Phonology Goes Syntax

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1 Setting the stage

2 Binding in phonology

3 Conclusion

How different/similar are phonology/syntax?

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2. No/little: Bromberger & Halle (1989), Neeleman & van de Koot (2006).
3. Fundamentally the same: Dependency Phonology (Kaye, Lowenstamm & Vergnaud 1990; Anderson 1992, 2003) & Government Phonology (GP) (Kaye, Lowenstamm & Vergnaud 1985, 1990; Kaye 1990; Harris 1994), the latter having borrowed numerous types of formalism from (GB) syntax (government, ECP, projection principle, minimality principle etc.).

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4. *laki-a* ‘of a law’ ≠ *täti-ä* ‘of an aunt’
   Vowel *i* transparent to spreading of **frontness**.

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4. Here we will focus on whether we need hierarchy similar to that in syntax.

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2. Hierarchy everywhere in grammar; null-hypothesis: also in phonology (van der Hulst 2006, 2010b,a).

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4. Syntax: trees for the expression of asymmetries, which could not be handled by flat structures (pace Barker 2012)
5. Binding phenomena, structural ambiguities (*blue striped suit*) etc. (Everaert, Huybregts, Chomsky, Berwick & Bolhuis 2015) — hierarchical structure essential.

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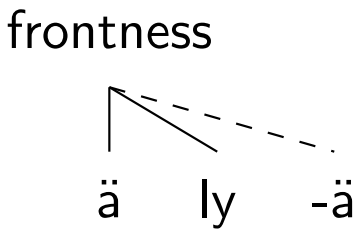

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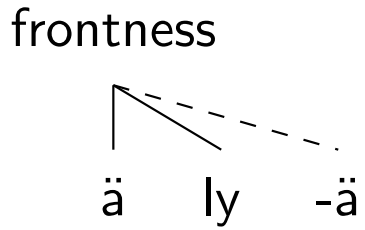

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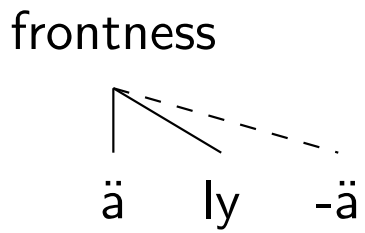

5. Here: Phenomena that cannot be adequately explained without hierarchy.
6. Argument for hierarchy meaningless if phonology seen as arbitrary operations.

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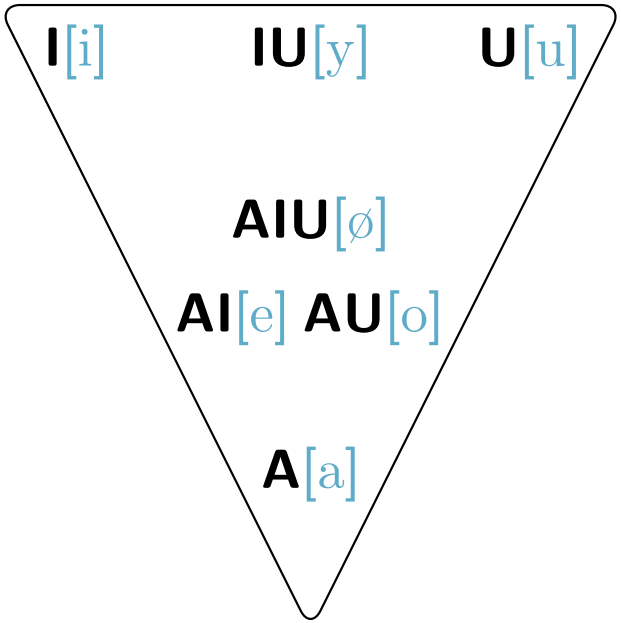

