# Writing systems

## LING 200: Introduction to the Study of Language

Hadas Kotek


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# Outline



Slides credit: David Pesetsky, Richard Sproat, Janice Fon

# Writing systems

## What is writing?

Writing is not language,
but merely a way of recording language by visible marks.

–Leonard Bloomfield, *Language* (1933)

# Writing systems

## Writing and speech

- Until the 1800s, writing, not spoken language, was what linguists studied. Speech was often ignored.
- However, writing is secondary to spoken language in at least 3 ways:
  - Children naturally **acquire** language without being taught, independently of intelligence or education levels.
  - ⇨ Many people struggle to **learn** to read.
  - All human groups ever encountered possess spoken language. All are equal; no language is more "sophisticated" or "expressive" than others.
  - ⇨ Many languages have no written form.
  - Humans have probably been speaking for as long as there have been anatomically modern Homo Sapiens in the world.
  - ⇨ Writing is a *much* younger phenomenon.

# Writing systems

## (Possibly) Independent Inventions of Writing

| | |
|---|---|
| Sumeria: | ca. 3,200 BC |
| Egypt: | ca. 3,200 BC |
| Indus Valley: | ca. 2,500 BC |
| China: | ca. 1,500 BC |
| Central America: | ca. 250 BC |
| | (Olmecs, Mayans, Zapotecs) |

# Writing systems

## Writing and pictures

- Let's define the distinction between pictures and true writing.
  - A picture denotes a concept apart from any particular linguistic expression. Pictures can't really be read.
  - Pictures are limited their expressive potential. They tend to denote only tangible things.
  - True writing, represents meaning through the medium of particular sounds—morphemes, syllables, phones.
  - True writing is an open system: it can—like spoken language—convey anything that can be imagined by the human mind.

# Writing systems

## Pictograms

- The earliest precursors to writing are **pictograms**
- These appear in various cultures as early as 40,000 years ago.
- Symbols that convey meaning through resemblance to a physical object.

Mesopotamia, ca. 3000 BC (British Museum)

Tablet records quantities of barley

# Writing systems

## Ideograms

- **Ideograms** developed over time from pictograms.
- They are are graphical symbols that represent a more abstract idea or concept.

| Ancient Sumerian | Ancient Egyptian | Chinese |
|---|---|---|
| Eye | See (verb) | 目 Eye |
| Forest | Water | 水 Water |
| Mountains | Cities | 山 Mountain |
| Torch | Fire | 火 Fire |
| | Men | 人 Person |
| Person | Women | 女 Woman |

# Writing systems

## Ideograms turn into a writing system...

- Over time, two innovations led to full-fledged writing systems.
- The **rebus principle**: if you can't make a picture of something, use a picture of something with the same sound.
  - The first clear example of this is in a tablet from Jemdet Nasr, dated to around 2900 BC, in which a pictograph of a reed (*GI* in Sumerian) is used to mean "reimburse" (also pronounced *GI*).

# Writing systems

## Ideograms turn into a writing system...

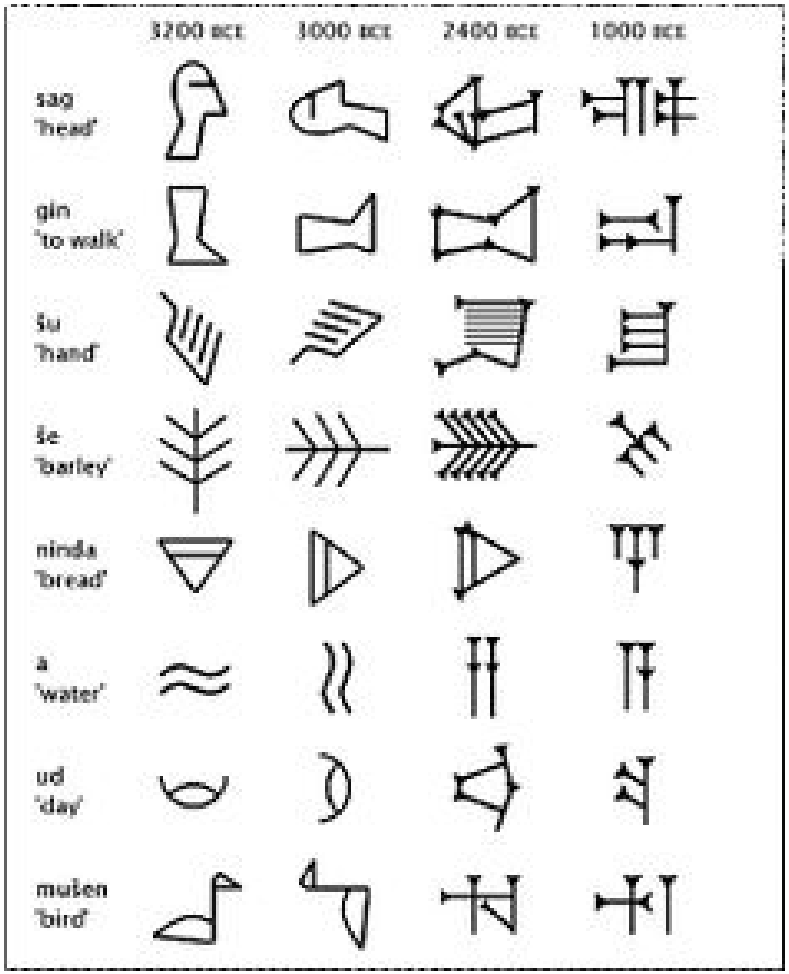
- The **charades principle**: combining a vague picture with a little information about what the word sounds like is more effective than giving only imperfect information about meaning or about sound.
  - Symbol for “leg” + symbol pronounced “ba” → Sumerian GUB “to stand”
  - Symbol for “leg” + symbol pronounced “na” → Sumerian GIN “to go”
  - Symbol for “leg” + symbol prnced “ma” → Sumerian TUM “to bring”
- This may not be very efficient, but it is a complete writing system, used to write not only warehouse records, but also poems, diplomatic treaties, letters, contracts, dictionaries, epic myths...

