



# The chronology and environments of *\*wr* > *\*rw* metathesis

Arbeitstagung of the Indogermanische Gesellschaft

John Clayton | [jclayton@humnet.ucla.edu](mailto:jclayton@humnet.ucla.edu)

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# Plan of the talk

- ▶ Introduction: The problems of  $*wr > *rw$  metathesis
  - Overview of the data
  - Goals of this presentation
- ▶ Survey the evidence for  $*wr > *rw$  metatheses in the Indo-European
- ▶ The issues with the Hittite data
- ▶ An articulatory account for  $*wr > *rw$  metatheses
- ▶ Conclusions



## Overview of the problem & data

- Already in *Brugmann*<sup>2</sup> I: 260–1, original *\*/wr/* was recognized to sporadically metathesize to *\*[rw / ru / rw]* throughout the IE languages:

- (1) a. *\*/k<sup>w</sup>etwr-/* >  $\left\{ \begin{array}{l} *[\text{k}^{\text{w}}(\text{e})\text{tur-}] > \text{Ved. } \textit{catur-}, \text{ Goth. } \textit{fidur-} \\ *[\text{k}^{\text{w}}(\text{e})\text{tru-}] > \text{Av. } \textit{ca\textsuperscript{9}ru-}, \text{ Gaul. } \textit{petru-}, \text{ Lat. } \textit{quadru-} \end{array} \right.$   
 ‘four’
- b. *\*/swek-wr-h<sub>2</sub>/* >  $\left\{ \begin{array}{l} *[\text{swek}\acute{\text{u}}\text{rh}_2] > \text{Gk. } \textit{\acute{\epsilon}\chi\upsilon\rho\acute{\alpha}}, \text{ OArm. } \textit{skesur}, \text{ Alb. } \textit{vje\textsuperscript{h}rr\acute{e}} \\ *[\text{swek}\acute{\text{r}}\acute{\text{u}}\text{h}_2] > \text{Ved. } \textit{\acute{s}va\acute{s}r\acute{u}}, \text{ OCS } \textit{svekry}, \text{ Lat. } \textit{socrus} \end{array} \right.$   
 ‘mother-in-law’
- c. *\*/smók-wr/* >  $\left\{ \begin{array}{l} *[\text{sm}\acute{\text{o}}\text{k}\text{ur}] > \text{Hitt. } \textit{zama(n)kur} \\ *[\text{sm}\acute{\text{o}}\text{k}\text{ru}] > \text{Ved. } \textit{\acute{s}m\acute{a}sru} \end{array} \right.$   
 ‘beard’

- By nature, metatheses are sporadic and subject to morphophonological remodeling.



## Overview of the problem & data

- IE scholarship<sup>1</sup> has accepted and expanded the evidence for these metatheses:
  - Indic: Tedesco (1957), Hoffmann (1980: 94–5), and Clayton (2023: 9–10, 39–99)
  - Tocharian: Del Tomba (2021)

<sup>1</sup>Meillet (1937: 134), Mayrhofer (1986: 161–2), Lubotsky (1994: 98–100), Lipp (2009: I 81–2<sup>232</sup>, II 343–50), Byrd (2015: 143–4), and Fritz & Meier-Brügger (2021: 109)



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**Issue 1** For the environment of this change, most follow Mayrhofer's (1986: 161–2) formulation:

$$(2) \quad *wr > *ru / \text{---} \left\{ \begin{array}{c} C \\ \# \end{array} \right\} \quad (\approx \text{---}]_{\sigma^2})$$

- This analysis ignores  $*wr > *rw / (V)\text{---}V$  and many non-applications of the metathesis.

<sup>1</sup>Meillet (1937: 134), Mayrhofer (1986: 161–2), Lubotsky (1994: 98–100), Lipp (2009: I 81–2<sup>32</sup>, II 343–50), Byrd (2015: 143–4), and Fritz & Meier-Brügger (2021: 109)

<sup>2</sup>Though Lubotsky (1994: 100) tentatively narrows the PIE change to final syllables.



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  - Tocharian: Del Tomba (2021)

**Issue 2** Kloekhorst (2011: 267–9) argues the metathesis postdated and counterfered Weise’s Law:

- (3) Weise’s Law:  $*\acute{K} > *K / \_\_r$  (Weise 1881: 115)
- a.  $*sm\acute{o}k-wr$   $> *sm\acute{o}kru$   $>$  Ved.  $\acute{s}m\acute{a}śru$  ‘beard’ (not  $\dagger sm\acute{a}kru$ )
- b.  $*h_2\acute{e}k-wr$   $> *h_2\acute{e}kru$   $>$  Ved.  $\acute{a}śru$  ‘tear’ (not  $\dagger \acute{a}kru$ )

- Kloekhorst argues the metathesis postdates Anatolian but previously acknowledged some potential Hittite examples of the metathesis (*EDH*: s.vv. *išḫaḫru-*, *kutruḫan-*, *šakuruue/a-<sup>zi</sup>*).

