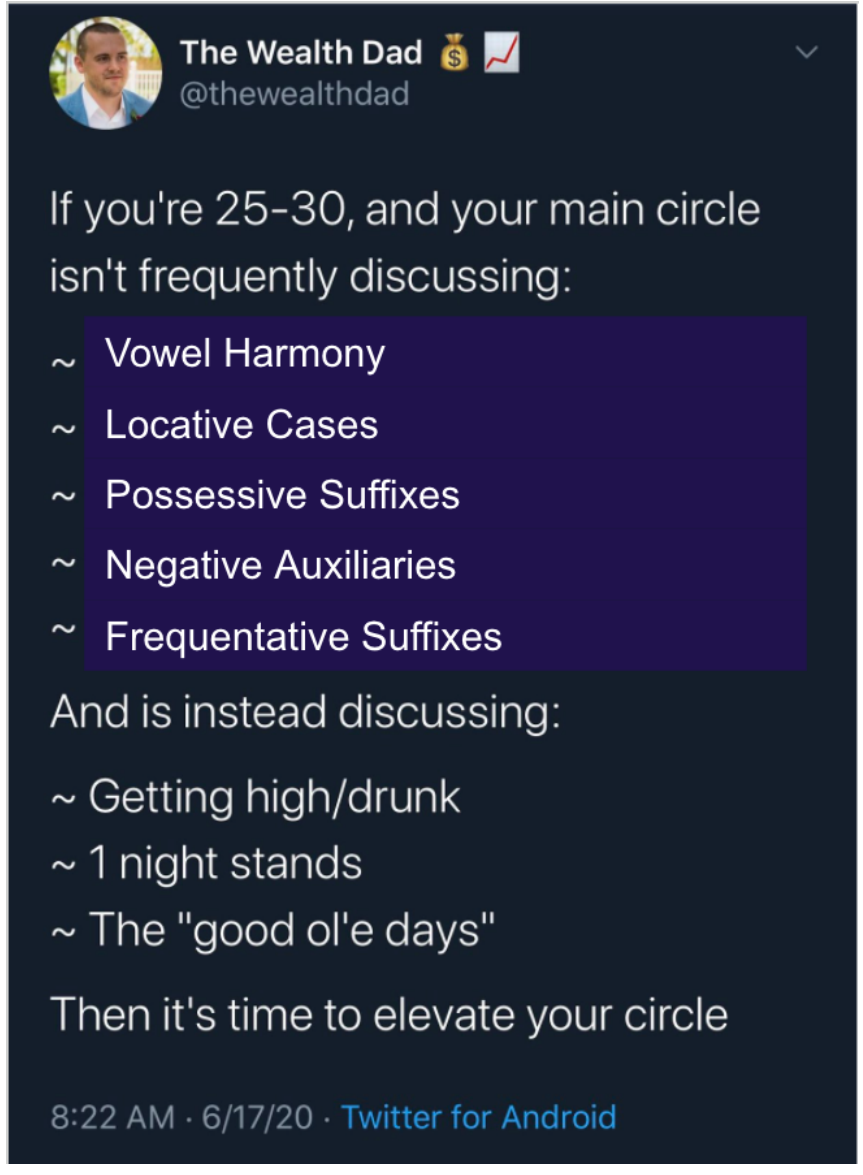
The Wealth Dad 💰📈
@thewealthdad
If you're 25-30, and your main circle isn't frequently discussing:
~ Vowel Harmony
~ Locative Cases
~ Possessive Suffixes
~ Negative Auxiliaries
~ Frequentative Suffixes
And is instead discussing:
~ Getting high/drunk
~ 1 night stands
~ The "good ol'e days"
Then it's time to elevate your circle
8:22 AM · 6/17/20 · Twitter for Android

Me

Ponrawee Prasertsom [pʰonráwi: pràsɤ̀ːtsǒm]

- M.A. student of linguistics at Chulalongkorn University
- Going to study at Centre for Language Evolution, University of Edinburgh (hopefully!)

