

**Have some beautiful art**



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# **Phonology: The Sound Patterns of Language are really, really awesome**

**Matt Zaslansky - LIGN 101**

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## **Today's Plan**

- Signed language Phonology
  - Syllables are fun
  - Phonotactics
  - Phonology Q/A
  - Language Background
- 

## **Signed Language Phonology**

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### **Phonology isn't just for spoken languages**

- Signed languages have phonology too!

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## Signed languages have parameters

- Handshape
  - Orientation
  - Movement
  - Location
  - Expression
- 

## All of these parameters can participate in rules and natural classes

- They act just like phonetic features (e.g. velar, voiced, stop, fricative)
  - Assimilation/Dissimilation/Epenthesis/Deletion of gestures
  - Similar approaches to rule-writing can describe the process
    - Feature -> Variant / [context]\_
  - The *exact same* principles and approaches apply
  - Minimal pairs are also a thing!
- 

## MOTHER - FATHER



ASL GIFs courtesy of Dr. Bill Vicars at <http://www.lifeprint.com> (<http://www.lifeprint.com>)

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## WHITE - LIKE



## PAPER - CHEESE



### There is one big difference!

- Parameters in sign are often Simultaneous
    - Spoken language is mostly sequential, with sequences of sounds
  - Signed language involves many simultaneous parameters affecting one another
  - This leads to interesting dimensionality in interactions
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## Signed language is language

- Damnit
- 

## Syllables

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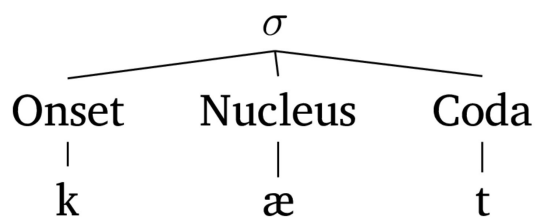
### Syllables seem to be pretty important in some languages

- English is among them.
  - English speakers have an intuitive sense of syllables
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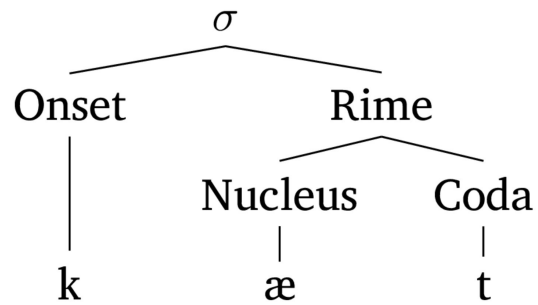
### Let's try

- Under
    - /ʌn.dəʊ/
  - Decoagulate
    - /di.kow.æg.ju.lejt/
  - Antipenultimate
    - /æn.ti.pɛ.nʌl.tɪm.ɪt/
- 

### Linguists break the syllable into three parts



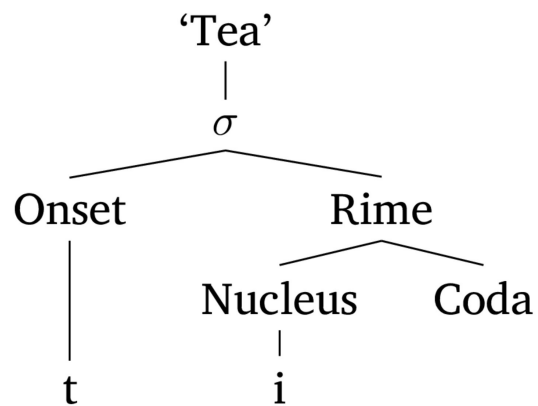
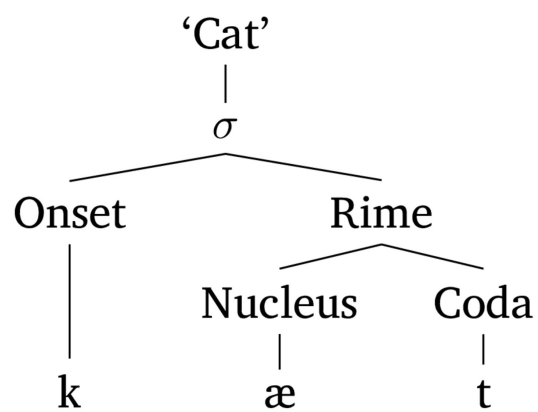
**Linguists break the syllable into three parts**