# Writing systems

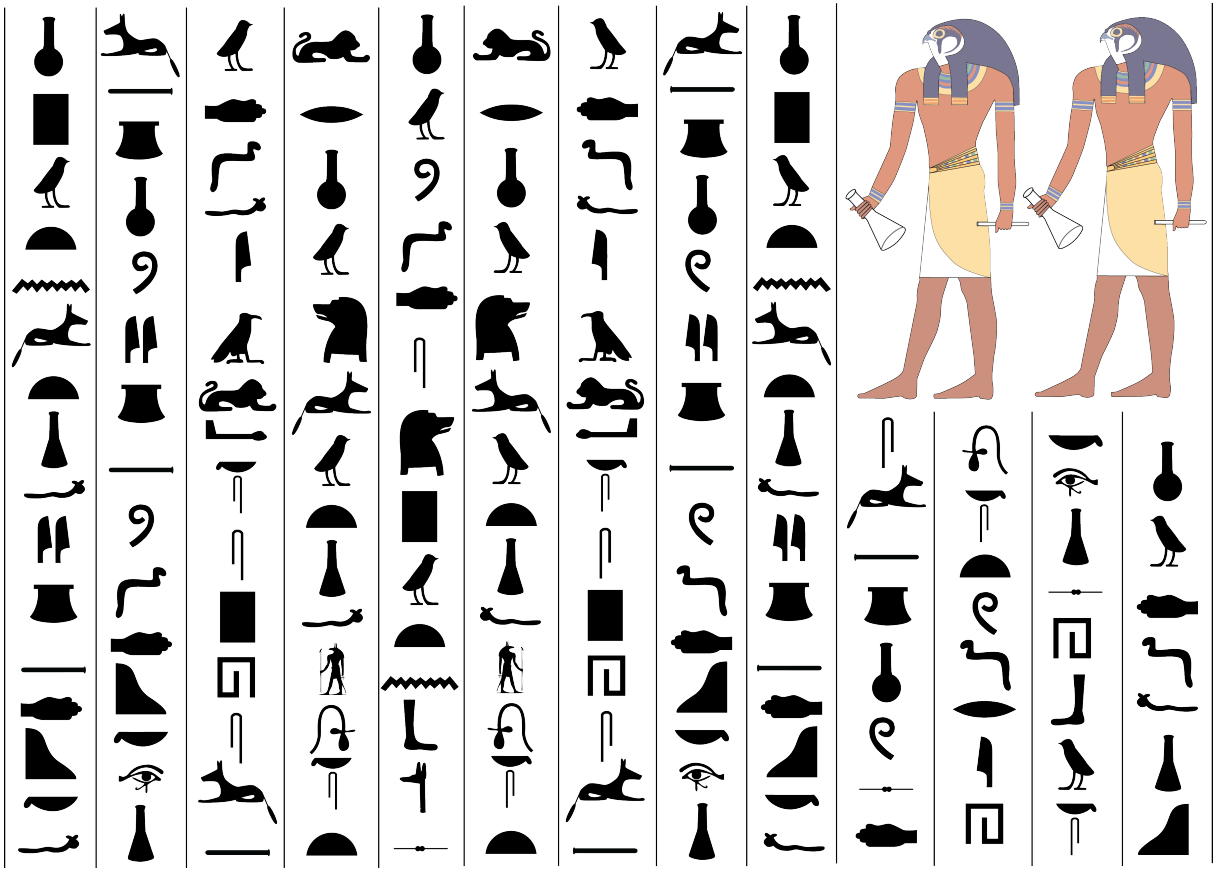
## Ideographic (logographic) writing systems

- **Sumerians cuneiform**: earliest writing system dated from the 4th millennium BC, used for over 3000 years throughout the Near East on a wide range of languages; the system used wedge-shaped characters.
- **Egyptians hieroglyphics**: a writing system which used mainly pictorial symbols, especially applied to the form of pictography developed in Egypt c.3000 BC.
- **Chinese characters**: a literary language recorded from c.1500 BC. It is the only writing system in the world descended directly from the earliest, irregular writing systems which survives to the present day.

# Writing systems: Sumerian cuneiform



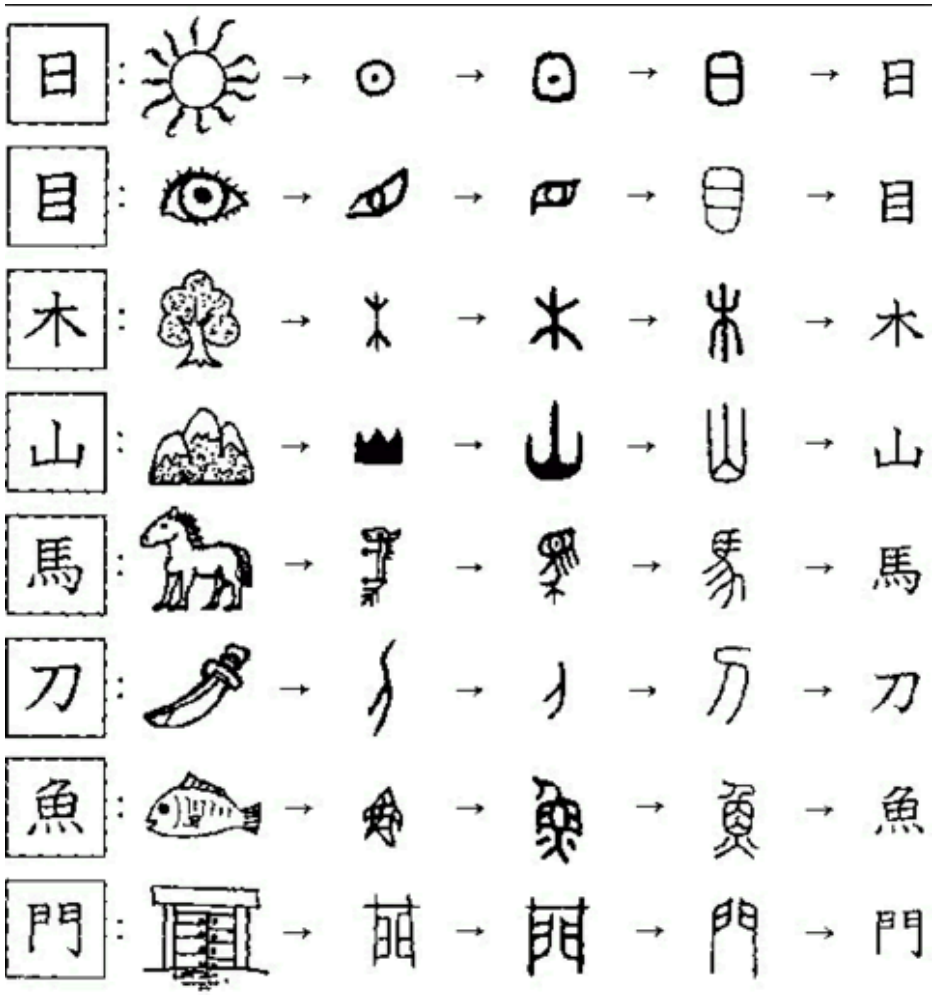
# Writing systems: Egyptian hieroglyphs



# Writing systems: Mayan hieroglyphs

HIEROGLYPHICS ON THE COPAN STATUE.

# Writing systems: Chinese characters



# Writing systems

## The Chinese writing system

- Not ideographic—Chinese characters refer to morphemes and syllables, not ideas, it is **morphosyllabic**.
  - 99.9% of the 30,000+ Chinese characters represent syllables (all except one ‘r’). (Several thousand are needed to be literate.)
  - 89% of Chinese syllables are separate morphemes.
  - 40% of words are monosyllabic, the rest are written with two or more characters, one for each syllable.
  - Only 2% have shapes with a completely random connection to the sound of the syllable they represent, descended from ancient pictograms.
- Most characters contain two elements: one provides semantic information, the other provides phonological information.