<sup>1</sup>Meillet (1937: 134), Mayrhofer (1986: 161–2), Lubotsky (1994: 98–100), Lipp (2009: I 81–2<sup>32</sup>, II 343–50), Byrd (2015: 143–4), and Fritz & Meier-Brügger (2021: 109)



## Goals of this presentation

**Goal 1** Survey the evidence for  $*wr > *rw$  metatheses in the Indo-European, specifically:

- in what branches the metatheses appear,
- in what environments the metatheses occur,
- what sorts of evidence we accept for the metatheses.

**Goal 2** Problematize the Hittite data for these metatheses.

**Goal 3** Motivate the metatheses via coarticulatory and phonotactic constraints for  $[r]$  &  $[w \sim u]$ .



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### Preview of the findings

- The metatheses likely occurred several times in various different branches.
- The metatheses obeyed the phonotactic principles of the branches where they occurred.
- The metatheses stopped functioning as a repair strategy as languages lost labiovelar  $*/w/$ .



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- ▶ Survey the evidence for  $*wr > *rw$  metatheses in the Indo-European
  - Indo-Iranian
  - Italic & Celtic
  - Balto-Slavic & Germanic
  - Tocharian
  - Greek
  - Albanian & Armenian
  - The interim summary of  $*wr > *rw$  across Indo-European
- ▶ The issues with the Hittite data
- ▶ An articulatory account for  $*wr > *rw$  metatheses
- ▶ Conclusions



## Indic $*wr > *rw$

- The metatheses appear most clearly in Indo-Iranian and particularly Indic data.
- A major locus for the metatheses are the strong stems of the  $*-wr/_wen$ -heteroclitics:

(4)  $*smók-wr$  > Ved.  $śmáśru-$  ‘beard’

(5)  $**h_2ék-wr$  > Ved.  $ásru-$  ‘tear’

(6)  $*snéh_1-wr$  > MIA  $*snāru-$  > Pā.  $nhāru$  ‘sinew’

(Tedesco 1957)

cf.  $*sneh_1-wén-$  » Ved.  $snāvan-/snāván-$  ‘id.’

cf. Av.  $snāuuar$  ‘id.’

(7)  $*déh_3-wr$  »  $dāru-$  ‘liberal’ (P 3.2.159)

a.  $*pro-deh_3-wr$  > Pras.  $pyōrū$  ‘gift’

(CDIAL: #8661)

cf.  $*deh_3-wén-$  » Ved.  $dāvāne$ , Gk.  $δοῦναι$ , Cyp.  $to-we-na-i$  ‘to give’



## Indic blocking environments for the metatheses

- Not all *\*wr* undergo metathesis. Several (Indic-specific) environments prevent metathesis:

(8)	a. <i>r</i> __:	<i>*pér-wṛ</i>	> <i>páruṛ</i>	not † <i>párru</i>	‘joint’
	b. <i>n</i> __:	<i>*dhén-wṛ</i>	> <i>dhánur</i>	not † <i>dhánru</i>	‘bow’
	c. <i>VXC</i> __:	<i>*kéh<sub>1</sub>s-wṛ</i>	> <i>sásur</i>	not † <i>sásru</i>	‘command’
	d. <i>r...__</i> : <sup>3</sup>	<i>*ṅ-peri-ghwṛ-to-</i>	> <i>áparihvṛta-</i>	not † <i>áparihruta-</i>	‘unafflicted’
	cf.	<i>*ṅ-ghwṛ-to-</i>	> <i>áhruta-</i>	not † <i>áhvrta-</i>	‘not crooked’

<sup>3</sup>Hoffmann (1980: 94–95) and Lubotsky (1994: 99–100)



## 2 Survey the evidence for \*wr > \*rw metatheses in the Indo-European

### Iranian \*wr > \*rw

- Avestan shows evidence for several classes of \*wr > \*rw:

(9) \*wr > Av. ru / \_\_C:

a. \*k<sup>w</sup>etwr- ‘four-’ > Av. caθru-

(10) \*wr > Av. <sup>u</sup>ruu [r<sup>w</sup>] / #\_\_V: (Bartholomae 1895: 177; Morgenstierne 1973: 58–9)

a. \*wreh<sub>1</sub>-tó- > OAv. <sup>u</sup>ruuāta- [r<sup>w</sup>a:ta-] ‘prayer’ (cf. Gk. ῥητός ‘spoken’)

b. \*wrik<sub>1</sub>-yé- > YAv. <sup>u</sup>ruuisiia- [r<sup>w</sup>isja-] ‘twist, turn’ (cf. OE wrīgian ‘incline’)



## Italic & Celtic \*wr > \*rw

- Italic & Celtic both show evidence for a variety of \*wr > \*rw metatheses:

(11) \*wr > \*ru / \_\_C:

a. \*k<sup>w</sup>(e)twr- ‘four’ > Lat. *quadru-*, Gaul. *petru-*

b. \*swek-wr-h<sub>2</sub>- > \*swekrúh<sub>2</sub>- ‘mother-in-law’

i. » Lat. *socrus*

ii. » PC \*swekrū > OBret. *hweger*, W *chwegr*

(» \*-n-stem)

c. \*\*d<sup>r</sup>k-h<sub>2</sub>ék-wr ‘tear’

i. » OLat. *dacruma*/*dacrīma* > Lat. *lacruma*/*lacrima*

ii. » PC \*dakro- > OIr. *dér*, MW *deigr*

d. ?\*méh<sub>2</sub>-wr-t ‘seasonal’ > \*mārut- > Lat. *Mārt-* ‘Mars’ (cf. Ved. *Māruta-*; Clayton 2022)



## Italic & Celtic \*wr > \*rw

- Italic & Celtic differ in the environments of prevocalic \*wr > \*rw metatheses:

(12) Celtic shows \*wr > \*rw in intervocalic positions:

a. \*táwr̥os ‘bull’ > OIr. *tarb*, OBret. *taruu*, Gaul. *taruos* (cf. Gk. ταῦρος; VKG I: 176)

(13) Latin is not consistent:

a. \*snéh<sub>1</sub>-wr-os > Lat. *nervus* ‘sinew’

b. \*peh<sub>2</sub>w-ró-s > OLat. *parvos* > Lat. *parvus* ‘small’ (cf. Gk. παῦρος)

but: \*táwr̥os ‘bull’ > Lat. *taurus*

- EDL: s.v. taurus explains \*táwr̥os as a loan from PSem. \*tawr- that postdates the metathesis.
  - This chronology is hard to understand as intervocalic \*wr > \*rw is limited to Italic & Celtic.
  - I instead assume that the metathesis was limited to onset position in Italic:
    - PIt. \*snē.wros > *nervus*, \*pā.wros > *parvos* vs. PIt. \*taw.ros > *taurus*



2 Survey the evidence for *\*wr > \*rw* metatheses in the Indo-European

## Balto-Slavic & Germanic *\*wr > \*rw*

- Balto-Slavic shows *\*wr > \*ru* / \_\_C based on the lexical items *\*swek-wr-h<sub>2</sub>-* & *\*smók-wr*:

(14) *\*swekrúh<sub>2</sub>-* > PSl. *\*svekrý* > OCS *svekrý* ‘mother-in-law’

(15) *\*smókrú-* » PBSl. *\*smákras* > Lith. *smãkras* ‘chin’ (LEW; ALEW: s.v. smãkras)

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- Germanic only indirectly shows \*wr > \*ru / \_\_C in \*swek-wr-h<sub>2</sub>- & \*smók-wr:

(16) \*swekrúh<sub>2</sub>- » PGmc. \*swegrō > Goth. swaíhrō, OE sweger, OHG swigar ‘mother-in-law’

(17) \*smókrú- » PGmc. \*smahrja- > OE smāras ‘lips’ M.PL



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- Within Germanic, onset *\*wr-* sometimes coalesce into [r<sup>w</sup>]:
  - Fisiak (1967) argues that OE ⟨wr⟩ & ⟨wl⟩ were single, velarized phonemes.
  - OFris. shows ⟨rw ~ ru⟩ spellings: *inrweze*, *inruesze* ‘wound’ < PGmc. *\*in-wrak-ja-*



## Tocharian $*wr > *rw$

- Recently, Del Tomba (2021; 2023: 227–30) has plausibly argued for  $*wr > *ru$  in Tocharian:

(18)  $*snéh_1-wr > *šñoru > TB šñor$  ‘sinew’ (vs. TB  $šñaura$  PL  $< *snéh_1-ur-eh_2$ )

(19)  $*kówh_1-r > *koru > TB kor$  ‘throat; cavity’ (cf. Gk.  $κὺαρ$  ‘eye of a needle’  $< *kúh_1r$ )

(20)  $*péh_2-wr > *poru > TB por$  ‘fire’ (cf. Hitt.  $paḥḥur$ )

- Note that the etymology in (19) requires that this metathesis postdate the loss of  $*h_1$ .



## Greek *\*wr > \*rw*

- Greek shows a mix of good to mediocre evidence for metatheses:

- (21) *\*\*sed-wr-ye-* > *\*s<sub>2</sub>druyé-* > Hom. ἰδρῦω ‘to seat’ (Vine 1999: 10)  
 cf. *\*sed-wr-* > Skt. *sadru-* ‘sitting, stable’ (P 3.2.159)  
 cf. *\*séd-won-* > Ved. *°sádvān-* ‘sitting’
- (22) *?\*dr̥k̥-h<sub>2</sub>ék̥-wr* ‘eye-bitter’ > *\*drákru-* > Hom. δάκρυ ‘tear’  
 a. If in fact this word was a *\*-wr/wen-* heteroclit (see below).
- (23) *?\*k<sup>w</sup>twr-* > PGk. *\*k<sup>w</sup>tru-* > Hom. τευφάλεια ‘four-horned helmet’  
 a. An old etymology (Fick 1877: 64–5; Schmidt 1881: 46–7; Bechtel 1914: s.v. τευφάλεια)  
 b. But the lack of PIE etymology for φάλος ‘helmet horn’ raises chronological issues.