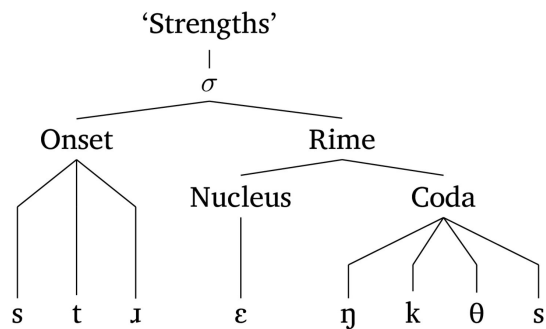
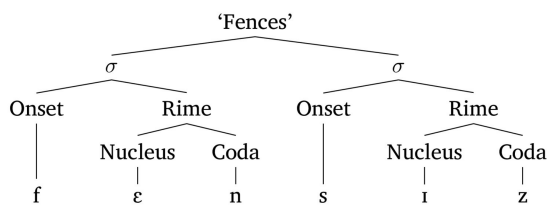
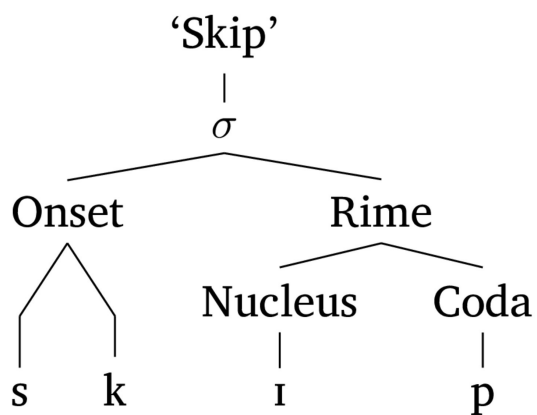
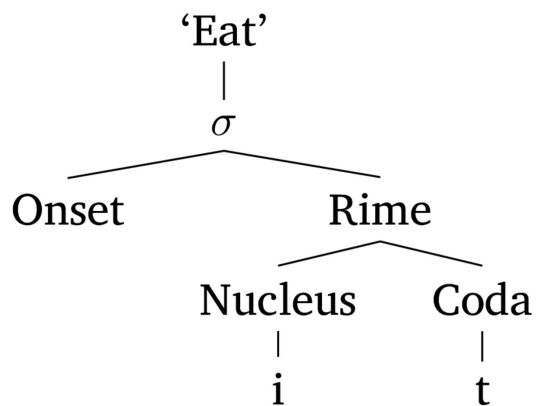


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**Let's look at some syllables**

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## Phonological rules will often reference syllables

- English /l/ becomes [ɫ] in the coda position
- /ɛ/ is illegal in words without a coda in English

- Spanish will often re-syllabify words to turn codas into onsets
    - “Van a gritar a las olas” (‘They will yell at the waves’)
  - **So, they’re good to think about!**
- 

**In the word ‘star’, the coda is...**

- A. /st/
  - B. /a/
  - C. /ɹ/
  - D. /aɹ/
  - E. /taɹ/
- 

**In the word ‘star’, the coda is...**

- A. /st/
  - B. /a/
  - C. /ɹ/
  - D. /aɹ/
  - E. /taɹ/
- 

## English Aspiration

- We’ve been ignoring this all quarter
  - But there’s more to /t/ than [t]
- 

|         |         |
|---------|---------|
| wʌt     | skɪn    |
| tʰaɪ    | spun    |
| pʰat    | spat    |
| ɹɛntʰɪŋ | ɹɪstɑɪt |

|        |          |
|--------|----------|
| kʰjubə | pʰakʰɪt  |
| staɪ   | spɪnstəʊ |

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## **/t/ is aspirated at the start of a syllable!**

- ... not just in the onset!
  - So are /p/ and /k/
  - Those sounds share a feature!
  - They're a *natural class*
- 

## **The English [d] is the same sound as the Spanish [t]**

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## **Different languages have different syllable structures**

- This is an important element of...
- 

# **Phonotactics**

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## **Phonotactics**

The study of what sounds and combinations of sounds are 'legal' in a language

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## **Every language has a set of phonemes which are used**

- This is called a language's **Phonemic Inventory**
  - Sometimes 'phonological inventory'
- Every language has one.