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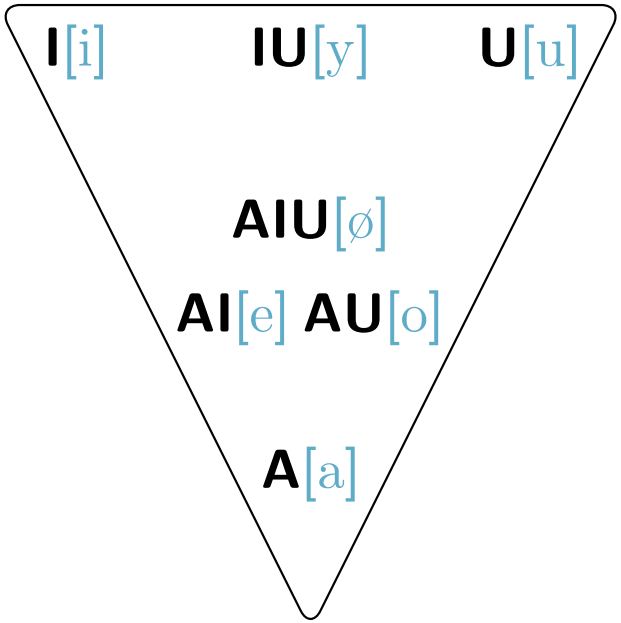

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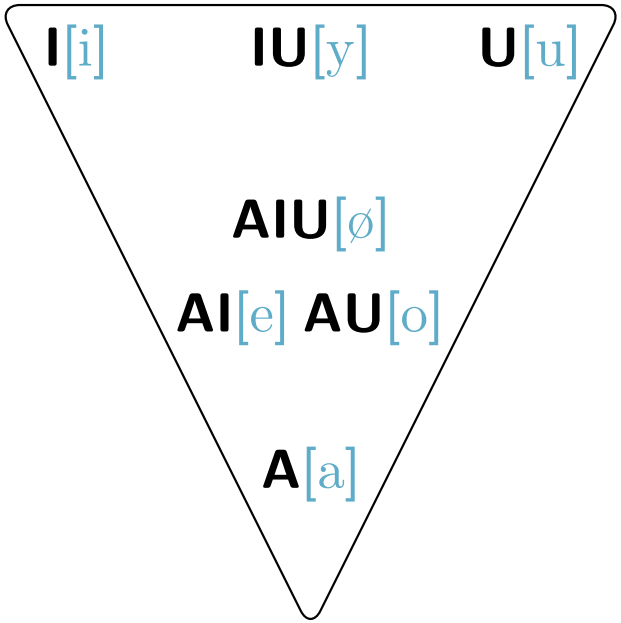

3. Elements can occur by themselves or in combination.
4. **I** in consonants [j], **U** in consonants [w], **A** in consonants [r] etc.

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4. Tree structures not simply convenient but also necessary.

English diphthongs in GP 1.x

ai	{**A**}	{**I**}	*ei*	{**A**, **I**}	{**I**}
au	{**A**}	{**U**}	*ou*	{**A**, **U**}	{**U**}
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2. Complexity: number of elements.

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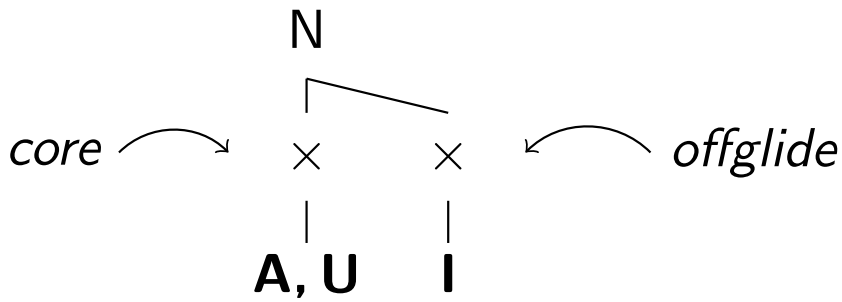

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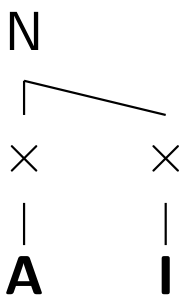

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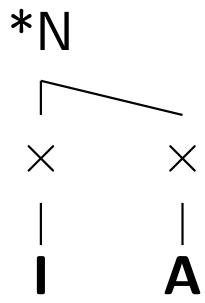

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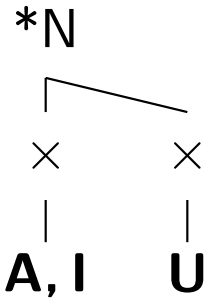