# Writing systems: Chinese characters

**Semantic-plus-Phonetic Matrix**

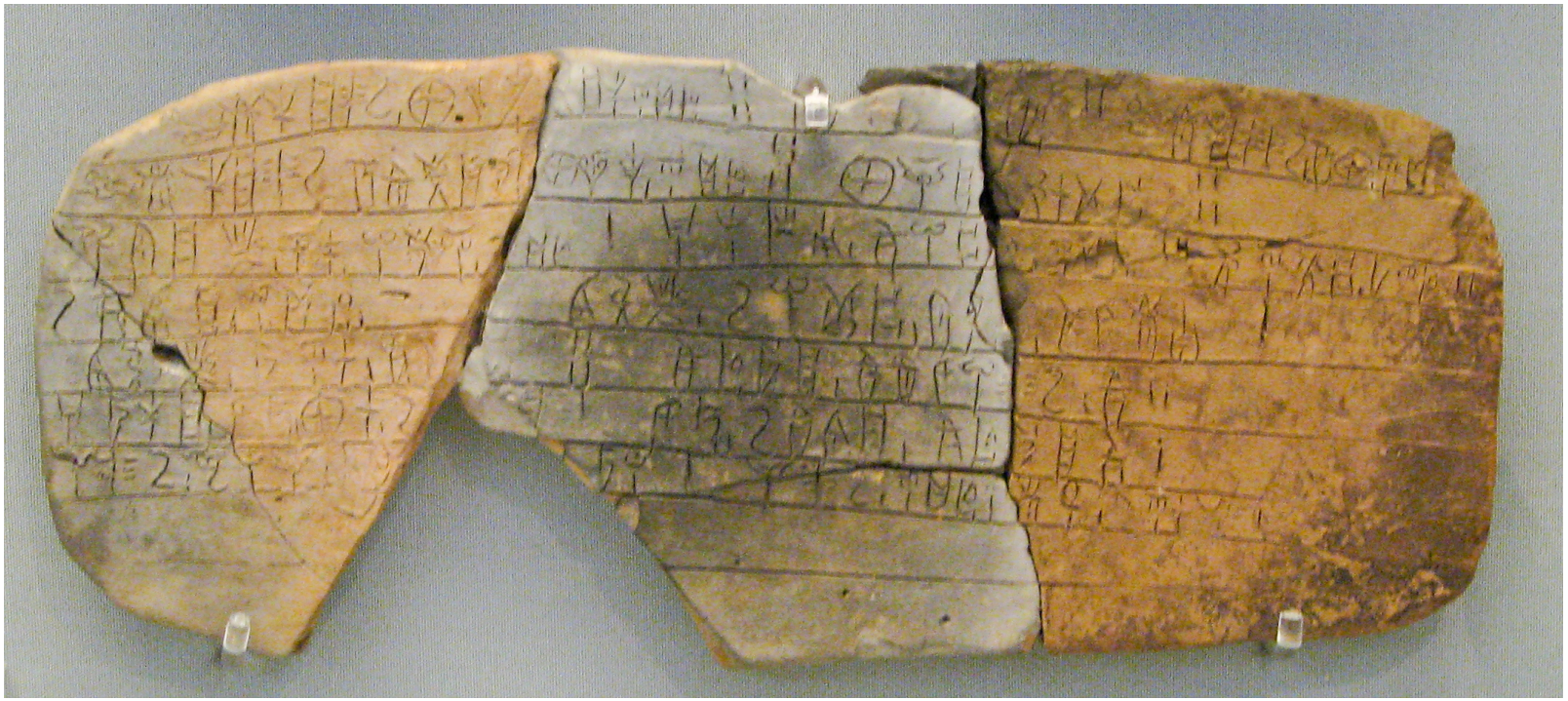
| semantic | Phonetic 264 敖 (*áo*) | Phonetic 282 參 (cān) | Phonetic 391 堯 (*yāo*) | Phonetic 597 甫 (*fǔ*) |
|---|---|---|---|---|
| 9 亻 'person' | 傲 (*ào*: 'proud') | 傪 (*cān*: 'good') | 僥 (*jiǎo*: 'lucky') | 俌 (*fù*: 'help') |
| 64 扌 'hand' | 搜 (*ào*: 'shake') | 摻 (*shán*: 'seize') | 撓 (*nǎo*: 'scratch') | 捕 (*bǔ*: 'catch') |
| 75 木 'wood' | 槪 (*āo*: 'barge') | 槮 (*shēn*: 'beam') | 橈 (*náo*: 'oar') | 補 (*fú*: 'trellis') |
| 85 氵 'water' | 滶 (*ào*: 'stream') | 滲 (*shèn*: 'leak') | 澆 (*jiāo*: 'sprinkle') | 浦 (*pǔ*: 'creek') |

# Writing systems

## Syllabaries

- In fact, many early writing systems were **syllabaries**.
- Definition: writing systems in which each symbol represents a syllable.
  - ancient Persian, Sanskrit, modern Japanese.
  - E.g., in Japanese, the basic phonotactic structure: CV
  - There are 12 consonants, 5 vowels, $12 \times 5 = 60$ possible sounds/symbols
- Advantages: in a syllabic writing, you only need the number of syllables possible in the language, much more economical and efficient.
- Disadvantages: when a language has a complex syllable structure, there will have to be a large amount of symbols.
  - E.g.: CVC $12 \times 5 \times 12 = 720$

# Writing systems: Sample of Linear B script, 1450 BC

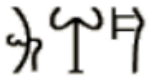
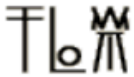


Deciphered by **Michael Ventris** (1922-1956), an architect and amateur linguist (assisted by John Chadwick, a classicist), who discovered that the **Linear B** texts are ...

# Writing systems: Linear B

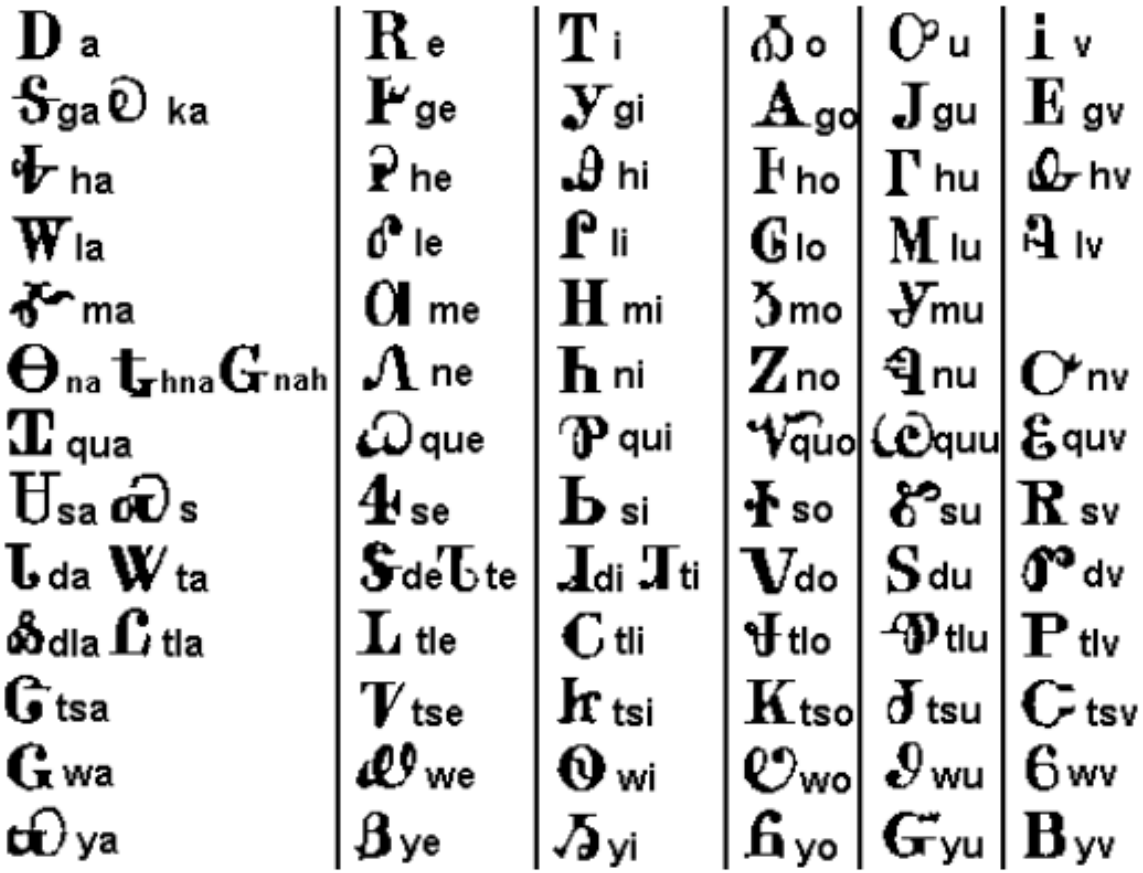
... Greek! —
written in a (somewhat imperfect) syllabary.
(Linear A remains undeciphered.)