- ... and you can find it at **PHOIBLE** (<https://phoible.org/>).

## Pirahã

### Consonants (Pulmonic)

|                     | Bilabial | Labiodental | Dental | Alveolar | Postalveolar | Retroflex | Palatal | Velar | Uvular | Pharyngeal | Glottal |
|---------------------|----------|-------------|--------|----------|--------------|-----------|---------|-------|--------|------------|---------|
| Plosive             | p b      |             | t̪ d̪  | t d      |              | ʈ ɖ       | c ɟ     | k ɡ   | q ɢ    |            | ʔ       |
| Nasal               | m        | ɱ           | n̪     | n        |              | ɳ         | ɲ       | ŋ     | ɴ      |            |         |
| Trill               | ʙ        |             | ʀ      | ʀ        |              |           |         |       | ʁ      |            |         |
| Tap or Flap         |          | v           | ɾ      | ɾ        |              | ɽ         |         |       |        |            |         |
| Fricative           | ɸ β      | f v         | θ ð    | s z      | ʃ ʒ          | ʂ ʐ       | ç ʝ     | x ɣ   | χ ʁ    | ħ ʕ        | h ɦ     |
| Lateral fricative   |          |             |        | ɬ ɮ      |              |           |         |       |        |            |         |
| Approximant         |          | ʋ           |        | ɹ        |              | ɻ         | j       | ɰ     |        |            |         |
| Lateral approximant |          |             | ɭ      | l        |              | ɭ         | ʎ       | ʟ     |        |            |         |

## Hawaiian

### Consonants (Pulmonic)

|                     | Bilabial | Labiodental | Dental | Alveolar | Postalveolar | Retroflex | Palatal | Velar | Uvular | Pharyngeal | Glottal |
|---------------------|----------|-------------|--------|----------|--------------|-----------|---------|-------|--------|------------|---------|
| Plosive             | p b      |             | t̪ d̪  | t d      |              | ʈ ɖ       | c ɟ     | k ɡ   | q ɢ    |            | ʔ       |
| Nasal               | m        | ɱ           | n̪     | n        |              | ɳ         | ɲ       | ŋ     | ɴ      |            |         |
| Trill               | ʙ        |             | ʀ      | ʀ        |              |           |         |       | ʁ      |            |         |
| Tap or Flap         |          | v           | ɾ      | ɾ        |              | ɽ         |         |       |        |            |         |
| Fricative           | ɸ β      | f v         | θ ð    | s z      | ʃ ʒ          | ʂ ʐ       | ç ʝ     | x ɣ   | χ ʁ    | ħ ʕ        | h ɦ     |
| Lateral fricative   |          |             |        | ɬ ɮ      |              |           |         |       |        |            |         |
| Approximant         |          | ʋ           |        | ɹ        |              | ɻ         | j       | ɰ     |        |            |         |
| Lateral approximant |          |             | ɭ      | l        |              | ɭ         | ʎ       | ʟ     |        |            |         |