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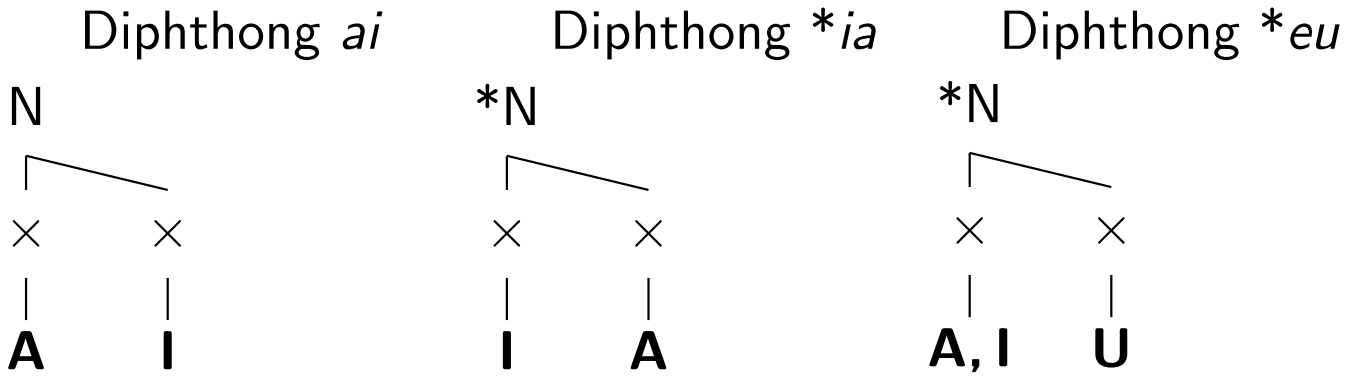

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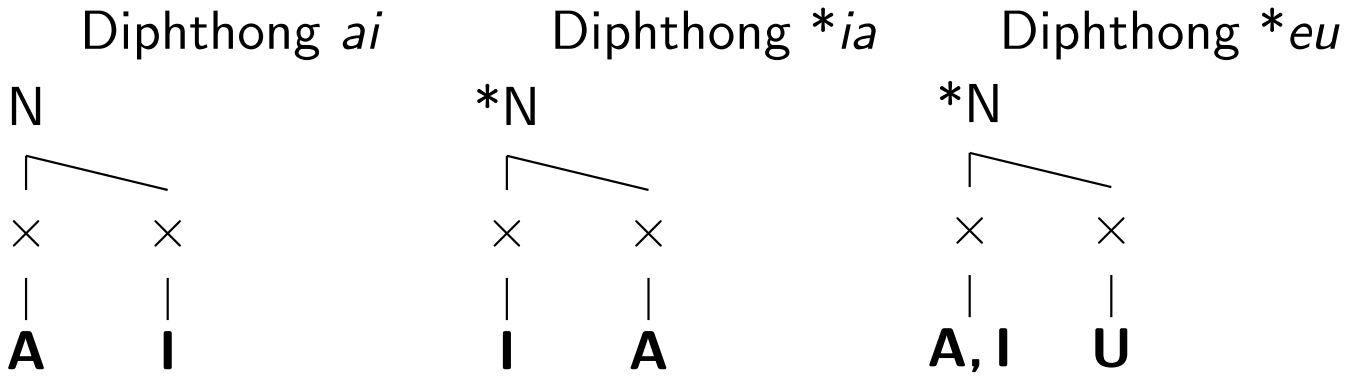

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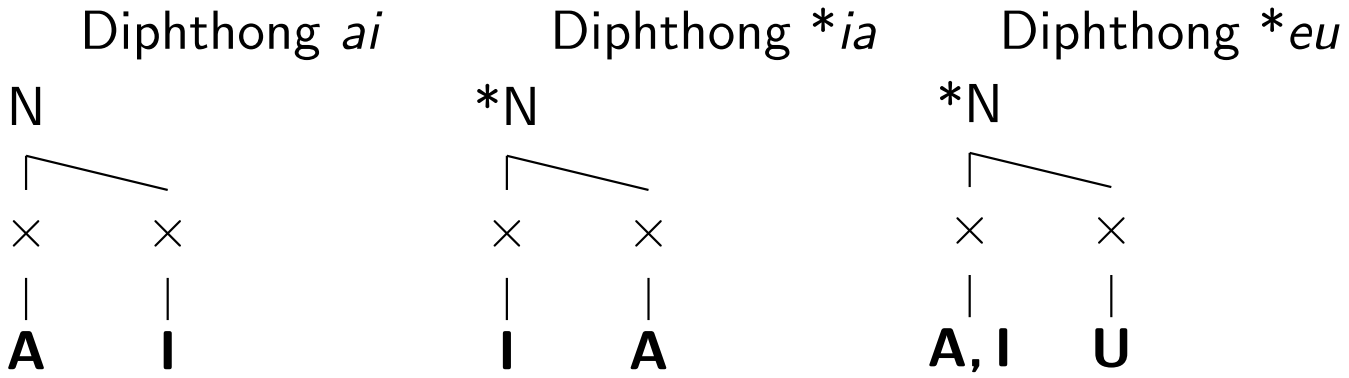