# Writing systems: Linear B

| sign sequence | trans-literation | Mycenaean Greek | Classic Greek | word meaning |
|---|---|---|---|---|
|  | ku-mi-no | *kuminon | kuminon | cumin |
|  | ku-na-ja | *gunaia | gune | woman (*gynecology*) |
|  | ku-ru-so | *khrusos | khrusos | gold (*chrysanthemun*) |
|  | pa-te | *pater | pater | father |
|  | pa-ma-ko | *pharmakon | pharmakon | medicine (*pharmacy*) |
|  | to-so | *toso | tosos | so many |
|  | to-ra-ke | *thorakes | thorax | thorax |
|  | qo-u- | *gwou- | bou- | cow |
|  | i-qo | *hikkwoi | hippos | horse |
|  | re-u-ka | *leuka | leukos | white (*leukemia*) |
|  | re-a | *rea | rhis, rhino- | nose (*rhinoplasty*) |

# Writing systems: Cherokee syllabary

Cherokee syllabary, invented by Sequoyah (1770-1843), a silversmith:



# Writing systems

## Syllabaries

- **Japanese script** uses the Chinese characters (called **kanji**), plus two syllabaries:
- **Hiragana**: written in a curving, flowing style. Used for writing some native Japanese words and for grammatical functions (e.g. question marker, subject/object marker, possessive, ...).
- **Katakana**: more angular characters. Used mostly for writing foreign-derived words.

# Writing systems

ひらがな

hiragana

| wa | ra | ya | ma | ha | na | ta | sa | ka | a |
|---|---|---|---|---|---|---|---|---|---|
| わ | ら | や | ま | は | な | た | さ | か | あ |
| | ri | | mi | hi | ni | chi | shi | ki | i |
| | り | | み | ひ | に | ち | し | き | い |
| o | ru | yu | mu | hu/fu | nu | tsu | su | ku | u |
| を | る | ゆ | む | ふ | ぬ | つ | す | く | う |
| | re | | me | he | ne | te | se | ke | e |
| | れ | | め | へ | ね | て | せ | け | え |
| n | ro | yo | mo | ho | no | to | so | ko | o |
| ん | ろ | よ | も | ほ | の | と | そ | こ | お |
| | | | | " ba, bi, bu, be, bo<br>° pa, pi, pu, pe, po | | " da, ji, zu, de, do | " za, ji, zu, ze, zo | " ga, gi, gu, ge, go | |

# Writing systems

カタカナ

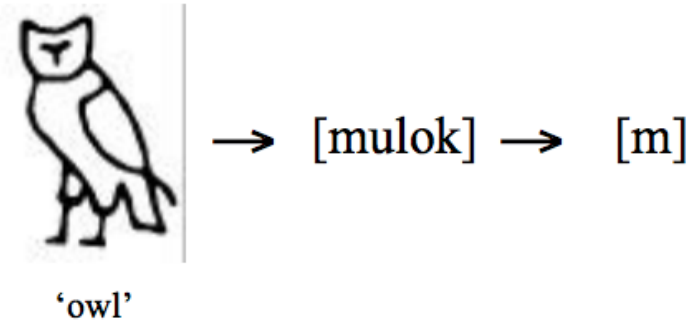
katakana

| wa | ra | ya | ma | ha | na | ta | sa | ka | a |
|---|---|---|---|---|---|---|---|---|---|
| ワ | ラ | ヤ | マ | ハ | ナ | タ | サ | カ | ア |
| | ri | | mi | hi | ni | chi | shi | ki | i |
| | リ | | ミ | ヒ | ニ | チ | シ | キ | イ |
| o | ru | yu | mu | hu/fu | nu | tsu | su | ku | u |
| ヲ | ル | ユ | ム | フ | ヌ | ツ | ス | ク | ウ |
| | re | | me | he | ne | te | se | ke | e |
| | レ | | メ | ヘ | ネ | テ | セ | ケ | エ |
| n | ro | yo | mo | ho | no | to | so | ko | o |
| ン | ロ | ヨ | モ | ホ | ノ | ト | ソ | コ | オ |
| | | | | " ba, bi, bu, be, bo<br>° pa, pi, pu, pe, po | | " da, ji, zu, de, do | " za, ji, zu, ze, zo | " ga, gi, gu, ge, go | |