Morpheme

- Morphology is the study of words and their structures
- Words in languages are formed by combining **MORPHEMES**
- Morphemes are the *smallest meaningful* units.
- These are all morphemes:
  - ไก่ (Thai)
  - *pig* (English)
  - *re-* (English)
  - *=ni/に* (Japanese)
  - *jan/जन्* (Sanskrit)

Morpheme-to-word ratio

- Isolating = Low ratio ~ 1:1 (Thai)

> ฉัน อยาก จะ ไป เที่ยว
> 1SG want IRR go travel
> 'I want to travel.'

- Synthetic = Mid-range ratio (Japanese)

> *Tarou-tachi = wa* *gohan = o* *tabe-mashita*
> Taro-ASSOC = TOP rice = ACC eat-POLITE:PFV
> 'Taro and his group ate rice.'

- Polysynthetic = High ratio (Central Yup'ik) ← IOL loves this type.

> *tuntu-ssur-qatar-ni-ksaite-ngqiggte-uq*
> reindeer-hunt-FUT-say-NEG-again-3SG.IND
> 'He had not yet said again that he was going to hunt reindeer.'

Making words from morphemes

- Affixation
  - Prefix: *‹me-›muni* 1PL.EXCL.SUBJ-drink ‘(We) drink.’ (Lewo)
  - Suffix: *lil‹-its›* cry-CAUS ‘make (sb) cry.’ (Chichewa)
  - Circumfix: *ke-›besar‹-an* NMLZ-huge-NMLZ ‘hugeness’ (Malay)
  - Infix: *k‹-amn-›aət* born:NMLZ ‘birth’ (Khmer)
- Compounding: *demir* road + *yol-u* iron-POSS → *demiryolu* ‘railway (lit. road of iron)’ (Turkish)
- Base modification: *káʔba* ‘filth’ → *káʔbá* filth:ADJLZ ‘filthy’ (Chalcatongo Mictec)
- Reduplication
  - Full reduplication: แดง → แดงๆ ‘kind of red’ (Thai)
  - Partial reduplication: *kuk* → ***kuk-uk*** bark-PROG ‘be barking’ (Mangap-Mbula)
  - “Duplifix”: *jid* → ***jid-ad*** street-PL ‘streets’ (Somali)

Discontinuous morphology

- Morphemes are usually combined in a (superficially) linear fashion.
  - *nat-* (root) → *nat-ion* → *nat-ion-al* → *nat-ion-al-ity* → *nat-ion-al-iti-es* (English)
- ... But Semitic languages such as Arabic, Amharic, Hebrew and Maltese have **CONSONANTAL ROOTS** (usually 3) and **TRANSFIXES**.

IOL 2003, Problem 2: Arabic Arithmetic

$tumn + tumnēn = talatt\ itmān$

$saba\text{ʕ}t\ itlāt + suds = \text{ʕ}ašart\ irbā\text{ʕ}$

$tus\text{ʕ}ēn + tus\text{ʕ} = sudsēn$

$xamast\ ixmās + sub\text{ʕ} = tamant\ isbā\text{ʕ}$

$sub\text{ʕ}ēn + xumsēn = \frac{24}{35}$

All words and sums are fractions. Words and sums' numerators and denominators ≤ 10 and there is no $\frac{x}{1}$.

IOL 2003, Problem 2: Arabic Arithmetic

tumn + *tumnēn* = *talatt itmān*
sabaʕt itlāt + *suds* = *ʕašart irbāʕ*
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All words and sums are fractions. Words and sums' numerators and denominators ≤ 10 and there is no $\frac{x}{1}$.

Roots

1. t-m-n
2. t-l-t
3. s-b-ʕ
4. s-d-s
5. ʕ-š-r
6. r-b-ʕ
7. t-s-ʕ
8. x-m-s

Transfixes

1. Ø-u-Ø-Ø
2. Ø-u-Ø-ēn
3. Ø-a-a-t
4. i-Ø-ā-Ø

IOL 2003, Problem 2: Arabic Arithmetic

tumn + tumnēn = talatt itmān

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xamast ixmās + subʕ = tamant isbāʕ

subʕēn + xumsēn = $\frac{24}{35}$

All words and sums are fractions. **Words and sums' numerators and denominators ≤ 10 and there is no** $\frac{x}{1}$**.**

All denoms ≤ 10

∴ subʕēn, xumsēn denoms = 5 and 7.

