To Achieve Harmony We Only Need One Tier

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My goal

- Several TSL grammars are needed to capture several long-distance phonological dependencies.
- For a single vowel harmony, only one tier is enough.
- There are double vowel harmonies, where primary and secondary features are being spread.
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One tier is always enough!

Outline

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Tier-based Strictly Local grammars capture non-local dependencies in a local fashion by projecting elements of a certain type on a *tier*.

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tense:	èsìsòn	‘smoke’	lèjìmə̀	‘matriclan’
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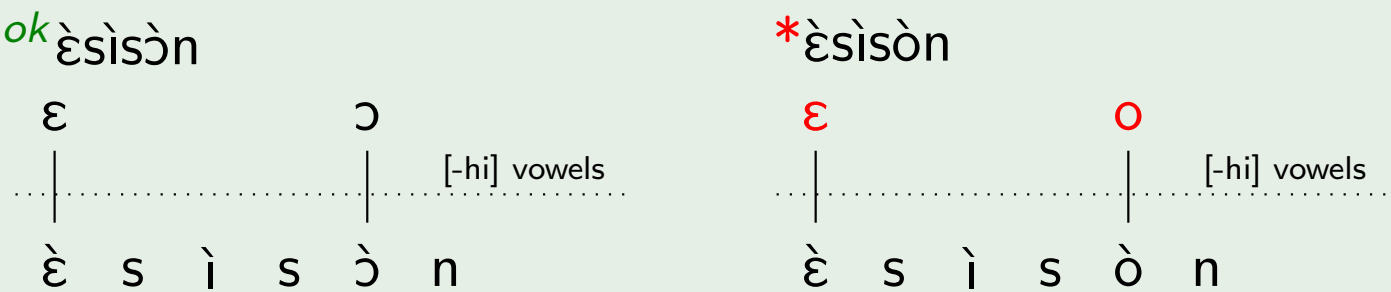

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- We expect to need a separate tier for secondary harmonies.
- Is it true?

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Secondary harmony: Buryat [cont.]

- Tier $T = \{$a, e, ɔ, o, ʊ, u$\}$
- Primary: all vowels harmonize in ATR.
- No *$V_{\alpha ATR} V_{-\alpha ATR}$ bigrams
  $H_{ATR} = \{$*ɔo, *oɔ, *ʊu, *uʊ, *ae, *ea, *ʊo, *oʊ, *ʊe, *eʊ, *ɔu, *uɔ, *ɔe, *eɔ, *oa, *ao, *au, *ua$\}$

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- Secondary: non-high vowels harmonize in rounding, high vowels are blockers: rounded non-high vowels can either occur in the first syllable, or be licensed by harmony.
- No *$V^{-hi}_{\alpha round}V^{-hi}_{-\alpha round}$ and *$V^{+hi}V^{-hi}_{+round}$ bigrams
  $H_{round} = \{$*ɔa, *aɔ, *eo, *oe, *ʊɔ, *uo$\}$

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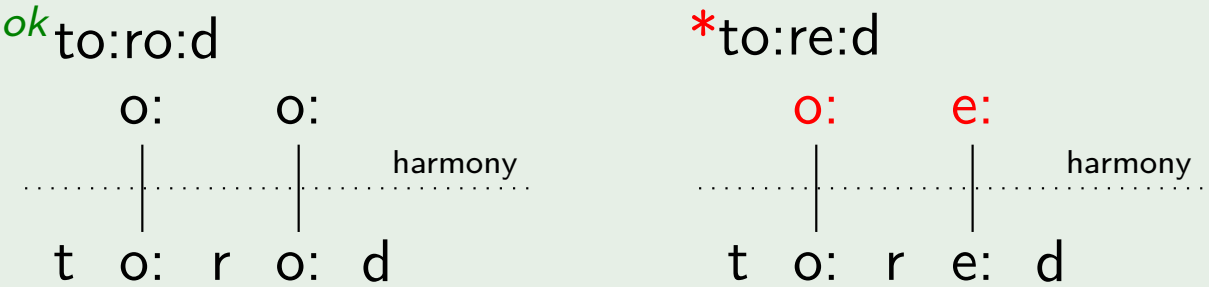