## Mandarin

### Consonants (Pulmonic)

|                     | Bilabial | Labiodental | Dental | Alveolar | Postalveolar | Retroflex | Palatal | Velar | Uvular | Pharyngeal | Glottal |
|---------------------|----------|-------------|--------|----------|--------------|-----------|---------|-------|--------|------------|---------|
| Plosive             | p b      |             | t̪ d̪  | t d      |              | ʈ ɖ       | c ɟ     | k ɡ   | q ɢ    |            | ʔ       |
| Nasal               | m        | ɱ           | n̪     | n        |              | ɳ         | ɲ       | ŋ     | ɴ      |            |         |
| Trill               | ʙ        |             | ʀ      | ʀ        |              |           |         |       | ʁ      |            |         |
| Tap or Flap         |          | v           | ɾ      | ɾ        |              | ɽ         |         |       |        |            |         |
| Fricative           | ɸ β      | f v         | θ ð    | s z      | ʃ ʒ          | ʂ ʐ       | ç ʝ     | x ɣ   | χ ʁ    | ħ ʕ        | h ɦ     |
| Lateral fricative   |          |             |        | ɬ ɮ      |              |           |         |       |        |            |         |
| Approximant         |          | ʋ           |        | ɹ        |              | ɻ         | j       | ɰ     |        |            |         |
| Lateral approximant |          |             | ɭ      | l        |              | ɭ         | ʎ       | ʟ     |        |            |         |

## Urdu

### Consonants (Pulmonic)

|                     | Bilabial | Labiodental | Dental | Alveolar | Postalveolar | Retroflex | Palatal | Velar | Uvular | Pharyngeal | Glottal |
|---------------------|----------|-------------|--------|----------|--------------|-----------|---------|-------|--------|------------|---------|
| Plosive             | p b      |             | t̪ d̪  | t d      |              | ʈ ɖ       | c ɟ     | k ɡ   | q ɢ    |            | ʔ       |
| Nasal               | m        | ɱ           | n̪     | n        |              | ɳ         | ɲ       | ŋ     | ɴ      |            |         |
| Trill               | ʙ        |             | ʀ      | ʀ        |              |           |         |       | ʁ      |            |         |
| Tap or Flap         |          | v           | ɾ      | ɾ        |              | ɽ         |         |       |        |            |         |
| Fricative           | ɸ β      | f v         | θ ð    | s z      | ʃ ʒ          | ʂ ʐ       | ç ʝ     | x ɣ   | χ ʁ    | ħ ʕ        | h ɦ     |
| Lateral fricative   |          |             |        | ɬ ɮ      |              |           |         |       |        |            |         |
| Approximant         |          | ʋ           |        | ɹ        |              | ɻ         | j       | ɰ     |        |            |         |
| Lateral approximant |          |             | ɭ      | l        |              | ɭ         | ʎ       | ʟ     |        |            |         |

# Malayalam

## Consonants (Pulmonic)

|                     | Bilabial | Labiodental | Dental | Alveolar | Postalveolar | Retroflex | Palatal | Velar | Uvular | Pharyngeal | Glottal |
|---------------------|----------|-------------|--------|----------|--------------|-----------|---------|-------|--------|------------|---------|
| Plosive             | p b      |             | t̪ d̪  | t̪ d̪    |              | ʈ ɖ       | c ɟ     | k ɡ   | q ɢ    |            | ʔ       |
| Nasal               | m        | ɱ           | n̪     | n        |              | ɳ         | ɲ       | ŋ     | ɴ      |            |         |
| Trill               | ʙ        |             | r̪     | r        |              |           |         |       | ʀ      |            |         |
| Tap or Flap         |          | v           | ɾ      | ɽ        |              |           |         |       |        |            |         |
| Fricative           | ɸ β      | f v         | θ ð    | s z      | ʃ ʒ          | ʂ ʐ       | ç ʝ     | x ɣ   | χ ʁ    | ħ ʕ        | h ɦ     |
| Lateral fricative   |          |             |        | ɬ ɮ      |              |           |         |       |        |            |         |
| Approximant         |          | ʋ           |        | ɹ        |              | ɻ         | j       | ɰ     |        |            |         |
| Lateral approximant |          |             | l̪     | l        |              | ɭ         | ʎ       | ʟ     |        |            |         |

## A language's phonological inventory is important!

- It tells you which phonemes are legal to use
- It tells you what the 'options' are when there are alternations
- It will play a big role in your analysis
- It really complicates word borrowings!