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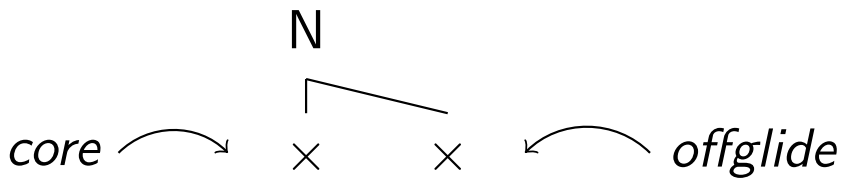
3. Complexity fails to consider the individual nature of elements.

Conditions on A



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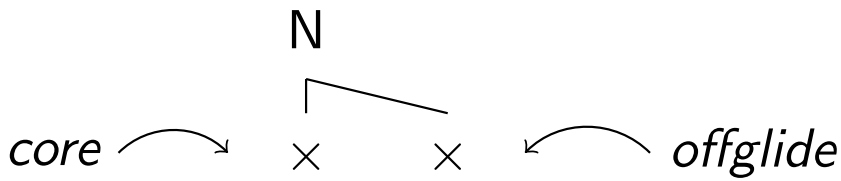

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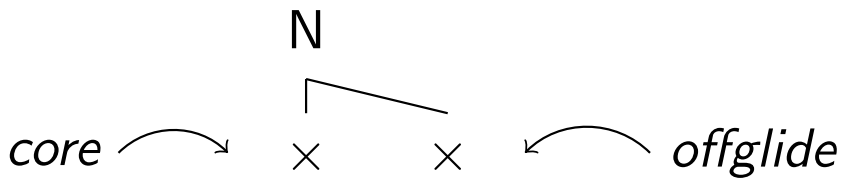

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3. Auxiliary assumption #2 (Aux2):
   No position without any elements.
   (For head, this follows from A-requirement.)

Logical combinations left

Assuming A-requirement, Aux1, Aux2:

Core	Offglide							
	{}	{A}	{I}	{U}	{A, I}	{A, U}	{I, U}	{A, I, U}
{}	*	*	*	*	*	*	*	*
{A}	*	*	✓	✓	*	*	*	*
{I}	*	*	*	*	*	*	*	*
{U}	*	*	*	*	*	*	*	*
{A, I}	*	*	✓	✓	*	*	*	*
{A, U}	*	*	✓	✓	*	*	*	*
{I, U}	*	*	*	*	*	*	*	*
{A, I, U}	*	*	*	*	*	*	*	*

Still 6 combinations remaining, $3 + 1 + 2$

a.			b.		
ai	{A}	{I}	*ei*	{A, I}	{I}
au	{A}	{U}	*ou*	{A, U}	{U}
oi	{A, U}	{I}			
**eu*	{A, I}	{U}			

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4. "Differently": **A** interacts with (constituent) structure unlike other elements.

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   fiend but not **fiemp* nor **fienk*,
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3. And: S. Br. English: *clasp*, *task*, *draft* — **cleesp*, **toosk*, **dreeft*.
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4. Recurrent across languages (Pöchtrager 2012):
   Finnish *aalto* 'wave', **aalpo*, **aalko*.

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4. How to implement that exactly? Let's look at vowels, where **A** used to encode openness.