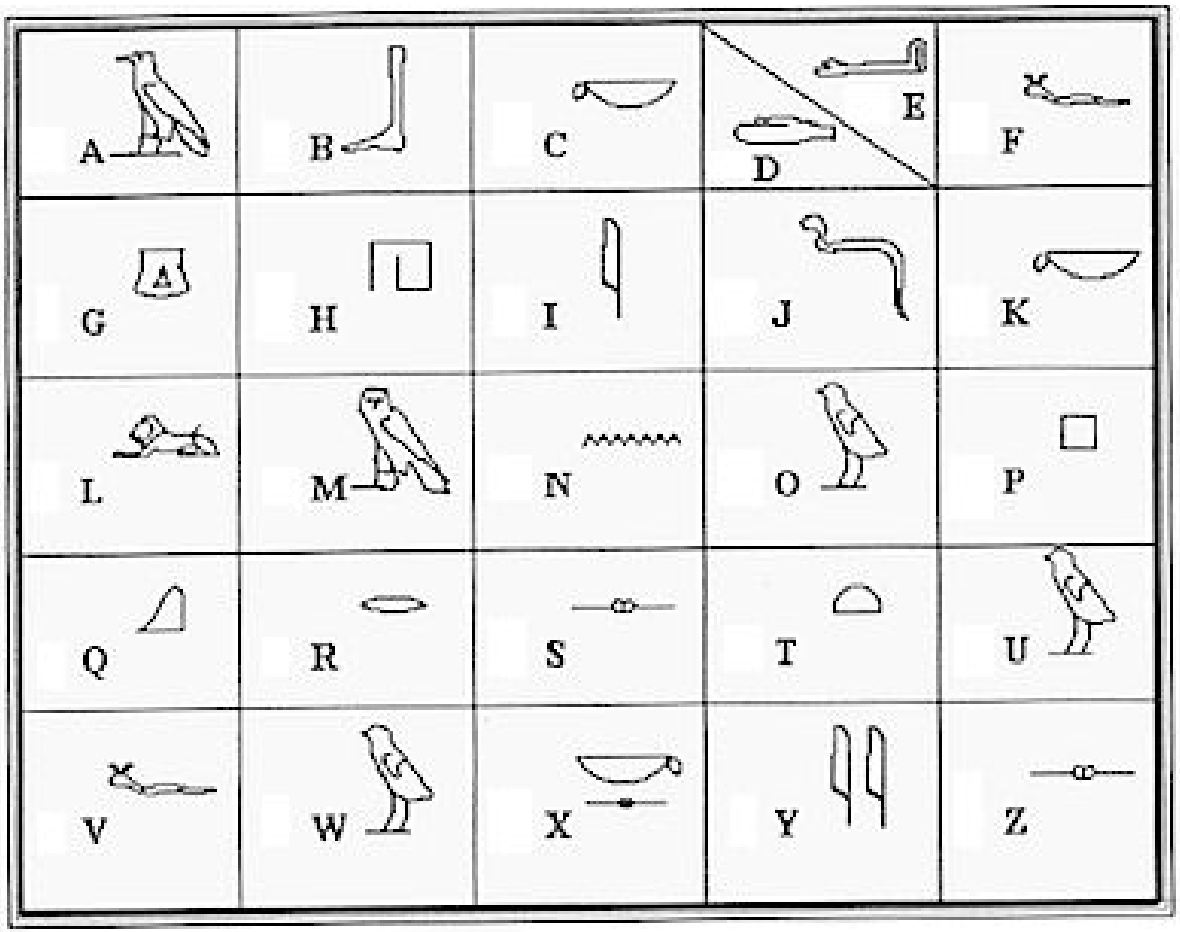
# Writing systems

## Alphabetic writing systems

- Definition: a system of consonant and vowel symbols that, either individually or in combinations, represent the speech sounds of a written language.
  - English, Cyrillic, Hindi.

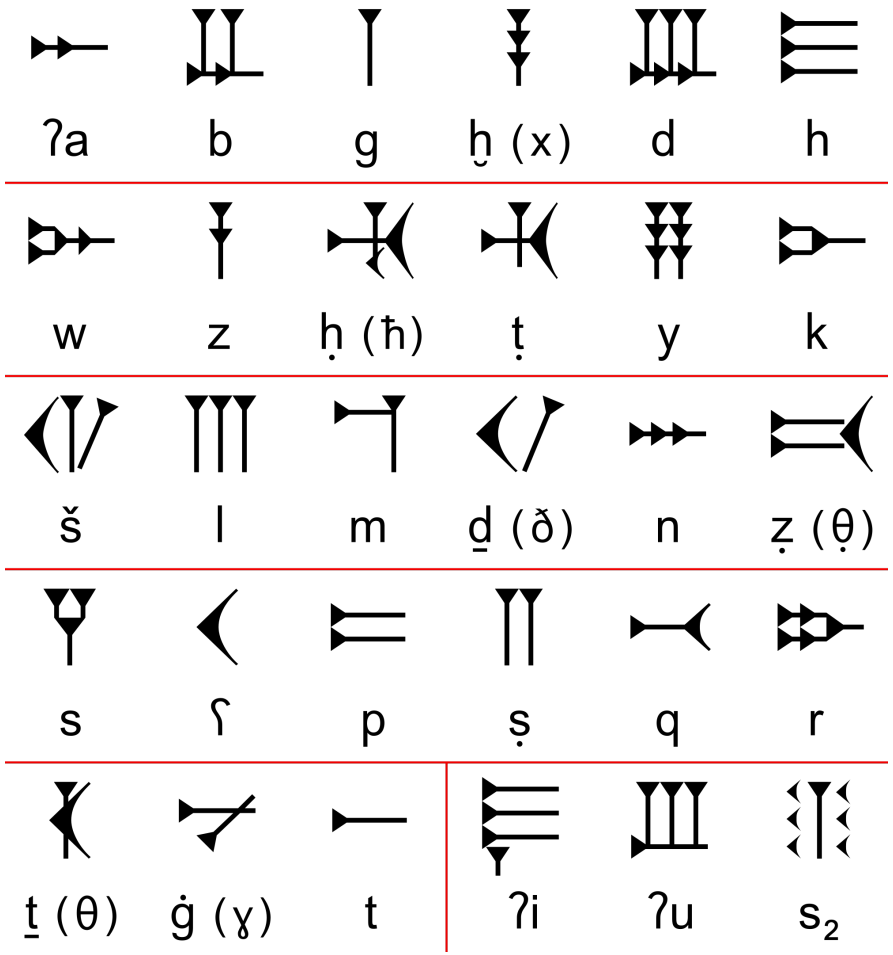


# Writing systems: Hieroglyphs are alphabet



# Writing systems: Ugaritic alphabet

Ugaritic cuneiform alphabet (W. Syria, ca.1300-1200 BCE)



# Writing systems: Phoenecian alphabet

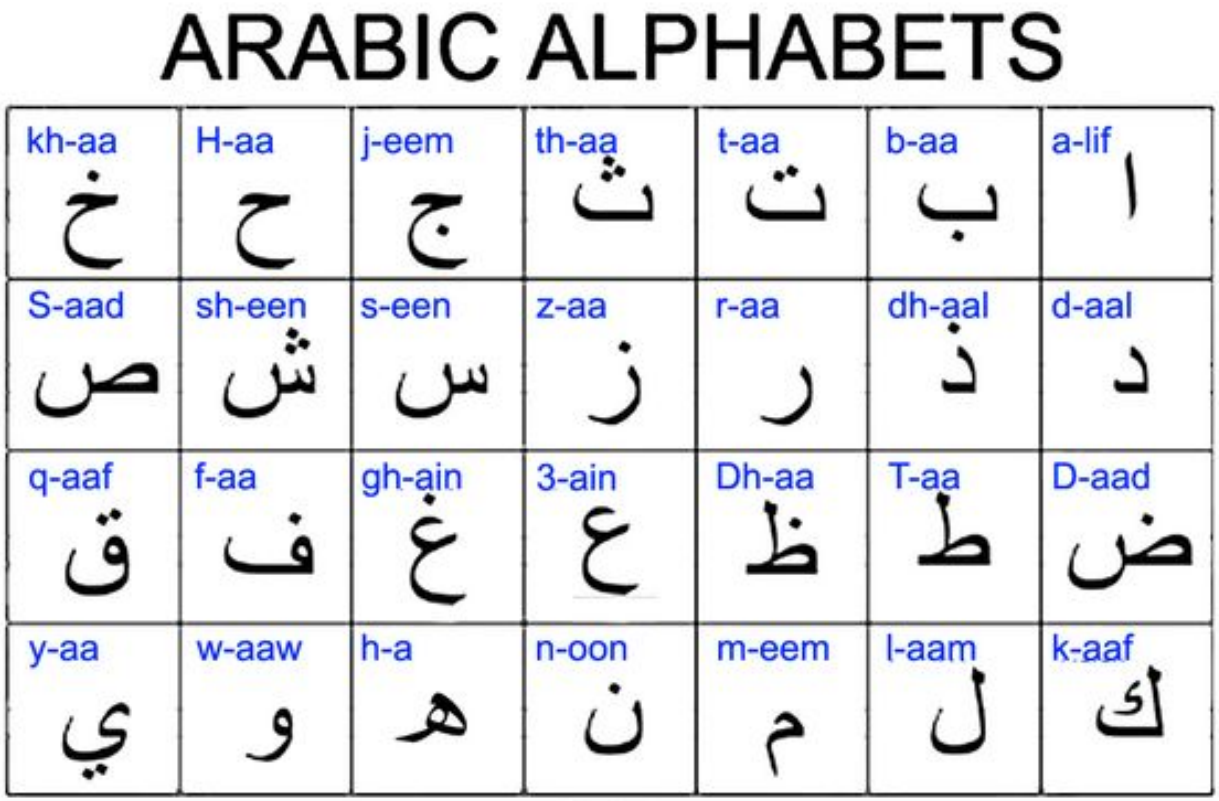
Phoenician (from ca. 1100 BCE)