## Hawaiian is an Indigenous language of Hawai'i

0:00 / 0:57

Video is from OiwiTV's 'Āha'i 'Ōlelo Ola: 'Ōlelo Hawai'i: A Brief History.  
([https://www.youtube.com/watch?v=G\\_sw5Q4ZyNc&t=76s](https://www.youtube.com/watch?v=G_sw5Q4ZyNc&t=76s)).

## Hawaiian has an atypically small number of consonants

### Consonants (Pulmonic)

|                     | Bilabial | Labiodental | Dental | Alveolar | Postalveolar | Retroflex | Palatal | Velar | Uvular | Pharyngeal | Glottal |
|---------------------|----------|-------------|--------|----------|--------------|-----------|---------|-------|--------|------------|---------|
| Plosive             | p b      |             | t̪ d̪  | t̪ d̪    |              | ʈ ɖ       | c ɟ     | k ɡ   | q ɢ    |            | ʔ       |
| Nasal               | m        | ɱ           | n̪     | n        |              | ɳ         | ɲ       | ŋ     | ɴ      |            |         |
| Trill               | ʙ        |             | r̪     | r        |              |           |         |       | ʀ      |            |         |
| Tap or Flap         |          | v           | ɾ      | ɽ        |              |           |         |       |        |            |         |
| Fricative           | ɸ β      | f v         | θ ð    | s z      | ʃ ʒ          | ʂ ʐ       | ç ʝ     | x ɣ   | χ ʁ    | ħ ʕ        | h ɦ     |
| Lateral fricative   |          |             |        | ɬ ɮ      |              |           |         |       |        |            |         |
| Approximant         |          | ʋ           |        | ɹ        |              | ɻ         | j       | ɰ     |        |            |         |
| Lateral approximant |          |             | l̪     | l        |              | ɭ         | ʎ       | ʟ     |        |            |         |

# How do speakers of Hawaiian borrow words from English?

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| Consonants                        |          | Vowels        |          |
|-----------------------------------|----------|---------------|----------|
| English                           | Hawaiian | English       | Hawaiian |
| m                                 | m        | i, I          | i        |
| n, ŋ                              | n        | e, ɛ          | e        |
| p, b, f                           | p        | æ, a, ʌ, ɔ, ʌ | a        |
| t, d, θ, ð, s, z, ʒ, tʃ, dʒ, k, g | k        | ɔ, o          | o        |
| s, h, ʃ                           | h        | u, ʊ          | u        |
| ʌ                                 | hu       |               |          |
| l, ɹ                              | l        |               |          |
| v, w                              | w        |               |          |

Table 4: Some correspondences between English and Hawaiian sounds in borrowings, adapted from Carr (1951), Pukui and Elbert (1957:xvii), and Schütz (1994:192)

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## Let’s look at some English-to-Hawaiian Borrowings

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### Iniseka

- Insect
- 

### Elepani

- Elephant
- 

### hipa

- Sheep
- 

### kaioke

- Coyote
- 

### Kanakalu

- Kangaroo
- 

### Lakuna

- Raccoon
- 

### Nupepa

- Newspaper
-

## **Mokokaikala**

- Motorcycle
- 

## **Kakalina**

- Gasoline
- 

## **Kelepona**

- Telephone
- 

## **Kolokalaiwa**

- Screwdriver
- 

## **But languages also differ in terms of the combinations they allow**

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### **Phonotactic Constraints dictate what combinations are ‘legal’**

- Some sounds can’t happen at the start or end of words
  - Some sound combinations can’t happen
  - Some syllable structures are favored or prevented
- 

### **English has some weird phonotactic constraints**

- End a word with a pronounced /h/ (“Bah”)
  - Say the /ŋ/ in “ring” at the start of a word. (“Ngöndro”)
  - End a word with the vowel in “bet” or “book”. (“Saké”)
  - English has “s”, “k”, “v”, but say “Moskva”
- 

### **So do other languages**

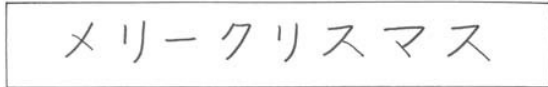
- ... and these come into play when we’re borrowing words
  - Languages adapt words to fit their phonotactic constraints when borrowing.
-