## Greek $*wr > *rw$

- (24) ?  $\sqrt{*twer-}$  »  $*o-tru-n-yé-$  > Hom. ὀτρύνω ‘hasten, encourage’
- The comparison with Ved. *tvárate* ‘hasten’ is very tempting, but the ὀ- is difficult:
    - Vedic provides no support for an initial  $*h_3-$  (e.g., *átvaranta*; KS)
    - Some<sup>4</sup> assume  $*h_2o-$  ‘neben, bei; zu, hin’ found also in ὀφείλλω ‘increase’.
- (25) ?  $\sqrt{*swerh_2-}$  »  $*sruh_2-$  ‘guard, protect’ (cf. ὀράω ‘see’; Hackstein 2002: 123–31)
- $*sruh_2-$  > Hom. ῥύσθαι,  $*se-sruh_2-$  > Hom. εἴρῥυσθαι
  - But various forms reconstructable as  $\sqrt{*serw-}$  exist:
    - Lat. *servō* ‘protect’, Av. *-ha<sup>u</sup>ruua-* ‘watching, protecting’, OIr. *serb* ‘theft’
    - An innovative pseudo-root  $\sqrt{*serw-}$  must be extracted from  $*sruh_2-$ .
    - Various other roots with the shape  $\sqrt{*ser-}$  &  $\sqrt{*wer-}$  have been reconstructed.

<sup>4</sup>Schwyzler II: 491, GEW<sup>2</sup>: s.v. ὀτραλέως, LIV<sup>2</sup>: s.v.  $*twer-^2$ , and LIPP: II 324+<sup>4</sup>



2 Survey the evidence for  $*wr > *rw$  metatheses in the Indo-European

## Albanian & Armenian $*wr > *rw$

- For Albanian, I know of no clear examples for  $*wr > *rw$  metatheses.



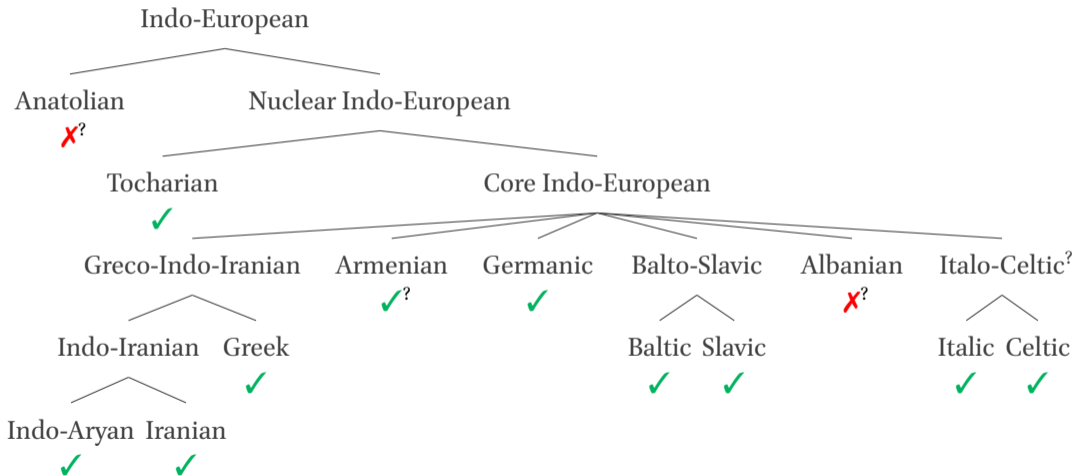
## Albanian & Armenian \*wr > \*rw

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  - For Armenian, Kortlandt (2003) argues a paradigm \*drakur ~ OBL \*drakru- ‘tear’ > \*artasur ~ OBL \*artawru » OArm. artawsr ~ PL artasuk<sup>c</sup>
  - Other Armenian material is less obviously probative:
    - \*#wr- > Arm. *erg-* (e.g., *ergicanem* ‘break’ < \*√wreh<sub>1</sub>ǵ-) may be \*wr- > \*gr- > \*rg- > *erg-*.
    - Perhaps an early loss of labiovelar coarticulation in \*w > Arm. *g* prevented metatheses.
    - There does appear to be a dissimilatory? \*w > ∅ / \_\_rV: (EDAIL: 739–40 with lit.)
- (26) a. \*b<sup>h</sup>réh<sub>1</sub>-wr-os > OArm. *atber* ‘spring’ GEN.SG (cf. *atbewr* < \*b<sup>h</sup>réh<sub>1</sub>-wr)
- b. \*h<sub>2</sub>léh<sub>1</sub>-wr-os > OArm. *aler* ‘flour’ GEN.SG (cf. *alewr* < \*h<sub>2</sub>léh<sub>1</sub>-wr)
- c. \*new-ró-s > OArm. *nor* ‘new’ (cf. Gk. νεαρός ‘young’)