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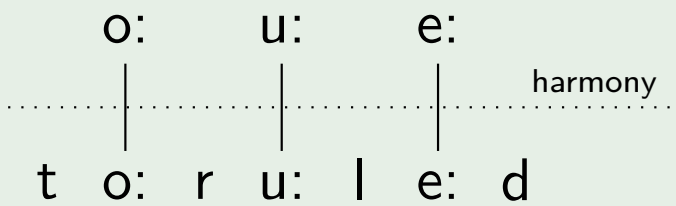

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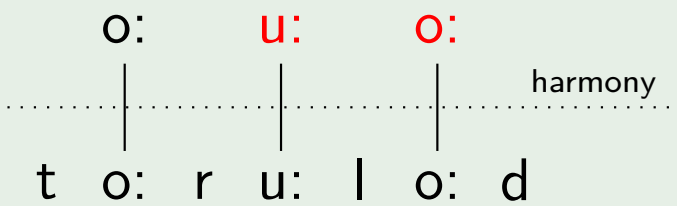

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- Only one tier is needed:
  - Transparent elements are same for both harmonies.
  - Secondary harmony is *bounded on the vowel tier*, high vowels block the spreading of [round] feature.

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It is possible to imagine a language where a separate tier for the secondary harmony will be needed:

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- Secondary harmony is also unbounded and affects only subset of the vowels that take part in the primary spreading.
- Secondary harmony involves a blocker that was not presented on the tier of the primary one.

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- One tier is not enough: there can be unbounded amount of high vowels in-between the two harmonizing non-high ones.

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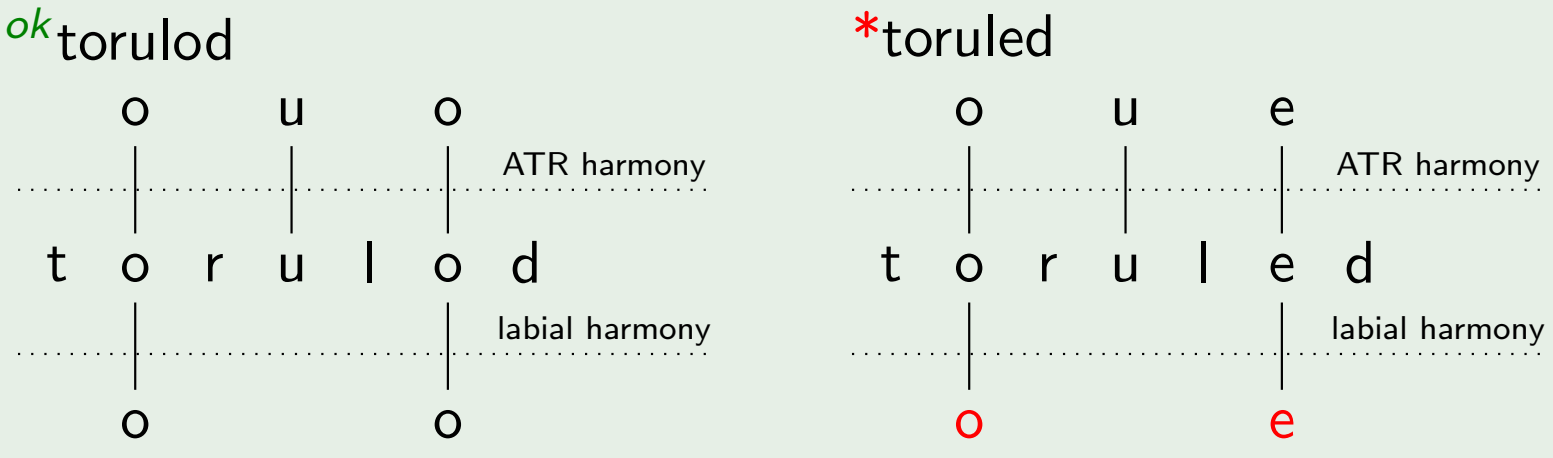

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It is always possible to fit vowel harmony on one tier!