∴ {subʕēn, xumsēn} = $\{\frac{2}{5}, \frac{2}{7}\}$

∴ Ø-u-Ø-ēn = $\frac{2}{\text{root}}$

{s-b-ʕ, x-m-s} = {5, 7}

∴ Transfixes = $\frac{x}{\text{root}}$

IOL 2003, Problem 2: Arabic Arithmetic

tumn + tumnēn = talatt itmān
sabaʕt itlāt + suds = ʕašart irbāʕ
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subʕēn + xumsēn $= \frac{24}{35}$

All words and sums are fractions. Words and sums' numerators and denominators ≤ 10 and there is no $\frac{x}{1}$.

$$\frac{\text{Ø-u-Ø-Ø}+2}{\text{t-s-ʕ}} = \frac{2}{\text{s-d-s}}$$

- Consider constraints
- Assume integer roots
- Assume unique words for integers

We get

- Ø-u-Ø-Ø = $\frac{1}{\text{root}}$
- t-s-ʕ = 6 or 9
- s-d-s = 4 or 6

IOL 2003, Problem 2: Arabic Arithmetic

tumn + tumnēn = talatt itmān
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subʕēn + xumsēn $= \frac{24}{35}$

All words and sums are fractions. Words and sums' numerators and denominators ≤ 10 and there is no $\frac{x}{1}$.

We know that:

- Ø-u-Ø-Ø = $\frac{1}{\text{root}}$
- Ø-u-Ø-ēn = $\frac{2}{\text{root}}$

$$\frac{\text{Ø-u-Ø-Ø+Ø-u-Ø-ēn}}{\text{t-m-n}} = \frac{1+2}{\text{t-m-n}} = \frac{\text{t-l-t}}{\text{t-m-n}}$$

∴ t-l-t = 3

Observe that Ø-a-a-t always occurs with i-Ø-ā-n, and all the remaining fractions have them:

∴ 1a1a1t i22ā2n = $\frac{1\text{-}1\text{-}1}{2\text{-}2\text{-}2}$

... when 1-1-1 > 2

IOL 2003, Problem 2: Arabic Arithmetic

tumn + tumnēn = talatt itmān
sabaʕt itlāt + suds = ʕašart irbāʕ
tusʕēn + tusʕ = sudsēn
xamast ixmās + subʕ = tamant isbāʕ
subʕēn + xumsēn $= \frac{24}{35}$

All words and sums are fractions. Words and sums' numerators and denominators ≤ 10 and there is no $\frac{x}{1}$.

$$\frac{\text{x-m-s}}{\text{x-m-s}} + \frac{1}{\text{s-b-ʕ}} = \frac{\text{t-m-n}}{\text{s-b-ʕ}}$$

$$\text{s-b-ʕ} + 1 = \text{t-m-n}$$

We know that s-b-ʕ ∈ {5, 7}, so t-m-n ∈ {6, 8}

But we also know that 6 **must** be either t-s-ʕ or s-d-s. So t-m-n cannot be 6.

∴ t-m-n = 8; s-b-ʕ = 7

Because {x-m-s, s-b-ʕ} = {5, 7}
∴ x-m-s = 5

IOL 2003, Problem 2: Arabic Arithmetic

tumn + tumnēn = talatt itmān

sabaʕt itlāt + suds = ʕašart irbāʕ

tusʕēn + tusʕ = sudsēn

xamast ixmās + subʕ = tamant isbāʕ

subʕēn + xumsēn $= \frac{24}{35}$

All words and sums are fractions. Words' and sums' numerators and denominators ≤ 10 and there is no $\frac{x}{1}$.

$$\frac{\text{s-b-ʕ}}{\text{t-l-t}} + \frac{1}{\text{s-d-s}} = \frac{\text{ʕ-š-r}}{\text{r-b-ʕ}}$$

$$\frac{7}{3} + \frac{1}{\text{s-d-s}} = \frac{\text{ʕ-š-r}}{\text{r-b-ʕ}}$$

Because s-d-s ∈ {4, 6}

$$\frac{7}{3} + \frac{1}{\text{s-d-s}} = \frac{7}{3} + \frac{1}{4} = \frac{31}{12}, \text{ or}$$

$$= \frac{7}{3} + \frac{1}{6} = \frac{5}{2} = \frac{10}{4}$$

Given the constraints and integer uniqueness, we get

- s-d-s = 6
- t-s-ʕ = 9
- ʕ-š-r = 10
- r-b-ʕ = 4

IOL 2003, Problem 2: Arabic Arithmetic

tumn + tumnēn = talatt itmān
sabaʕt itlāt + suds = ʕašart irbāʕ
tusʕēn + tusʕ = sudsēn
xamast ixmās + subʕ = tamant isbāʕ
subʕēn + xumsēn $= \frac{24}{35}$

All words and sums are fractions. Words' and sums' numerators and denominators ≤ 10 and there is no $\frac{x}{1}$.

