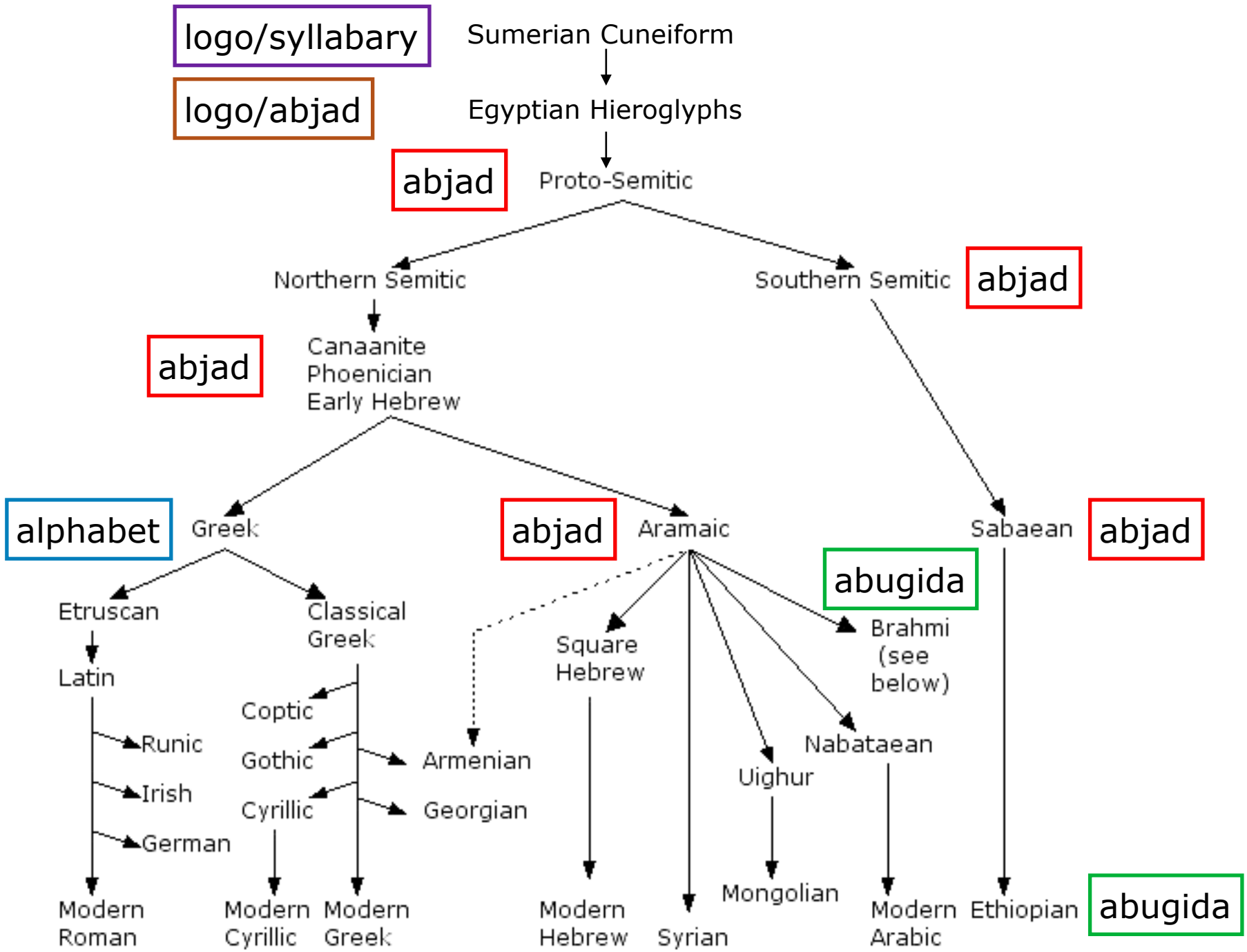
The Phoenician script turns into Arabic and Hebrew and related abjads