2 Survey the evidence for  $*wr > *rw$  metatheses in the Indo-European

# The interim summary of $*wr > *rw$ across Indo-European





# Plan of the talk

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- ▶ The issues with the Hittite data
  - *kutruwa/en-* ‘witness’
  - *šak(u)ruwe/a-* ‘to water (animals); to slake oneself’
  - *išḫaḫru-* ‘tear’
- ▶ An articulatory account for  $*wr > *rw$  metatheses
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### 3 The issues with the Hittite data

## *kutruwa/en-* ‘witness’

- Carruthers (1933: 151–2) derives this from *\*k<sup>w</sup>twr-én-* ‘the fourth party in a case  $\leadsto$  witness’:
  - Lat. *testis* ‘witness’ < *\*tri-sth<sub>2</sub>-i-* provides an approximate parallel.
  - For Anatolian, the third party (besides the litigants) must be the judge.
    - Eichner (1992: 72–3, 80–2) assumes HLuw. *tara/i-wa/i-n-* ‘judge’ < *\*tri-won-* ‘third’<sup>5</sup>
  - Many accept this idea (Oettinger 1982: 164–5, 174<sup>46</sup>; Rieken 2004: 287; *EDH*: s.v. *kutruḫan-*).<sup>6</sup>
- Yet there are reasons to doubt this etymology:
  - On semantic grounds (Pedersen 1933: 177–9; Benveniste 1962: 110–1; Vanséveren 2019)
  - Hittite otherwise uses the lexical item *\*me(y)u-* ‘four’ (*HED*: s.v. *kutruwa(n)-*).
  - It is difficult to model why *\*/k<sup>w</sup>etwr-én-/* should give *\*[k<sup>w</sup>truwén-]* instead of *\*[k<sup>w</sup>turén-]*.
    - *\*k<sup>w</sup>tru-* is given here as the “compound form”, but this derivation is not compounding.

<sup>5</sup>*Contra* (Giusfredi 2009)

<sup>6</sup>But *contra* Oettinger (1995: 47–8)



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- Better is Pedersen’s connection with Lith. *gudrùs* ‘clever’ < *\*g<sup>(h)</sup>ud<sup>(h)</sup>-ru-s*
  - Terms for ‘witness’ frequently derived from words meaning ‘knowledgeable, canny’:
    - Goth. *weitwōps* < *\*√weyd-*
    - Hung. *tanú*  $\leftarrow$  PTurk. *\*tanu-* ‘to know’
  - The earlier appearance of *gùdras* ‘id.’ (*LED*: s.v. *gudrùs*) is reminiscent of *smākras*  $\ll$  *\*smókru-*.

<sup>5</sup>*Contra* (Giusfredi 2009)

<sup>6</sup>But *contra* Oettinger (1995: 47–8)



## šak(u)ruwe/a- ‘to water (animals); to slake oneself’

- In order to connect this with the thrice attested verb šarakku(i)- ‘to water’<sup>7</sup>,  
AHP: 169–70 and EDH: s.v. šakuruue/a-<sup>zi</sup>, šaraku- follow a dubious etymology:

- (27) a. \*srog<sup>w(h)</sup>-wr-ye- (denominal from unattested \*sróg<sup>w(h)</sup>-wr/um-)  
 b. > \*srog<sup>w(h)</sup>-ru-ye- (\*wr > \*ru metathesis)  
 c. > \*sog<sup>w(h)</sup>-ru-ye- (\*r...r > \*∅...r dissimilation)  
 d. > ša-ku-ru-u-e<sup>7</sup> (intervocalic loss of \*-y-)

- The connection to šarakku(i)- < \*srog<sup>w(h)</sup>- is tenuous and unhelpful:
  - šarakku(i)- has geminate -kk- in 2/3 attestations, whereas šak(u)ruwe/a- is always singleton.
  - šarakku(i)-’s contexts are not semantically clear (CHD Š: s.v. šarak(k)u(i)- has ‘to water(?)’).
  - šarakku(i)- has no further etymology beyond a mechanical Transponat.

<sup>7</sup>Orthographically, MS has ša-ku-ru- [sak<sup>w</sup>ru-] whereas NS has ša-ak-ru- [sakru-].



## šak(u)ruwe/a- ‘to water (animals); to slake oneself’

- In order to connect this with the thrice attested verb šarakku(i)- ‘to water’<sup>7</sup>,  
AHP: 169–70 and EDH: s.v. šakuruwe/a-<sup>zi</sup>, šaraku- follow a dubious etymology:

- (27) a. \*srog<sup>w(h)</sup>-wr-ye- (denominal from unattested \*sróg<sup>w(h)</sup>-wr/ur-)  
 b. > \*srog<sup>w(h)</sup>-ru-ye- (\*wr > \*ru metathesis)  
 c. > \*sog<sup>w(h)</sup>-ru-ye- (\*r...r > \*∅...r dissimilation)  
 d. > ša-ku-ru-u-e-<sup>7</sup> (intervocalic loss of \*-y-)

- The phonological environment for \*wr > \*ru is improbable.
  - The metathesis \*srog<sup>w(h)</sup>-wr- > \*srog<sup>w(h)</sup>-ru- creates an undesirable \*r...r requiring repair.  
cf. \*w<sub>a</sub>r-ór-i > \*w(a)rári > \*w(a)ráni > ú-ra-a-ni/wa-ra-a-ni ‘burns’
- Overall, the etymology remains speculative.