## Japanese requires all syllables to be CV

- This means that borrowing from English (which has no such constraint) is complicated
- 

### Japanese

*Japonic - Japan*



‘Merry Christmas’ - merii kurisumasu

0:00 / 0:01

(Image and Sound Credit (<http://japanese.about.com/library/blqow33.htm>))

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## Some languages allow more complexity in syllables

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### English

- ‘Sixths’ [sɪksθs]
    - CVCCCC
  - ‘Strengths’ [stɹɛŋkθs]
    - CCCVCCCC
- 

### Russian

- ‘Glance’ - взгляд (/vzglʲat/)
    - CCCVC syllable
  - ‘Of Construction’ - строительств (/strʌ'jitɕɪstf/)
    - CCCVCVCVCCCC
- 

### Czech

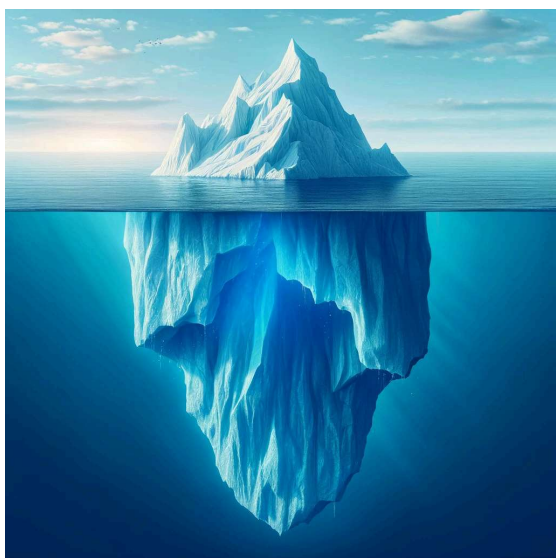
- Strč prst skrz krk - ‘Stick your finger down your throat’

- CCCC CCCC CCCC CCC
- 

## English

- 'Able' [ejbəl]
    - V CC
  - 'Fun and games' [fʌn ɪ geɪmz]
    - CVC C CVCC
- 

## This is just scratching the surface of phonology



## LIGNering Questions in Phonology?

Phonology, phoneme, allophone, complimentary Distribution, Contrastive Distribution, Phonological rule, Natural Class, Minimal Pair, Insertion/Epenthesis, Deletion, Phonotactic Constraint, Syllable, Onset, Coda, Nucleus, Rhyme/Rime

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**LIGN 111 is where you'll go for more of this!**



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**A person's 'accent' is often guided by the phonology of the languages in their language background**

- Wait, what is that?

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## **Language Background**

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**Let's think about language background a bit more**

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### **“L1” vs. “L2” shorthand**

- L1 is a 'native' language which you've learned well, generally as a child or young adult
- L2 is an 'acquired' language which you didn't grow up speaking, but have acquired later on
  - Many levels of fluency are possible
- 'Heritage Speakers' have learned a language informally through exposure at home or from relatives, but may never have learned in school or spoken extensively outside the home
  - Many levels of fluency are possible

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### **The 'Native Speaker' problem**

- What exactly is a 'native speaker' of a language?
- Where does this leave bilinguals?

- What about people who learned English as L2, but have used it more than their L1 in their lifetimes?
  - What about heritage speakers?
  - See Cheng et al. 2022 for more discussion of this issue  
(<https://www.frontiersin.org/articles/10.3389/fpsyg.2021.715843/full>)
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## **More useful ways to think about language background**

- Which language(s) did you learn first?
  - Which language(s) do you use most often?
  - Which language(s) do you feel conversationally fluent in?
  - Which language(s) do you have grammatical intuitions in?
  - Which language(s) would you prefer to use in a given context?
  - Which language(s) do you identify with, or feel an allegiance towards?
- 

## **Language background is complicated**

- Every person has a rich language background
  - This is important to consider as we do linguistic work
  - ... and trying to compact it down to one dimension or 'term' isn't a great plan!
- 

## **Next time**

- We'll dive into how words work
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Thank you!