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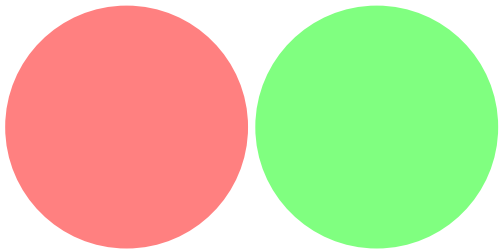

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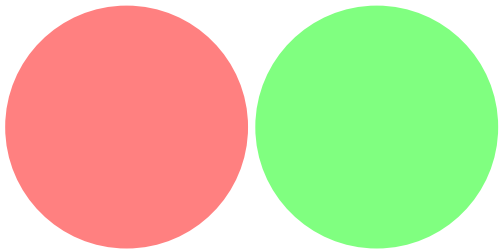

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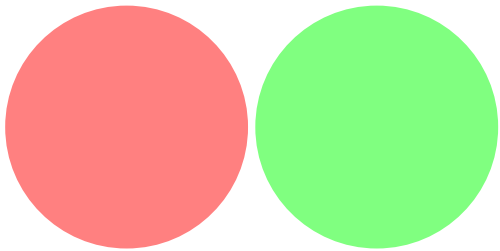

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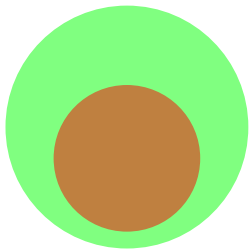

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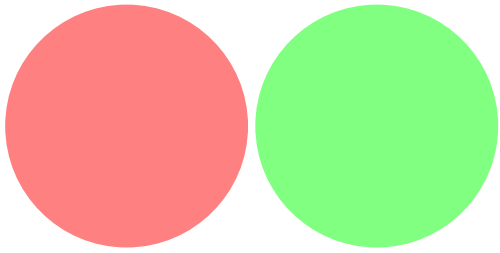

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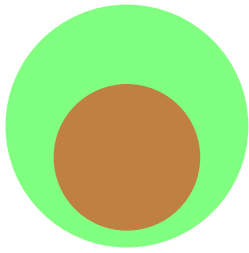

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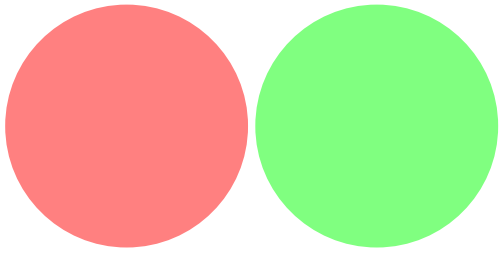

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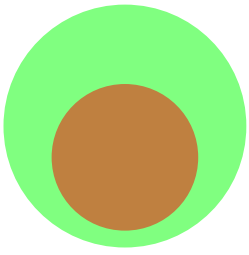

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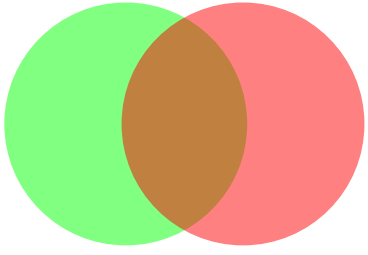