# Writing systems

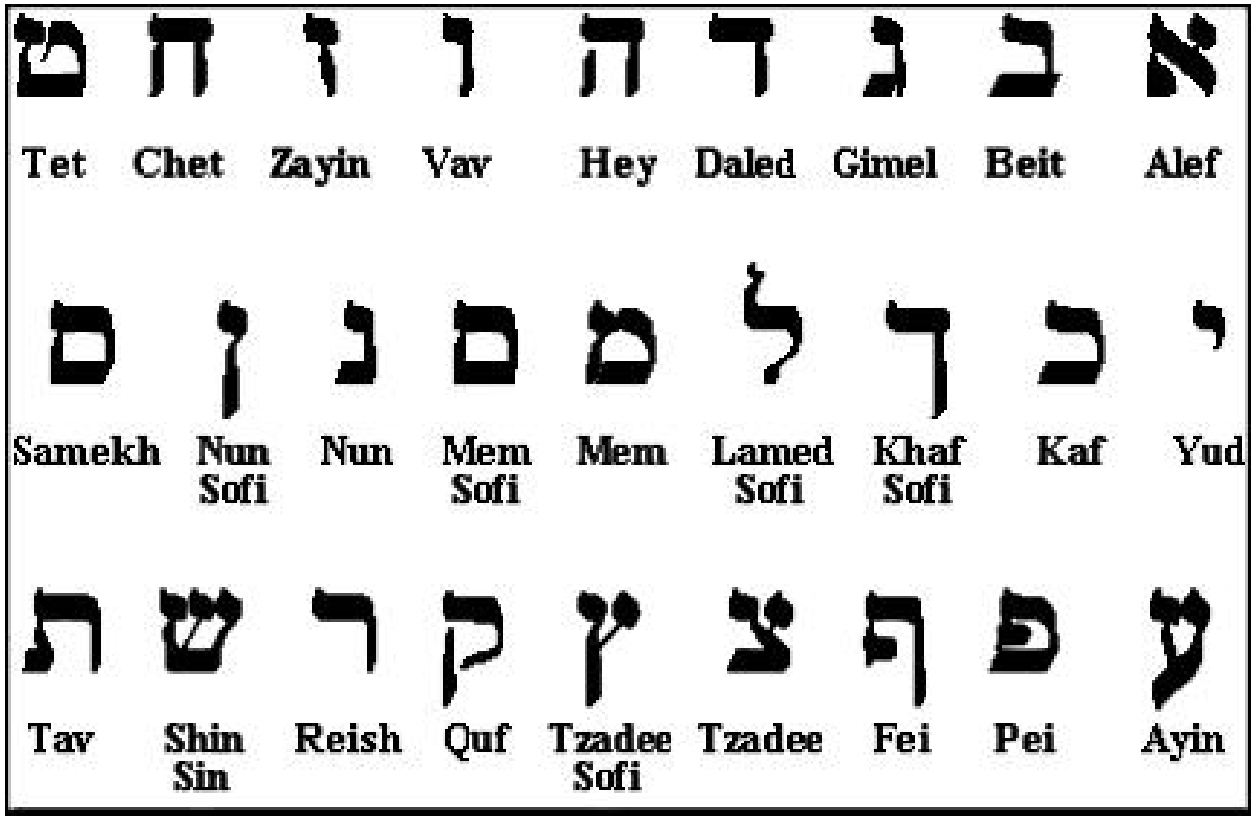
## Alphabetic writing systems: A sub-type

- **Consonantal Alphabet**: alphabetic writing systems in which only the consonants in words are written, and the vowels are left out
  - Phoenician, Hebrew, Arabic.
- Despite what you might think, it is not as difficult as it seems.
- Ths sntnc s wrttn wth th vwl smbls lft t bt t s stll ndrstndbl.
- Semitic languages that use this script are *templatic*, so nouns and verbs have predictable forms.
- Some consonant letters also used to mark (some) vowels.
- Optional diacritics for vowels, when necessary.

# Writing systems: Arabic alphabet



# Writing systems: Hebrew alphabet



# Writing systems

## Alphabetic writing systems: The Phoenician alphabet and its descendants

- The Phoenician alphabet is derived from Egyptian hieroglyphs.
  - Contains 22 consonant letters.
- It became one of the most widely used writing systems, spread by Phoenician merchants across the Mediterranean world.
- One derivative: Aramaic script, the predecessor of modern Arabic and Hebrew scripts.
- Another derivative: The Greek, and later Latin and Cyrillic, scripts.

# Writing systems

## Alphabetic writing systems: The Greek alphabet

- The Greeks took the Phoenician alphabet and repurposed it:
- Several letters corresponding to sounds that did not exist in Greek: used as vowels.
- Some letters repurposed, some new letters added (phi, psi, chi, omega).

# Writing systems

## Alphabetic writing systems: The Roman alphabet

- The Etruscans who ruled early Rome adopted and modified the Greek alphabet.
- The Etruscan alphabet was in turn adopted and further modified by the ancient Romans to write the Latin language.
- Later developments: w, diacritics to represent sounds in various languages (German umlaut, Scandinavian vowels, etc).

# Writing systems: Greek alphabet

| Letter Name | Proto-Sinaitic | Early Phoenician | Greek | Phonetic Value | Letter Meaning |
|---|---|---|---|---|---|
| 'aleph |  |  | A | ['] | ox |
| beth |  |  | B | [b] | house |
| gimmel |  |  | Γ | [g] | throwstick |
| daleth |  |  | Δ | [d] | door |
| he |  |  | E | [h] | |
| waw |  |  | F[1] Y | [w] | hook/peg |
| zayin |  |  | Z | [z] | |
| heth |  |  | H | [ḥ] | fence |
| teth | |  | Θ | [ṭ] | |
| yodh |  |  | I | [y] | arm/hand |
| kaph |  |  | K | [k] | palm of hand |
| lamedh |  |  | Λ | [l] | goad/crook |
| mem |  |  | M | [m] | water |
| nun |  |  | N | [n] | snake |
| samekh | |  | Ξ | [s] | |
| ʿayin |  |  | O | [ʿ] | eye |
| pe | |  | Π | [p] | |
| tsade |  |  | M[2] | [ṣ] | |
| qoph |  |  | Q[3] | [q] | |
| reš |  |  | P | [r] | head |
| šin |  |  | Σ | [š] | |
| taw |  |  | T | [t] | mark (?) |

# Writing systems

In the 9th century AD, two Byzantine missionaries, the brothers Cyril (827-869) & Methodius (826-885), designed an alphabetic writing system for the Moravian Slavic dialect.


After Cyril's death, Methodius continued his work. The alphabet that Cyril and Methodius created is to this day called...