And we're done!

Roots

1. t-m-n = 8
2. t-l-t = 3
3. s-b-ʕ = 7
4. s-d-s = 6
5. ʕ-š-r = 10
6. r-b-ʕ = 4
7. t-s-ʕ = 9
8. x-m-s = 5

Transfixes

1. Ø-u-Ø-Ø $= \frac{1}{\text{root}}$
2. i-Ø-ā-Ø $= \frac{2}{\text{root}}$
3. 1a1a1t 2u22ēn $= \frac{1\text{-}1\text{-}1}{2\text{-}2\text{-}2}$

Derivation and inflection

- **Derivation** = morphological processes that change the *core* meaning of a word
  - *read* → *re-read* (affixation)
  - *dɔ̀* drink → *tɔ* drink:CAUS ‘cause to drink’ (base modification)
- **Inflection** = no change in the core meaning, change in grammatical features
  - *read* → *(he) read-s* (affixation)
  - *paːrʃt̪* bard:NOM:SG:INDF ‘a bard’ → *vaːrʃt̪* bard:GEN:PL:INDF ‘of bards’ (base modification)

Universal!!! 😀:

- Across spoken languages, derivational morphemes are (generally) closer to the root than inflectional ones.
  - *read-er-s* read-NMLZ-PL

UR & SR

- Often, the same morphemes (same meaning) have different forms, changing some sounds:
  - *Buch* ~ *Büch-er* book-PL 'books' (German Umlaut)
  - *kami* 'paper' ~ *ori-gami* fold-paper 'folding paper' (Japanese Rendaku)
- Not random but predictable from sound and word structure, or from the specific words themselves.
  - German Umlaut (simplified): *ü* [y:] occurs in the morpheme when the word is plural, *u* [u:] elsewhere
  - Japanese Rendaku (simplified): *g* [g] at the start of the second morpheme in a compound, when preceded by a vowel; *k* [k] elsewhere

UR & SR: German

- Sometimes it is useful to think of a word and its morphemes as having an "original" form (**underlying representation; UR**), and the derived form (**surface representation; SR**)

Consider the German examples below:

Singular

1. [taːk] 'day:SG'
2. [los] 'lot:SG'
3. [ʔanʁuːf] 'phone.call:SG'
4. [ʔaʁm] arm:SG'
5. [hʊnt] 'dog:SG'
6. [boːt] 'boat:SG'

Plural

1. [taːg-ə] 'day:PL'
2. [loz-ə] 'lot:PL'
3. [ʔanʁuːf-ə] 'phone.call:PL'
4. [ʔaʁm-ə] arm:PL'
5. [hʊnd-ə] 'dog:PL'
6. [boːt-ə] 'boat:PL'

What are the URs (original form)? What is the rule for deriving the SRs?

UR & SR: German

- If the forms of the root are different, the UR is the ones with a final voiced obstruent [g, d, z], if any. (Why choose the voiced variant?)
  - [taːg], [loz], [hund], [ʔaʁm]
- Otherwise, the root's UR is the same as its SR.
  - [ʔanʁuːf], [boːt]

- The rule is:

$$\begin{bmatrix} +\text{consonantal} \\ -\text{sonorant} \end{bmatrix} \rightarrow [-\text{voice}] / \_\_\#$$

where

- $\begin{bmatrix} +\text{consonantal} \\ -\text{sonorant} \end{bmatrix}$ = obstruent consonants
- $[-\text{voice}]$ = voiceless

“All obstruent consonants become voiceless at the end of the word (before pause, #).”

UR & SR: Indonesian

Isolate the prefix common to the words below. What is its UR? What are the rules to derive the SR? (No need for fancy notation.)