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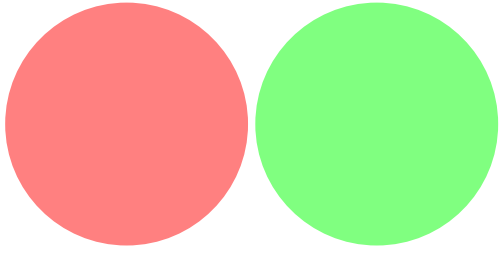

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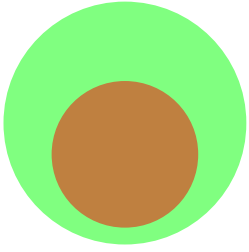

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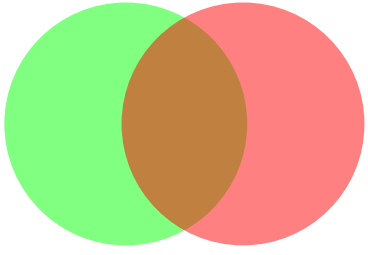

`Intersecting`

None?

On the next episode...

- What are double harmonies telling us?
- What are natural tiers and how do they differ from the unnatural ones?
- What are the limitations on the tier projection?

> The more complex the mind, the greater the need for the simplicity of play.
>
> *James T. Kirk*

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Example (Double vowel harmony in KIRGHIZ)

From (Kaun 1995), dialect described in (Herbert & Poppe 1963)

- Primary: all vowels harmonize in frontness.
- Secondary:
  - In [+front] words, all vowels agree in rounding.
  - In [–front] words, only adjacent non-high vowels harmonize in rounding, high vowels are blockers.

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  - In [+front] words, all vowels agree in rounding.
  - In [–front] words, only adjacent non-high vowels harmonize in rounding, high vowels are blockers.

köl-dön	'lake-ABL'	*köl-den
üy-dön	'house-ABL'	*üy-den
tokoy-don	'forest-ABL'	*tokoy-dan
tormuš-tan	'life-ABL'	*tormuš-ton

Secondary harmony: Kirghiz [cont.]

- $T = \{$o, ö, e, a, ɣ, a, u, ü$\}$

Secondary harmony: Kirghiz [cont.]

- $T = \{$o, ö, e, a, ɤ, a, u, ü$\}$

- Primary: all vowels harmonize in frontness.
- No *V$_{\alpha front}$V$_{-\alpha front}$ bigrams
  $H_{front} = \{$*öo, *ea, *aö, *uü, *ae, ...$\}$

Secondary harmony: Kirghiz [cont.]

- $T = \{$o, ö, e, a, ɤ, a, u, ü$\}$

- Primary: all vowels harmonize in frontness.
- No *$V_{\alpha front} V_{-\alpha front}$ bigrams
  $H_{front} = \{$*öo, *ea, *aö, *uü, *ae, ...$\}$

- Secondary: in [+front] words, all vowels agree in rounding.
- No *$V^{+front}_{\alpha round} V^{+front}_{-\alpha round}$ bigrams
  $H_{round} = \{$*üe, *eü, *öe, *eö, *iü, *üi, ...$\}$

Secondary harmony: Kirghiz [cont.]

- $T = \{$o, ö, e, a, ɀ, a, u, ü$\}$

- Primary: all vowels harmonize in frontness.
- No *$V_{\alpha front} V_{-\alpha front}$ bigrams
  $H_{front} = \{$*öo, *ea, *aö, *uü, *ae, ...$\}$

- Secondary: in [+front] words, all vowels agree in rounding.
- No *$V^{+front}_{\alpha round} V^{+front}_{-\alpha round}$ bigrams
  $H_{round} = \{$*üe, *eü, *öe, *eö, *iü, *üi, ...$\}$

- Secondary: ... and in [–front] words, only adjacent non-high vowels harmonize in rounding.
- No *$V^{-hi}_{\alpha round} V^{-hi}_{-\alpha round}$ bigrams
  $H'_{round} = H_{round} + \{$*ao, *oa, *uo, *ɀo$\}$

Secondary harmony: Kirghiz [cont.]