<sup>7</sup>Orthographically, MS has ša-ku-ru- [sak<sup>w</sup>ru-] whereas NS has ša-ak-ru- [sakru-].



## *išḫaḫru-* ‘tear’

- Hitt. *išḫaḫru-* ‘tear’ looks very like various words in Indo-European, including:

(28) a. Ved. *ásru*, YAv. *asrū*<sup>o</sup>

b. Gk. *δάκρυ*

c. TB *akrūna* PL, TA *ākār* ~ *ākrun* PL

d. OLat. *dacruma*/*dacrima* > Lat. *lacruma*/*lacrima*

- The base noun is normally thought to be *\*(dṛk-)h<sub>2</sub>ék-wr/un-* ‘eye-bitter  $\leadsto$  tear’<sup>8</sup>
  - The heteroclitic origin of this word is assumed on the basis of the *-n-* inflection found in Armenian, Tocharian, & Germanic (*inter alia*).
  - Compare semantically *\*séh<sub>2</sub>-wr/un-* ‘sourness’ > Hitt. *šēḫur/n-* ‘urine’

<sup>8</sup>Hamp (1972), Pinault (1997), and Kortlandt (2003). Differently, Oettinger (2009): PIE *\*s-h<sub>2</sub>ék-wr* > PNIE *\*dakru-*.



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- If the Hittite belongs here, a different form  $*sk^w-h_2ék-wr$  >  $*sk^wh_2ékru$  would be preferable:
  - The  $*wr$  >  $ru$  could avoid the similar sequence  $*k^w...k^w$ .
  - As discussed in the next section, similarity avoidance may be a factor in several metatheses.
  - The change  $*k^wh_2...k > ḫ...ḫ$ , however, remains troublesome (EDH: s.vv. *ḫarsar*, *išḫaḫru-*).



# Plan of the talk

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- ▶ The issues with the Hittite data
- ▶ An articulatory account for  $*wr > *rw$  metatheses
  - The articulatory organization of onset and coda  $r$
  - Gestural organization of liquids
  - The articulatory effects on  $*/wr/$
  - The importance of labiovelar  $*w$
- ▶ Conclusions



## The articulatory organization of onset and coda $r$

- How then do we motivate all these metatheses?
- Byrd (2015: 142–3) argues for a sonority hierarchy  $*W \gg *L \gg *N$ . While this may play a part,
  - this explanation only predicts  $*/wL/ \rightarrow *[Lu]$  but not  $*/wL/ \rightarrow *[Lw]$ ,
  - it fails to predict that  $*/wr/ \rightarrow *[ru / rw / r̥w]$  is more common than  $*/wl/ \rightarrow *[lu / lw / l̥w]$ ,
  - and it incorrectly predicts the largely unattested  $*/yL/ \rightarrow *[Li / Ly / l̥y]$ .
- A true explanation should make reference to the specific phonetic features of  $*/w/$  &  $*/r/$ .



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  - this explanation only predicts  $*/wL/ \rightarrow *[\text{Lu}]$  but not  $*/wL/ \rightarrow *[\text{Lw}]$ ,
  - it fails to predict that  $*/wr/ \rightarrow *[\text{ru} / \text{rw} / \text{r}^{\text{h}}\text{w}]$  is more common than  $*/wl/ \rightarrow *[\text{lu} / \text{lw} / \text{l}^{\text{h}}\text{w}]$ ,
  - and it incorrectly predicts the largely unattested  $*/yL/ \rightarrow *[\text{Li} / \text{Ly} / \text{l}^{\text{h}}\text{y}]$ .
- A true explanation should make reference to the specific phonetic features of  $*/w/$  &  $*/r/$ .

### Articulatory account for $*wr > *rw$

- I propose that the frequency of  $*wr > *rw$  is explained by constraints on the overlap of dorsal gestures of  $*/w/$  &  $*/r/$ .<sup>8</sup>
- The metatheses become less likely as languages lose labiovelar articulation of  $*/w/$ .

<sup>8</sup>And to a less extent  $*/l/$ .



## Gestural organization of liquids

- Crosslinguistically, Gick et al. (2006) and Walker & Proctor (2019) have found that liquids and particularly rhotics have variable gesture organization based on syllable position:
  - In addition to the expected tongue-tip gesture, liquids also have a tongue-dorsum gesture.
  - In onsets, the dorsal gesture may occur at the same time or after the tongue-tip gesture.
  - In codas, however, the dorsal gesture normally proceeds the tongue-tip gesture.
    - Coda rhotics tend to show a greater time offset of the dorsal gesture than liquids.