Verb stems

1. baʧa
2. ɲaɲi
3. antuk
4. ŋaʧo
5. ʧuʧi
6. lempar
7. pukul
8. masak
9. gambar
10. tulis
11. ʤawab
12. isi

Prefixed forms

1. məmbaʧa
2. məɲaɲi
3. məŋantuk
4. məŋaʧo
5. meɲʧuʧi
6. məlempar
7. məmukul
8. məmasak
9. məŋgambar
10. mənulis
11. məɲʤawab
12. məŋisi

UR & SR: Indonesian

The UR is **məŋ**. The rules are:

- Change the place of articulation of ŋ to be the same as the following consonant

$$\text{ŋ} \rightarrow [\,\alpha\text{place}\,] / \_\_ \begin{bmatrix} +\text{consonantal} \\ \alpha\text{place} \end{bmatrix}$$

- Delete the nasal before a sonorant (n, ŋ, m, l)

$$[\,+\text{nasal}\,] \rightarrow \emptyset / \_\_ \begin{bmatrix} +\text{consonantal} \\ +\text{sonorant} \end{bmatrix}$$

- Delete p, t, k after the nasal

$$\begin{bmatrix} +\text{consonantal} \\ -\text{voice} \\ -\text{delayed release} \end{bmatrix} \rightarrow \emptyset / [\,+\text{nasal}\,] \_\_$$

... where + = morpheme boundaries.

Do these rules have to be ordered? Why?

UR & SR: Indonesian

Why not choose other forms as URs, e.g. **mən, məm, mə** or **məŋ**?

UR & SR: Indonesian

Why not choose other forms as URs, e.g. **mən, məm, mə** or **məɲ**?

Because of cases like these:

- antuk → məŋantuk
- isi → məŋisi

You may have another set of rules. These are fine as long as your rules account for 100% of the data, but there are probably more rules/they are more complicated.

All unpredictable things in the UR:

Posit a UR that has all unpredictable information. In this case, we cannot predict what nasals will occur between vowels, so we put [ŋ] in the UR.

IOL 2004, Problem 5 Chuvash verbs

1.	aman	amant
2.	aptra	
3.	cĕt	çĕter
4.	çit	
5.	čühen	čühe
6.	hupăn	
7.	kaç	
8.	kăvakar	kăvakart
9.	kuç	kuçar
10.	puçtarăn	puçtar
11.	shăn	shănt
12.	taptan	tapta
13.	tupăn	tup
14.	uçăn	uç
15.	ük	üker
16.	vĕre	vĕret
17.	vĕren	vĕrent
18.	vitĕn	vit
19.		kĕrt
20.		pytar

Instructions:

- Fill in the blanks
- Indicate which blanks cannot be filled with certainty (i.e. more than one possible forms).

IOL 2004, Problem 5 Chuvash verbs

1.	**aman**	amant
2.	aptra	
3.	**cĕt**	çĕter
4.	çit	
5.	čühen	**čühe**
6.	hupăn	
7.	kaç	
8.	**kăvakar**	kăvakart
9.	**kuç**	kuçar
10.	puçtarăn	**puçtar**
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14.	uçăn	**uç**
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16.	**vĕre**	vĕret
17.	**vĕren**	vĕrent
18.	vitĕn	**vit**
19.		kĕrt
20.		pytar

The key is just finding the right URs for the stems!

Sometimes the UR is on the left, sometimes on the right.
(Hax: The UR is just the shorter one.)

IOL 2004, Problem 5 Chuvash verbs

1.	aman	amant
2.	aptra	
3.	cĕt	çĕter
4.	çit	
5.	čühen	čühe
6.	hupăn	
7.	kaç	
8.	kăvakar	kăvakart
9.	**kuç**	**kuçar**
10.	**puçtarăn**	**puçtar**
11.	shăn	shănt
12.	taptan	tapta
13.	tupăn	tup
14.	uçăn	uç
15.	ük	üker
16.	vĕre	vĕret
17.	vĕren	vĕrent
18.	vitĕn	vit
19.		kĕrt
20.		pytar

The key is just finding the right URs for the stems!

Sometimes the UR is on the left, sometimes on the right. (Hax: The UR is just the shorter one.)