- $T = \{o, ö, e, a, ɤ, a, u, ü\}$
- $H_{front} = \{*öo, *ea, *aö, *uü, *ae, ...\}$
- $H_{round} = \{*üe, *eü, *öe, *iü, *üi, ...\} + \{*ao, *oa, *uo, *ɤo\}$

Secondary harmony: Kirghiz [cont.]

- $T = \{$o, ö, e, a, ɐ, a, u, ü$\}$
- $H_{front} = \{$*öo, *ea, *aö, *uü, *ae, ...$\}$
- $H_{round} = \{$*üe, *eü, *öe, *iü, *üi, ...$\} + \{$*ao, *oa, *uo, *ɐo$\}$

Example (Double vowel harmony in KIRGHIZ)

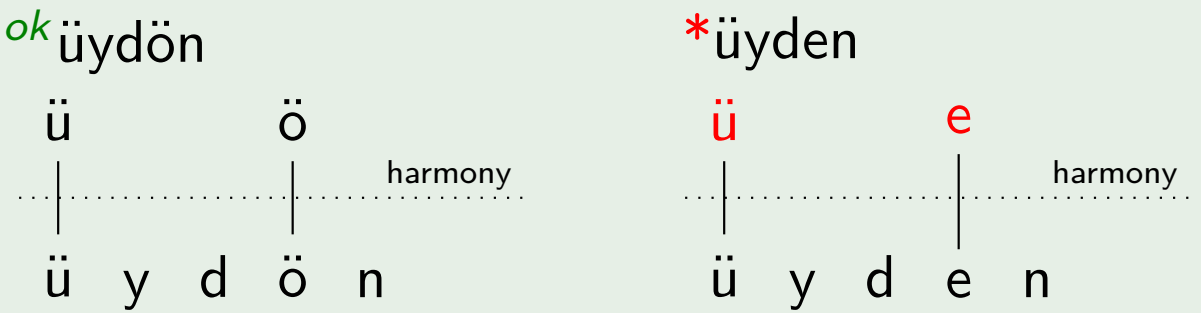
üy-dön ‘house-ABL’ *üy-den

Secondary harmony: Kirghiz [cont.]

- $T = \{$o, ö, e, a, ɤ, a, u, ü$\}$
- $H_{front} = \{$*öo, *ea, *aö, *uü, *ae, ...$\}$
- $H_{round} = \{$*üe, *eü, *öe, *iü, *üi, ...$\} + \{$*ao, *oa, *uo, *ɤo$\}$

Example (Double vowel harmony in Kirghiz)

üy-dön ‘house-ABL’ *üy-den



Secondary harmony: Kirghiz [cont.]

- $T = \{$o, ö, e, a, ɐ, a, u, ü$\}$
- $H_{front} = \{$*öo, *ea, *aö, *uü, *ae, ...$\}$
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Example (Double vowel harmony in KIRGHIZ)

tormuš-tan ‘life-ABL’ *tormuš-ton

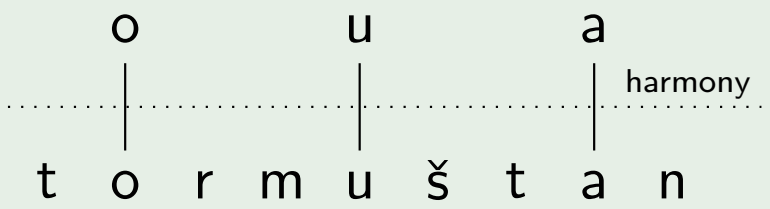
Secondary harmony: Kirghiz [cont.]