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  - In codas, however, the dorsal gesture normally proceeds the tongue-tip gesture.
    - Coda rhotics tend to show a greater time offset of the dorsal gesture than liquids.
- This asymmetry can have various observable effects crosslinguistically:
  - In the Prātiśākhya,  $r$  is called *jihvā-mūlīya* ‘of the tongue root’, not coronal (*RVP* 1.41; *VP* 1.65).
  - Germanic vowel breaking effects often precede dorsal fricatives and coda liquids.
  - Dorsal liquids may sometimes count as bimoraic (counting the dorsal and tongue-tip gestures separately).



## The articulatory effects on $*/wr/$

- When syllabifying  $*/wr/$  in Indo-European, these gestural conflicts come to a head.
- Before a consonant or word-end, the syllabifications  $[wr_{\sigma\mu\mu}]$  or  $[u_{\mu}r_{\mu\mu}]$  add extra morae.
  - Metathesis to  $[ru_{\mu}]$  repairs this and the additional weight is avoided.
- Furthermore, metathesis may avoid distant  $*[w/K^w...w]$  or  $*[r_{\sigma}...r_{\sigma}]$  similarity.
  - $*/k^w\text{et}wr/ > * [k^w\text{ət}ru]$  avoiding  $*[k^w...w]$
  - $*/swek-wr-h_2/ > * [swekruh_2]$  avoiding  $*[w...w]$
  - $*/derk-h_2\acute{e}k-wr/ > * [d_rkh_2\acute{e}kru]$  avoiding  $*[r_{\sigma}...r_{\sigma}]$
  - $*/sek^w-h_2\acute{e}k-wr/ > * [sk^wh_2\acute{e}kru]$  avoiding  $*[k^w...w]$



## The articulatory effects on $*/wr/$

- When syllabifying  $*/wr/$  in Indo-European, these gestural conflicts come to a head.
- For onset  $*[wr]$ , the dorsal gestures of  $*/w/$  precede the coronal & dorsal gestures of  $*/r/$ .
- Several strategies exist for repairing these unstable  $*[wr]$  onsets:
  - Coalescence of onset  $*[wr] > [r^w]$  allows simultaneous coronal and dorsal gestures.
    - PIE  $*/wr/ > \text{OFris. } \langle rw/ru \rangle [r^w]$
    - PIE  $*/wr/ > \text{Av. } \langle uruu \rangle [r^w]$
  - $*[V.wrV]$  is misperceived as  $*[Vr^w.wV]$ , thinking  $*/w/$ 's dorsal gesture belongs to coda  $*[r^w]$ :
    - PIE  $*/VwrV/ > \text{PC } *[Vr^w.wV]$
    - PIE  $*/VwrV/ > \text{Lat. } [Vr^w.wV]$
- $*/r/$ 's ability to receive labial coarticulation is crucial to both repairs.



## The importance of labiovelar $*w$

- For all of these repairs, the ability for  $*/r/$  to be rounded and for  $*/w/$  to have a dorsal gesture has been crucial for predicting the metatheses and coalescences.
  
- As such, I propose that the loss of labiovelar  $*/w/$  (through conversion to  $*/v/$ ,  $*/v/$ ,  $*/g/$ , or  $\emptyset$ ) acted as a *terminus ante quem* for these metatheses:
  - $*/v/$  &  $*/v/$  do not have dorsal gesture that can interact with a following  $*/r/$ .
  - As an unrounded stop,  $*/g/$  is less likely to have its dorsal feature misperceived beside  $*/r/$ .



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## Conclusions

- This presentation surveyed  $*/wr/ > */rw/$  metatheses across the IE languages.
  - While sharing many environments, they are sensitive to einzelsprachlich phonotactic principles (esp. in Indic, Italic, and Celtic).
  - The metatheses must be considered an available repair at many points in a language's history.
  - Thus, they cannot easily be used for relative chronology for other sound laws like Weise's Law.
- Some tasks remain:
  - Narrowing and modeling the environments that aid and prevent metathesis.
  - Comparing the evidence for metatheses with the preservation of labiovelar  $*/w/$ .
  - Expand this analysis to include the less common  $*/wl/ > */lw/$  metatheses.



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Appendix 1: The case of *\*péh<sub>x</sub>-wr/won-* ‘swelling, fat’

- Clayton (2021, 2023, 2024b) argues that there were even animate adjectives *\*-wr-s* > *-ru-s*.
- The most fleshed out example of this comes from  $\sqrt{peyh_x}$ - ‘to swell, be fat’:

(29) The inflection of *\*péh<sub>x</sub>-wr* ~ *\*píh<sub>x</sub>-won-*:

	M.NOM/ACC.SG	~	M.OBL	~	F
PIE	<i>*péh<sub>x</sub>-wr-</i>	~	<i>*píh<sub>x</sub>-won-</i>	~	<i>*píh<sub>x</sub>-wer-ih<sub>2</sub>-</i>
Ved.	<i>péru-</i>	vs.	<i>pívan-</i>	~	<i>pívarī-</i>
	‘swelling’		‘fat’		

cf. *\*péh<sub>x</sub>-wr* N » *\*píh<sub>x</sub>-wr* > Gk. πῖαρ ‘fat, cream’

cf. *\*píh<sub>x</sub>-wer-ih<sub>2</sub>(-on)-* F > Gk. πῖερα ‘rich, abundant’, > OIr. *íriu* ‘earth, soil’