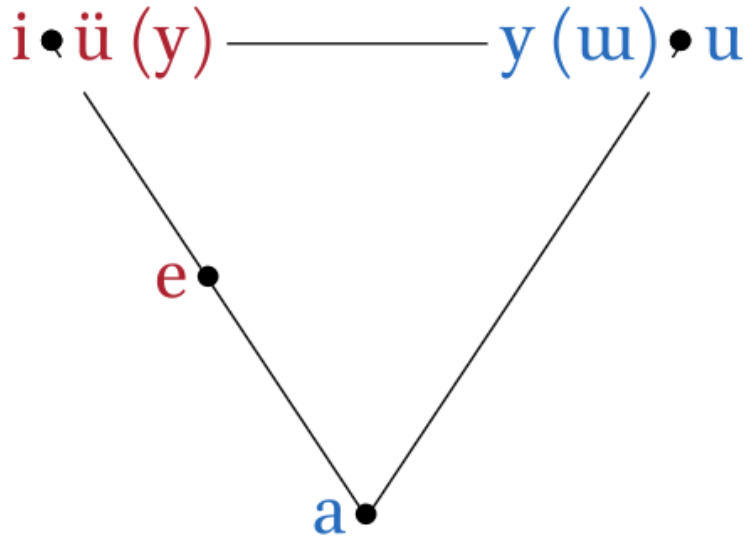
Choosing the wrong UR will result in unpredictability.

IOL 2004, Problem 5 Chuvash verbs

1.	**aman**	1. **aman*t***
2.	aptra	2.
3.	**cĕt**	3. **çĕt*er***
4.	çit	4.
5.	čühen	5. čühe
6.	hupăn	6.
7.	kaç	7.
8.	**kăvakar**	8. **kăvakar*t***
9.	**kuç**	9. **kuç*ar***
10.	puçtarăn	10. puçtar
11.	**shăn**	11. **shăn*t***
12.	taptan	12. tapta
13.	tupăn	13. tup
14.	uçăn	14. uç
15.	**ük**	15. **ük*er***
16.	**vĕre**	16. **vĕre*t***
17.	**vĕren**	17. **vĕren*t***
18.	vitĕn	18. vit
19.		19. kĕrt
20.		20. pytar

For URs on the left side, there are two suffixes:

- -Vr (e or a followed by r), used when the stem ends with an obstruent.
  - The choice of the vowel depends on vowel harmony.



- -t, used when the stem ends with a sonorant (vowels, n, r).

IOL 2004, Problem 5 Chuvash verbs

1.	aman	amant
2.	aptra	
3.	cĕt	çĕter
4.	çit	
5.	**čühe*n***	**čühe**
6.	hupăn	
7.	kaç	
8.	kăvakar	kăvakart
9.	kuç	kuçar
10.	**puçtarăn**	**puçtar**
11.	shăn	shănt
12.	**taptan**	**tapta**
13.	**tupăn**	**tup**
14.	**uçăn**	**uç**
15.	ük	üker
16.	vĕre	vĕret
17.	vĕren	vĕrent
18.	**vitĕn**	**vit**
19.		kĕrt
20.		pytar

For URs on the right side, there is one suffix:

- -(V̆)n (n, might be preceded by ĕ or ă): The vowel is harmonic and is inserted when the stem ends with a consonant.

IOL 2004, Problem 5 Chuvash verbs

1.	aman	amant
2.	aptra	**aptrat**
3.	cĕt	çĕter
4.	çit	**çiter**
5.	čühen	čühe
6.	hupăn	**hup, hupănt**
7.	kaç	**kaçar**
8.	kăvakar	kăvakart
9.	kuç	kuçar
10.	puçtarăn	puçtar
11.	shăn	shănt
12.	taptan	tapta
13.	tupăn	tup
14.	uçăn	uç
15.	ük	üker
16.	vĕre	vĕret
17.	vĕren	vĕrent
18.	vitĕn	vit
19.	**ker, kertĕn**	kĕrt
20.	**pyt, pytarăn**	pytar

We can now fill in the blanks. Some blanks are ambiguous because the data are compatible with the UR on either side.

Notes on how to answer

When you write your answers, you can use formulae, made-up notations (a → b), technical terms (URs, obstruents, sonorants, etc.) and abbreviations (C for consonants, V for vowels, etc.). But you must **define** them in the answers.

Next module is **grammatical features**. Have fun!