- $T = \{o, ö, e, a, ɤ, a, u, ü\}$
- $H_{front} = \{*öo, *ea, *aö, *uü, *ae, ...\}$
- $H_{round} = \{*üe, *eü, *öe, *iü, *üi, ...\} + \{*ao, *oa, *uo, *ɤo\}$

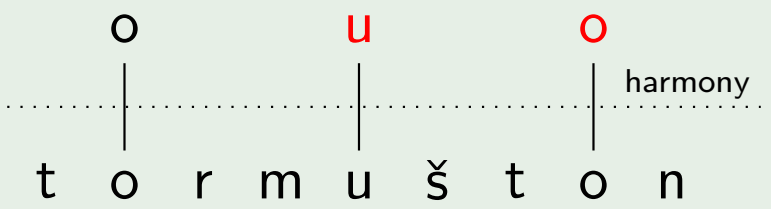
Example (Double vowel harmony in KIRGHIZ)

tormuš-tan ‘life-ABL’ *tormuš-ton

ok tormuštan



*tormušton



Secondary harmony: Kirghiz [cont.]

- Primary: all vowels harmonize in frontness.
- Secondary: in [+front] words, all vowels harmonize in rounding, and in [–front] words, only adjacent non-high vowels agree in it, whereas high vowels function as blockers.

Secondary harmony: Kirghiz [cont.]

- Primary: all vowels harmonize in frontness.
- Secondary: in [+front] words, all vowels harmonize in rounding, and in [–front] words, only adjacent non-high vowels agree in it, whereas high vowels function as blockers.

- Only one tier is needed:
  - Both harmonies operate over the same alphabet.
  - Secondary harmony is *bounded on the vowel tier* for [–front] words, or *spreads* together with the [+front] feature.

Unattested patterns: Quasi-Buryat

- Secondary harmony involves blocker that was not presented at the tier of the primary one.

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Example (Double vowel harmony in Quasi-Buryat)

- Primary: all vowels except *i* harmonize in ATR.
- Secondary: adjacent non-high vowels harmonize in rounding, high vowel *i* blocks this spreading.

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- Secondary: adjacent non-high vowels harmonize in rounding, high vowel *i* blocks this spreading.

ɔrɔd	*ɔrad	*ɔrod
ɔrilad	*ɔrilɔd	*ɔriled
torod	*tored	*torad
toriled	*torilod	*torilad

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ɔrɔd	*ɔrad	*ɔrod
ɔrilad	*ɔrilɔd	*ɔriled
torod	*tored	*torad
toriled	*torilod	*torilad

- One tier is not enough: *i* MUST NOT presented on the ATR harmony tier, and MUST BE presented on the labial assimilation tier.

Unattested patterns: Quasi-Buryat [cont.]

- Primary: all vowels except *i* harmonize in ATR.

Unattested patterns: Quasi-Buryat [cont.]

- Primary: all vowels except *i* harmonize in ATR.
- $T_{ATR} = \{$ɔ, o, a, e$\}$
- $H_{ATR} = \{$*ɔo, *oɔ, *ae, *ea, *ɔe, *ao, ...$\}$

Unattested patterns: Quasi-Buryat [cont.]

- Primary: all vowels except *i* harmonize in ATR.
- $T_{ATR} = \{$ɔ, o, a, e$\}$
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- Secondary: adjacent non-high vowels harmonize in rounding, high vowel *i* blocks this spreading.
- $T_{round} = \{$i, ɔ, o, a, e$\}$
- $H_{round} = \{$*ɔa, *aɔ, *oe, *eo, *iɔ, *io$\}$

Unattested patterns: Quasi-Buryat [cont.]

- $T_{ATR} = \{$ɔ, o, a, e$\}$
- $H_{ATR} = \{$*ɔo, *oɔ, *ae, *ea, *ɔe, *ao, ...$\}$
- $T_{round} = \{$i, ɔ, o, a, e$\}$
- $H_{round} = \{$*ɔa, *aɔ, *oe, *eo, *iɔ, *io$\}$

Unattested patterns: Quasi-Buryat [cont.]