The Phoenician script also turns into Greek and related alphabets

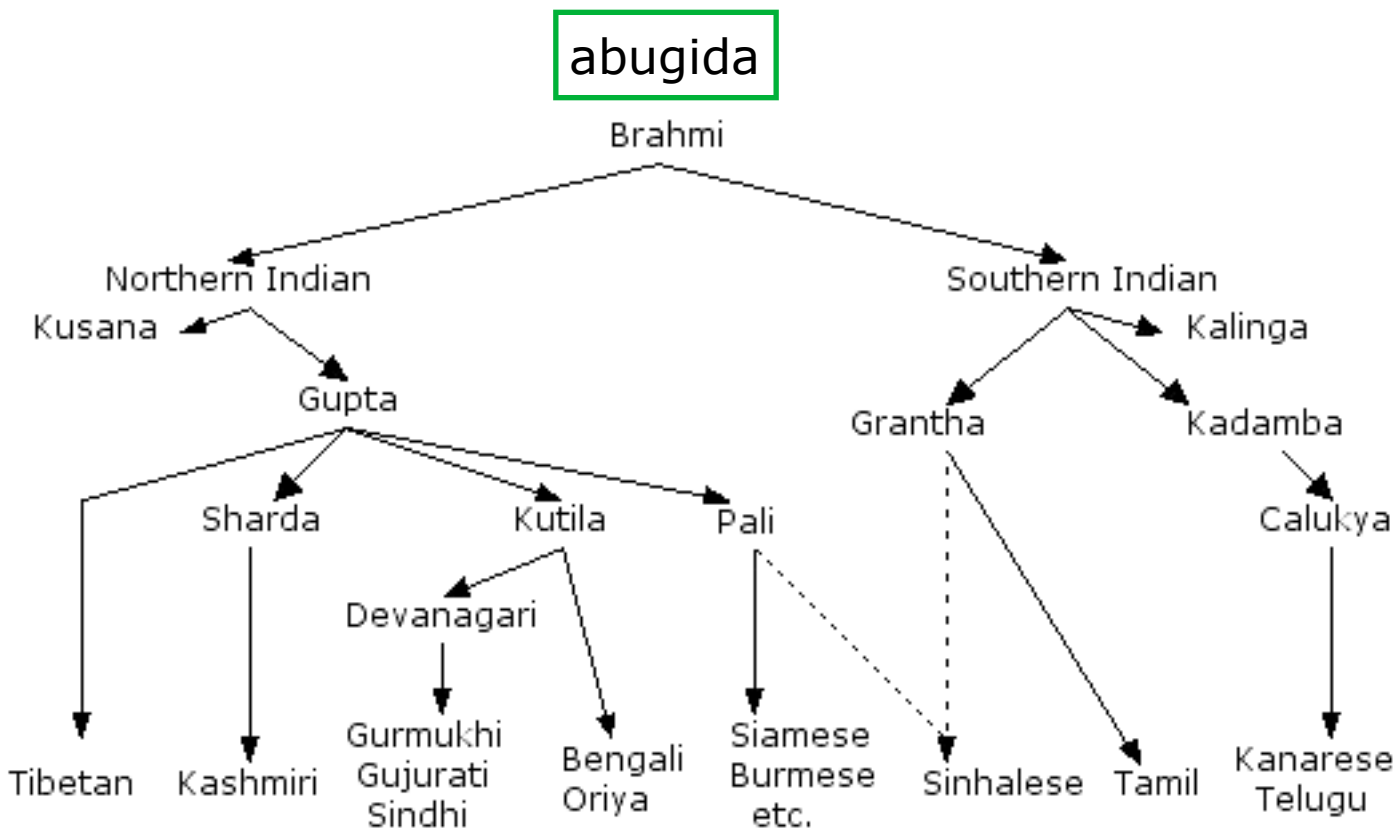


A tree showing the spread of systems



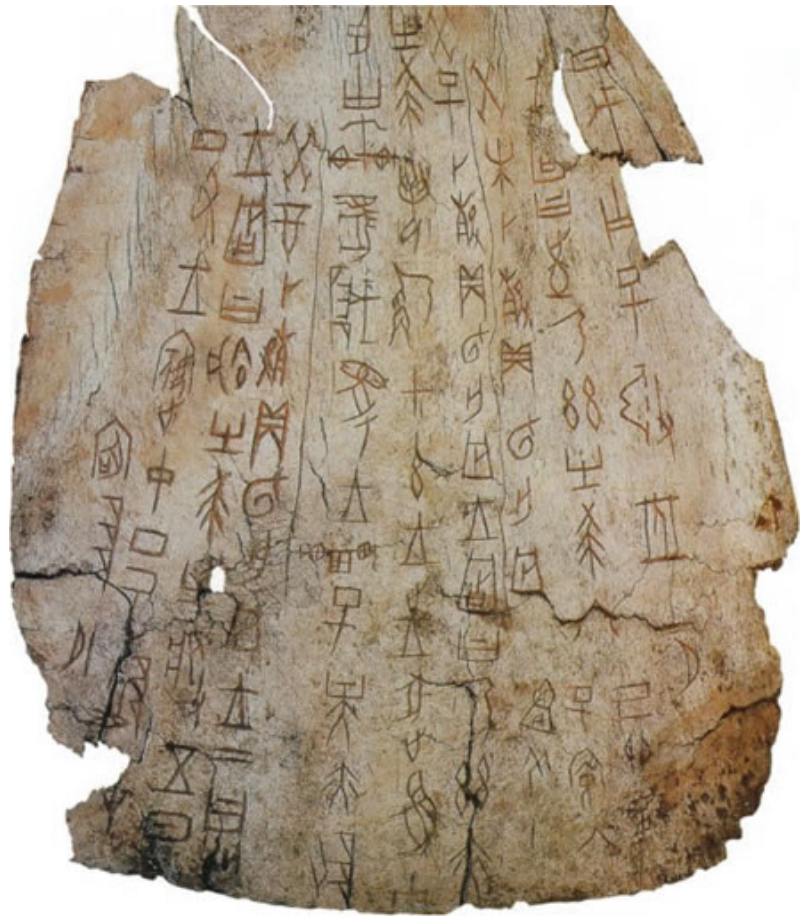
The Indus valley abugidas

Around 300 BCE, two scripts appeared in the Indus valley. One died out. It is called the "Indus Valley Script" because it is still undeciphered to this day. The other is Brahmi, which is the progenitor of all of the abugidas in South and Southeast Asia today!



Chinese characters ~ 1500 BCE

The Chinese script began as carvings on animal bone, often called the “Oracle bone script”. You can see in this chart how the oracle bone carvings evolved into the Chinese characters that are in use today.