Appendix 2: Latin examples of onset \*/wr/ > \*/r<sub>2</sub>w/

- Clayton (2024a) argues for some examples of \*/wr/ > \*/r<sub>2</sub>w/:

- (30) a. \*men-wr-eh<sub>2</sub>- > Plt. \*men.wrā > \*menr<sub>2</sub>wā > *Minerva*
- b. \*kát-wr-eh<sub>2</sub>- > Plt. \*kát.wrā > \*kát<sub>r</sub><sub>2</sub>wā > *caterva* '(enemy) band'
- Ved. *sátru-* 'enemy' < \*kát-ru-  
Ved. *sátrūyánt-* 'acting as enemy' < \*kát-ru-h<sub>2</sub>-yónt-
  - NHG *Hader* 'enmity' < MHG *hader* < PGmc. \**hapruz* < \*kát-ru-
  - HLuw. *katun<sup>a</sup>/i-* 'hostility' < \*kát-un-o-
- c. \*pro-pt(h<sub>x</sub>)-wr-os > Plt. \*prop.twros > \*propt<sub>r</sub><sub>2</sub>wos > *proptervus* 'violent; shameless'
- Gr. πτύρομαι 'be scared ⇄ fly' < \*ptuh<sub>x</sub>r-yé- < \*pth<sub>x</sub>-ur-yé-
  - Ved. *pátvan-* 'flying; beating' < \*péth<sub>x</sub>-won-



## Appendix 3: English sesquisyllabicity

- English sesquisyllabicity ( $1\frac{1}{2}$ -syllabicity) is an example of this effect (Lavoie & Cohn 1999):
  - English syllables have maximum weight of  $3\mu$ .
  - Tense vowel & diphthongs count as  $2\mu$ .
  - When followed by a coda liquid, the liquid's dorsal gesture cannot overlap the preceding tense vowel or diphthong's dorsal gesture, requiring repair.

(31)

	[ 1 $\sigma$ ~ 2 $\sigma$ ]		[ 1 $\sigma$ ~ 2 $\sigma$ ]
a.	<i>peer</i> [ p <sup>h</sup> <sub>I</sub> <sub>μ</sub> ·I <sub>μμ</sub> ~ p <sup>h</sup> <sub>i</sub> <sub>μμ</sub> ·I <sub>μμ</sub> ]	<i>peel</i> [ p <sup>h</sup> <sub>I</sub> <sub>μ</sub> ‡ <sub>μμ</sub> ~ p <sup>h</sup> <sub>i</sub> <sub>μμ</sub> ·‡ <sub>μμ</sub> ]	
b.	<i>poor</i> [ p <sup>h</sup> <sub>ʊ</sub> <sub>μ</sub> ·I <sub>μμ</sub> ~ p <sup>h</sup> <sub>u</sub> <sub>μμ</sub> ·I <sub>μμ</sub> ]	<i>pool</i> [ p <sup>h</sup> <sub>ʊ</sub> <sub>μ</sub> ‡ <sub>μμ</sub> ~ p <sup>h</sup> <sub>u</sub> <sub>μμ</sub> ·‡ <sub>μμ</sub> ]	
c.	<i>pyre</i> [ p <sup>h</sup> <sub>a</sub> <sub>μ</sub> ·I <sub>μμ</sub> ~ p <sup>h</sup> <sub>aɪ</sub> <sub>μμ</sub> ·I <sub>μμ</sub> ]	<i>pile</i> [ p <sup>h</sup> <sub>a</sub> <sub>μ</sub> ‡ <sub>μμ</sub> ~ p <sup>h</sup> <sub>aɪ</sub> <sub>μμ</sub> ·‡ <sub>μμ</sub> ]	
d.	<i>pair</i> [ p <sup>h</sup> <sub>ε</sub> <sub>μ</sub> ·I <sub>μμ</sub> ~ p <sup>h</sup> <sub>eɪ</sub> <sub>μμ</sub> ·I <sub>μμ</sub> ]	<i>pale</i> [ p <sup>h</sup> <sub>ε</sub> <sub>μ</sub> ‡ <sub>μμ</sub> ~ p <sup>h</sup> <sub>eɪ</sub> <sub>μμ</sub> ·‡ <sub>μμ</sub> ]	
e.	<i>pore</i> [ p <sup>h</sup> <sub>ɔ</sub> <sub>μ</sub> ·I <sub>μμ</sub> ~ p <sup>h</sup> <sub>oʊ</sub> <sub>μμ</sub> ·I <sub>μμ</sub> ]	<i>pole</i> [ p <sup>h</sup> <sub>ɔ</sub> <sub>μ</sub> ‡ <sub>μμ</sub> ~ p <sup>h</sup> <sub>oʊ</sub> <sub>μμ</sub> ·‡ <sub>μμ</sub> ]	