- $T_{ATR} = \{$ɔ, o, a, e$\}$
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Example (Double vowel harmony in Pseudo-Buryat)

toriled *torilod *torilad

Unattested patterns: Quasi-Buryat [cont.]

- $T_{ATR} = \{$ɔ, o, a, e$\}$
- $H_{ATR} = \{$*ɔo, *oɔ, *ae, *ea, *ɔe, *ao, ...$\}$
- $T_{round} = \{$i, ɔ, o, a, e$\}$
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Example (Double vowel harmony in Pseudo-Buryat)

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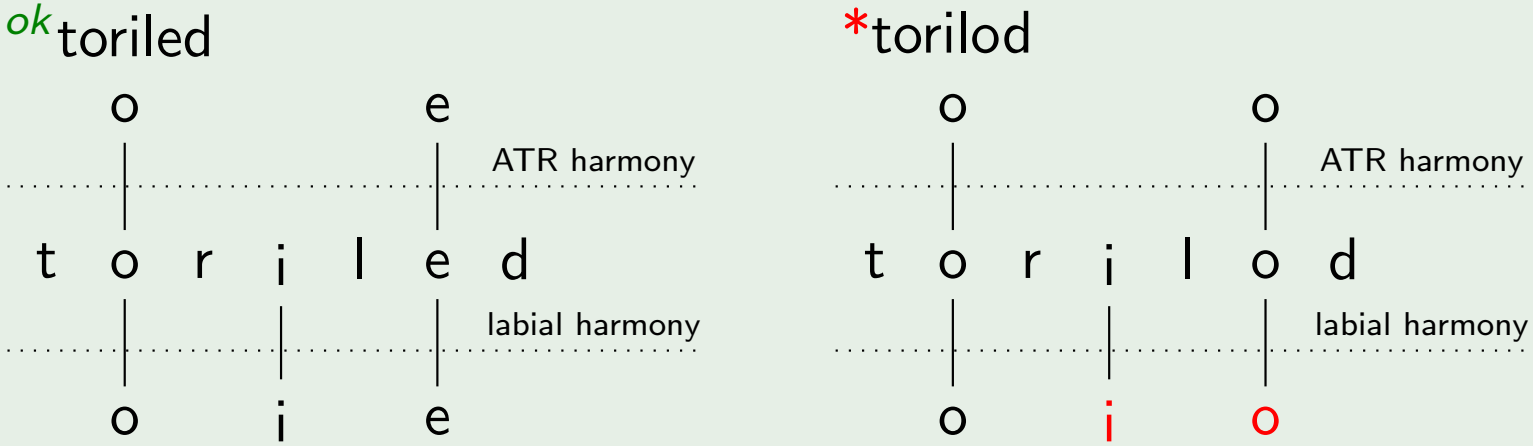

Unattested patterns: Quasi-Buryat [cont.]

- $T_{ATR} = \{$ɔ, o, a, e$\}$
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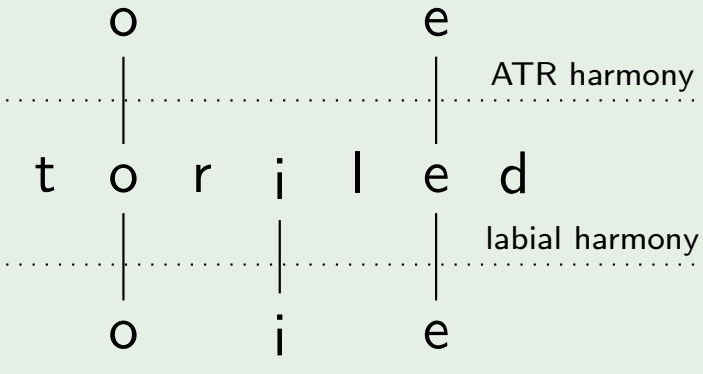
Example (Double vowel harmony in Pseudo-Buryat)

toriled *torilod *torilad

ok toriled



*torilad