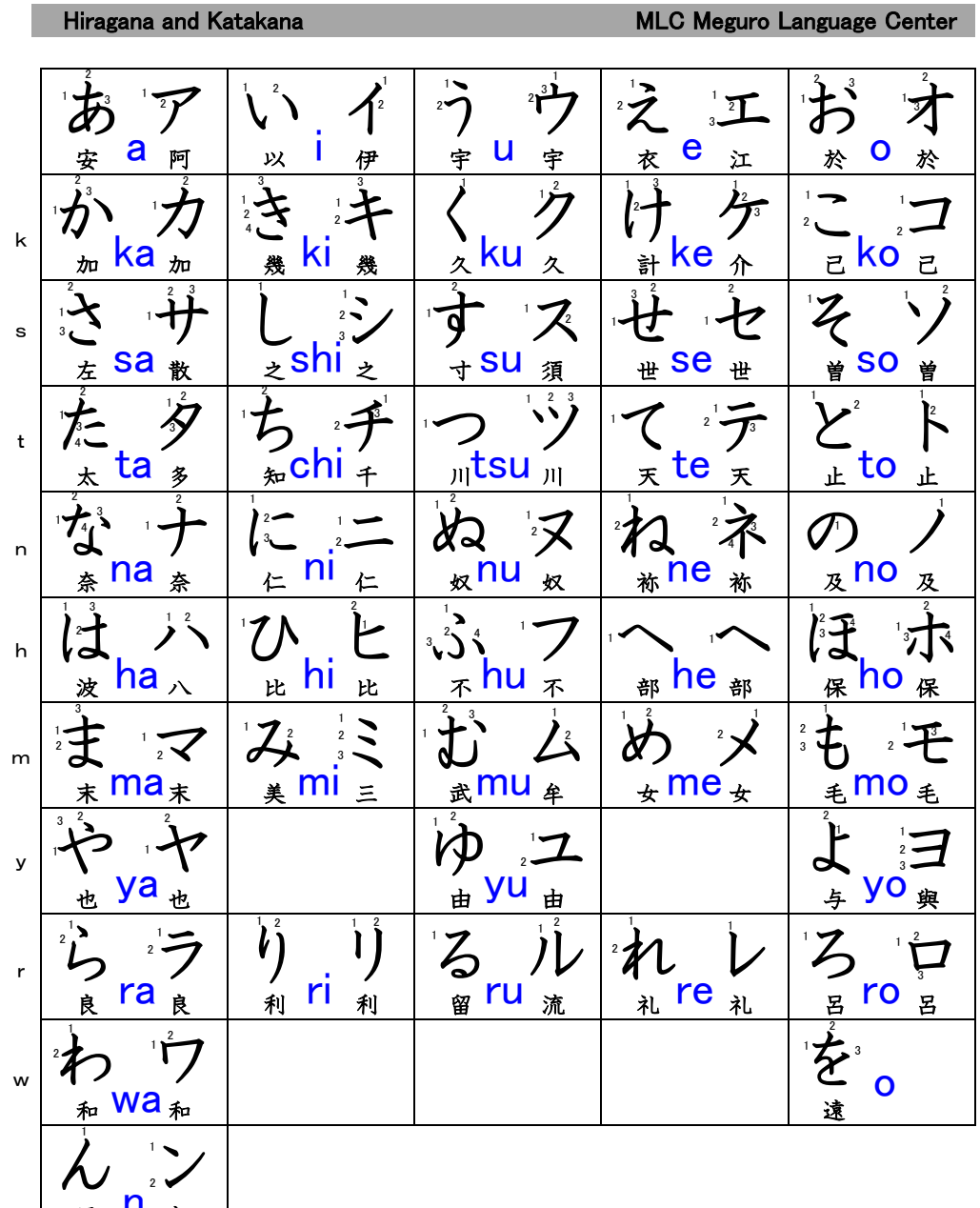


China exports writing to Japan (~400 CE)

Japan first started writing with Chinese characters directly. But over time, developed its own writing systems based originally on the Chinese characters.

Japan has three writing systems in use today:

hiragana (syllabary)
katakana (syllabary)
kanji (Chinese characters)



China exports writing to Korea (~400 CE), and then Korea invents its own system

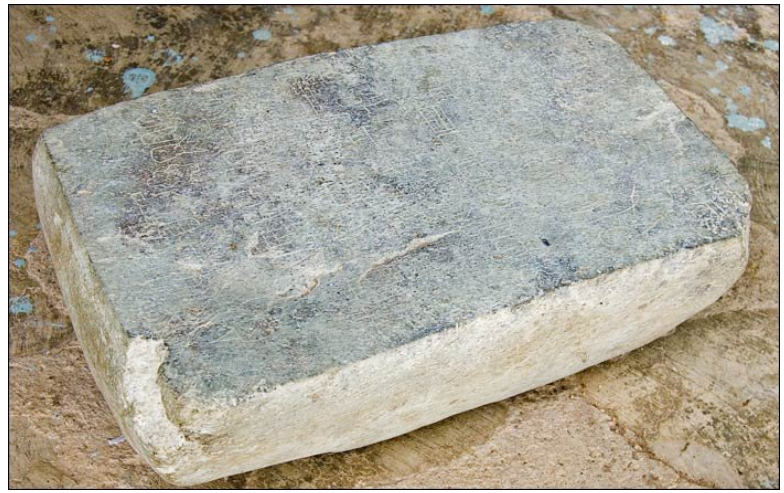
Korea also first started writing using Chinese characters, again around 400 CE.