# Writing systems

... the **GLAGOLITIC** alphabet: the oldest known Slavic alphabet

| The Old Church Slavonic Glagolitic Alphabet | | | | | | | |
|---|---|---|---|---|---|---|---|
|  a |  b |  v |  g |  d |  ɛ |  ž |  dz |
|  z |  i |  i |  ǵ |  k |  l |  m |  n |
|  ɔ |  p |  r |  s |  t |  u |  f |  x (kh) |
|  ɔ |  ts |  č |  š |  št |  w/ə |  ɨ |  y |
|  æ/e |  yu |  ɛ̃ |  yɛ̃ |  ɔ̃ |  yɔ̃ |  f |  i/v |

# Writing systems

The **Cyrillic alphabet** was developed and formalized by early disciples of Cyril and Methodius, based on Greek letters augmented by Glagolitic letters for sounds not found in Greek. Named after Cyril.

| А а | Б б | В в | Г г | Д д | Е е | Ё ё | Ж ж | З з | И и | Й й |
|---|---|---|---|---|---|---|---|---|---|---|
| а | бэ | вэ | гэ | дэ | е | ё | жэ | зэ | и | и краткое |
| a | b | v | g | d | e | ë | ž | z | i | j |
| [ a ] | [ b ] | [ v ] | [ g ] | [ d ] | [ je/ie/e/ɛ ] | [ jo/io/o ] | [ ʒ ] | [ z ] | [ i ] | [ j ] |

| К к | Л л | М м | Н н | О о | П п | Р р | С с | Т т | У у | Ф ф |
|---|---|---|---|---|---|---|---|---|---|---|
| ка | эль | эм | эн | о | пэ | эр | эс | тэ | у | эф |
| k | l | m | n | o | p | r | s | t | u | f |
| [ k ] | [ l ] | [ m ] | [ n ] | [ o ] | [ p ] | [ r ] | [ s ] | [ t ] | [ u ] | [ f ] |

| Х х | Ц ц | Ч ч | Ш ш | Щ щ | Ъ ъ | Ы ы | Ь ь | Э э | Ю ю | Я я |
|---|---|---|---|---|---|---|---|---|---|---|
| ха | цэ | чэ | ша | ща | | ы | | э | ю | я |
| h | c | č | š | ŝ | ″ | y | ′ | è | û | â |
| [ x ] | [ ts ] | [ ʧ ] | [ ʃ ] | [ ʃʧ/ʃʃ ] | - | [ ɨ ] | [ ʲ ] | [ ɛ ] | [ ju/ʲu ] | [ ja/ʲa ] |

# Writing systems: Hangul

## Hangul: the Korean Alphabet

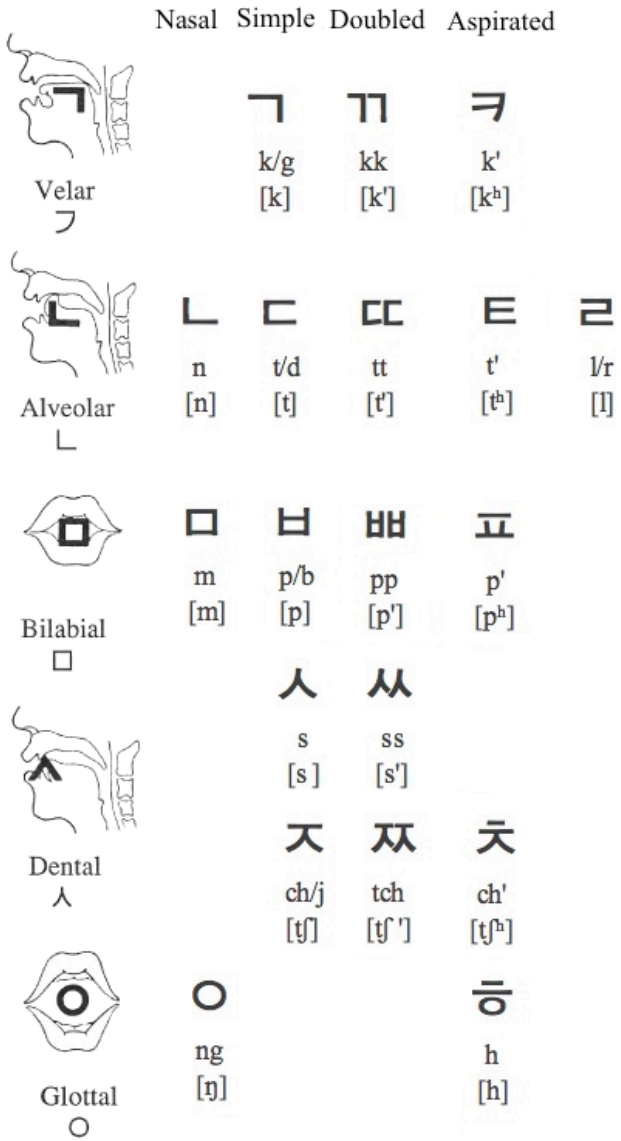
"The sounds of our country's language are different from those of China and do not correspond to the sounds of Chinese characters.

Therefore, among the stupid people, there have been many who, having something to put into writing, have in the end been unable to express their feelings.

I have been distressed by this and have designed twenty-eight new letters, which I wish to have everyone practice at their ease and make convenient for their daily use."

—King Sejong (1397-1450)

# Writing systems: Hangul



# Writing systems: Hangul

The consonants are arranged in blocks together with vowels that mostly correspond to syllables.

Simple vowels

| a | ŏ | o | u | ŭ | i | ae | e |
|---|---|---|---|---|---|---|---|
| [ a ] | [ ʌ ] | [ o ] | [ u ] | [ ɨ ] | [ i ] | [ æ ] | [ e ] |

Diphthongs

| ya | yŏ | yo | yu | yae | ye | wa | wae | wŏ | we | oe | wi | ŭi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [ ja ] | [ jʌ ] | [ jo ] | [ ju ] | [ jæ ] | [ je ] | [ wa ] | [ wæ ] | [ wʌ ] | [ we ] | [ we ] | [ wi ] | [ ɨj ] |

기 /gi/ 미 /mi/

김 /gim/ 민 /min/

... giving the false impression that Hangul is a syllabary.

# Summary

## Summary

- Writing systems are a (rather new) *technology*.
- Invented independently a few times throughout humanity.
- Transmitted, adopted and adapted commonly.

## Types of writing systems

| Type of writing | Meaning |
|---|---|
| **Pictographic** | Elements are pictures |
| **Ideographic** | Elements denote abstract ideas |
| **Morphemic** | Elements denote words or morphemes |
| **Syllabic** | Elements denote syllables |
| **Alphabetic** | Elements denote phones (vowels and consonants) |
| **Consonantal** | Elements denote consonants (mostly) |

# Phonemic vs. phonetic spelling

## The rule of akan'je in Russian

- In the syllable before the stress, or word-initial in an unstressed syllable, /o/ becomes [a]:

| | | |
|---|---|---|
| /nogá/ | becomes | [nagá] 'foot' |
| /nógi/ | stays | [nɔ́gi] 'feet' |

- In other unstressed syllables, /o/ becomes [a] (Belarusian and some Russian dialects) or [ə] (Standard Russian).

| | | |
|---|---|---|
| /góroda/ | becomes | [gɔrədə] 'of the city' (Standard Russian) |
| /gorodá/ | becomes | [gərədá] 'cities' |

# Phonemic vs. phonetic spelling

## Different choices for spelling in Russian and Belarusian

| | **Russian** | | **Belarusian** | |
|---|---|---|---|---|
| | sg. | pl. | sg. | pl. |
| ‘foot’ | noga | nogi | naga | nogi |
| ‘table’ | stol | stoly | stol | staly |
| ‘window’ | okno | okna | akno | vokny |
| ‘city’ | gorod | goroda | gorad | garady |

(Using roman transcriptions of the Cyrillic script)

- Russian chooses to use phonemic spelling, and Belarusian chooses to use phonetic spelling of the same words.