But in 1444, under the reign of King Sejong, a new system was invented, now called **Hangeul.**

One interesting facet of Hangeul is that the shapes of some of the symbols were chosen based on articulatory phonetics (e.g., the position of the tongue). This may be the first writing system to try that!

Mesoamerican glyphs (in modern day Mexico)

The Olmec civilization may have had writing around 900 BCE. The Cascajal block has 62 symbols (28 distinct) that may be written language. But we don't know for sure.

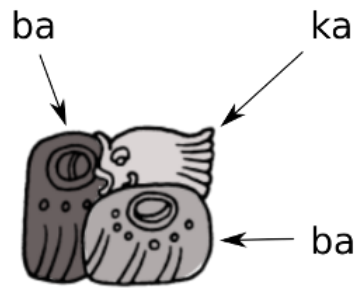


What we know for sure is that by 500 BCE the Mayan civilization did have a fully formed writing system. And we have deciphered about 80% of the system

Both of these civilizations died out without passing on their writing systems. So there are no modern writing systems that descend from Mesoamerica.

Maya Hieroglyphs ~500 BCE

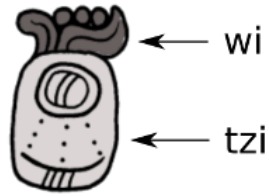
Maya glyphs are a mix of syllabary and logographic glyphs. The glyphs are presented in blocks. Here is an example of how the syllabary glyphs work.



ba-ka-ba

bakab

"head of" (title)



wi-tzi

witz

"mountain"

Like Egyptian hieroglyphs and Chinese characters, glyphs can be logograms or phonetic symbols, and additional glyphs can be added to clarify what is intended.

In this example, the gray glyph can mean ‘stone’ or the syllable ‘ku’.

a-ku

ahk

"turtle"

ku-tzu

kutz

"ocellated turkey"

2 phonograms

TUUN-ni

tuun

"stone"

Logogram + phonetic complement

https://www.mayaarchaeologist.co.uk/school-resources/maya-world/maya-writing-system/

Undeciphered writing systems

Deciphering a writing system requires knowing the underlying language

In order to decipher a writing system, you must know the underlying language that it represents. If that is unknown, there is no way to decipher the system. The system only exists insofar as it represents a language.

Many of the undeciphered scripts in the world are undeciphered because we don't know the underlying language. (The one exception may be Rongorongo.)

The script called Linear A is a good example of this. It is from Crete. It was used around ~1600 BCE. But we do not know what language it represents.

Linear A probably gave rise to a script called Linear B, which we have deciphered - it represents Mycenaean Greek, and was used around ~1300 BCE, also on Crete. But Linear A remains a mystery.

The Indus Valley script

The Indus Valley Civilization existed from 3300 BCE to 1300 BCE in Northern India and Pakistan. It was an incredibly sophisticated civilization, with dense cities with complex drainage and water systems. It dispersed over time, likely due to climate change.

There are over 4000 objects inscribed with the Indus Valley Script. There are over 417 distinct symbols on those objects.

Despite all of these examples, the Indus Valley Script remains undeciphered because we do not know the language spoken by the IVC.

Easter Island: Rapa Nui and Rongorongo

The indigenous language of Easter Island is Rapa Nui. There was a writing system in use on Easter Island as late as the 1860s that is (presumably) a representation of an older form of Rapa Nui. The writing is called Rongorongo.

The origin of rongorongo is unknown. Some carvings date to the 1600s CE, but because the only medium was wood, it is not clear if earlier carvings existed and have been lost.

The challenge with rongorongo is that we don't have much knowledge of older forms of Rapa Nui, and we don't have any key to link some set of the symbols to known words (like the Rosetta stone for Egyptian hieroglyphs). Some scholars even debate whether it is a fully fledged writing system.