# Phonemic vs. phonetic spelling

## German final devoicing

| | | | | |
|---|---|---|---|---|
| [haːp] | hab | [haːbən] | haben | ‘to have’ |
| [huːp] | hup | [huːpən] | hupen | ‘to sound the horn’ |
| [veːʁt] | werd | [veːʁdən] | werden | ‘to become’ |
| [veːʁt] | wert | [veːʁtən] | werten | ‘to value’ |
| [zink] | sing | [zingən] | singen | ‘to sing’ |
| [zink] | sink | [zinkən] | sinken | ‘to sink’ |

- German chooses to use phonemic spelling here.

# Phonemic vs. phonetic spelling

## Turkish final devoicing

| | | |
|---|---|---|
| ‘rope’ | [ip] ip | [ipi] ipi |
| ‘reason’ | [sebep] sebe**p** | [sebebi] sebe**b**i |
| ‘bunch’ | [demet] demet | [demeti] demeti |
| ‘Ahmed’ | [ahmet] ahme**t** | [ahmedi] ahme**d**i |
| ‘color’ | [renk] ren**k** | [rengi] ren**g**i |
| ‘pilot’ | [pilot] pilot | [pilotu] pilotu |
| ‘wolf’ | [kurt] kur**t** | [kurdu] kur**d**u |

- Turkish chooses to use phonetic spelling here.

# Phonemic vs. phonetic spelling

## English trisyllabic laxing

**Trisyllabic laxing**: *tense* vowels (long vowels or diphthongs) become *lax* (short monophthongs) in words when followed by two syllables, the first syllable of which is unstressed.

| | | | |
|---|---|---|---|
| insane | ɪnsejn | insanity | ɪnsænəɾij |
| grave | grejv | gravity | grævəɾij |
| serene | səɾijn | serenity | serɛnəɾij |
| divine | dəvajn | divinity | dəvɪnəɾij |
| facile | fæsajl | facility | fæsɪləɾij |

Not just about *-ity*:

- contrite — contrition
- mendacious — mendacity

# English spelling

## Poem by Gerald Nolst Trenite (1870-1946)

**Dearest creature in creation,**
**Study English pronunciation.**
**I will teach you in my verse**
**Sounds like corpse, corps, horse, and worse.**
**I will keep you, Suzy, busy,**
**Make your head with heat grow dizzy.**
**Tear in eye, your dress will tear.**
**So shall I! Oh hear my prayer.**

# English spelling

## Poem by Gerald Nolst Trenite (1870-1946)

**Just compare heart, beard, and heard,**
**Dies and diet, lord and word,**
**Sword and sward, retain and Britain.**
**(Mind the latter, how it's written.)**
**Now I surely will not plague you**
**With such words as plaque and ague.**
**But be careful how you speak:**
**Say break and steak, but bleak and streak;**
**Cloven, oven, how and low,**
**Script, receipt, show, poem, and toe.**

# English spelling

## Poem by Gerald Nolst Trenite (1870-1946)

**... this goes on for a while longer, but you get the point...**

**Finally, which rhymes with enough—**
**Though, through, plough, or dough, or cough?**
**Hiccough has the sound of cup.**
**My advice is to give it up!!!**

# English spelling

## But maybe it's not all that bad after all?

**Can you pronounce these words?**

The balistanicacious pressure device

It was simply clantific, as she liked to say.

Dr. Harriglon will see you to your room.

Would you some more gartiletti! I made them myself from free-range Wookies.

"And now, the tranya."
— from the (original series) Star Trek episode
*The Corbomite Maneuver*

# English spelling

## But maybe it's not all that bad after all?

**Hi!**
**My name is Tony**

**Hi!**
**My name is Toni**

# English spelling

## But maybe it's not all that bad after all?

**Hi!**
**My name is Andy**

**Hi!**
**My name is Andi**

# English spelling

## But maybe it's not all that bad after all?

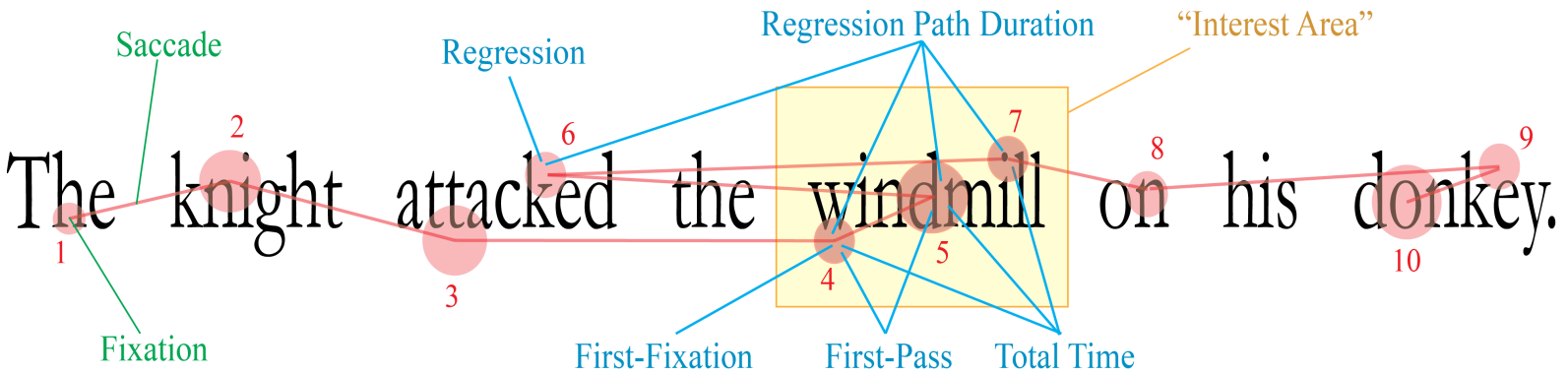
**Hi!**
**My name is Bobby**

**Hi!**
**My name is Bobbi**

# Reading

## How fluent reading works

- Reading involves two processes: short, rapid eye-movements (*saccades*) intermingled with short stops (*fixations*).
- Studies show that we don't fixate on every word, and that occasionally we go back to re-examine text we've already read (*regressions*), if we didn't fully understand it the first time.



# Reading

Aoccdrnig to a rseearch sduty at Cmabrigde Uinervtisy, it deosn't mttaer in waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht the frist and lsat ltteer be in the rghit pclae. The rset can be a toatl mses and you can sitll raed it wouthit porbelm. Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe.

# Reading

## How fluent reading works

- Reading is routed through phonology: a “voice in the head”. Some evidence:
  - Tongue twisters take longer to read than non-tongue twisters... even in Chinese!
  - The ability of deaf speakers to read oral languages such as English correlates with their degree of phonological knowledge.
  - In normal reading in an alphabetic system, every letter is scanned and processed, though we do “error correct”...

# Reading

## How fluent reading works

- Exceptions are flagged and processed in a special way.
- "Acquired dyslexia" after brain damage may impair "decoding" (reading of regular spellings) but spare exceptions — or vice versa.

  *have* vs. *cave*

  - **Deep dyslexia**
    hæv vs. "I don't know" or guessing
    (also: can't read non-words: stumped by *bave*)
  - **Surface dyslexia**
    hejv vs. kejv
    (can read non-words, but reads irregulars phonetically)

- Indicates differences in how they are stored in the lexicon!

# For next time. . .

- **Next Wednesday: midterm!**
- Topics: phonetics, phonology, morphology.
- Monday's lecture will be a review session.
- Practice questions for the midterm have been posted on MyCourses. Try to solve before Friday's conference.