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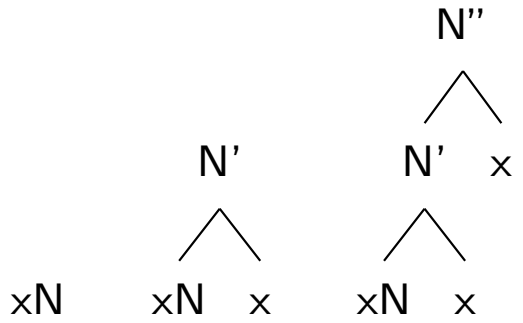

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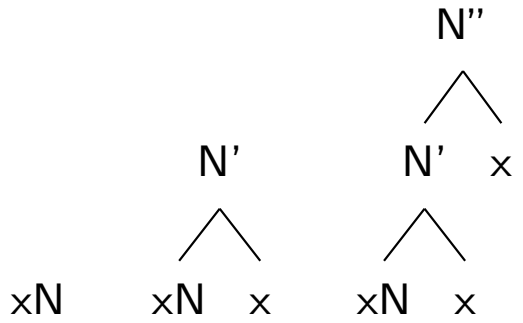
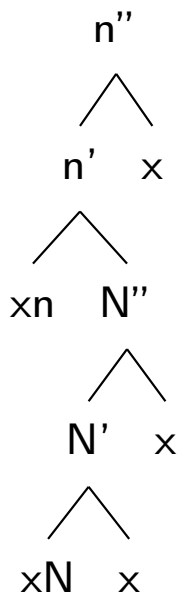


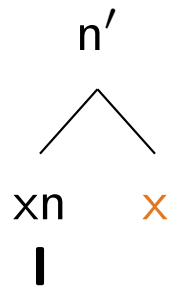
3. Projection of xn on top of that of xN, if both are present. Maximal structure:



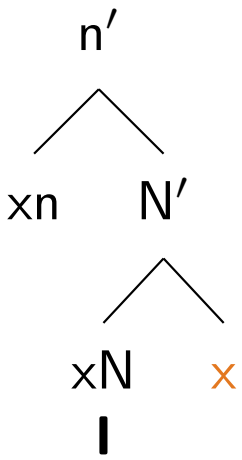
Meaning of xn, xN: still somewhat unclear, but linked to prosody (Pöchtrager 2021).

English vowels

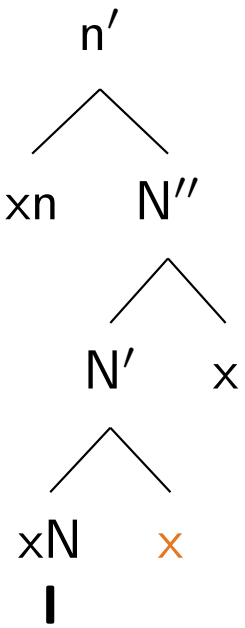
1. [ɪ]/[i]



[ɛ]/[e]



[æ]/[ä]



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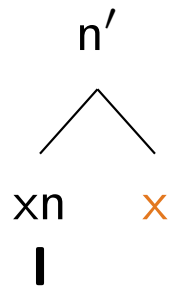
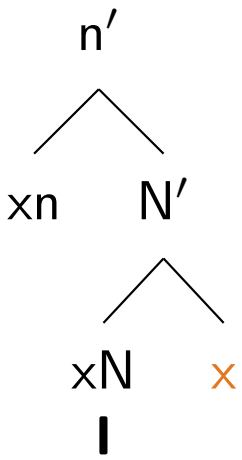


[ɛ]/[e]



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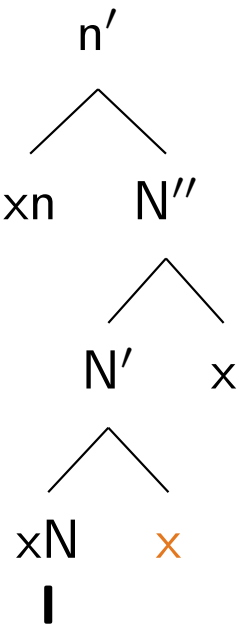

2. Melody in lowest head, whose complement (orange) expresses tense/lax.

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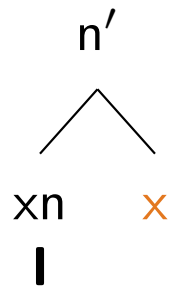
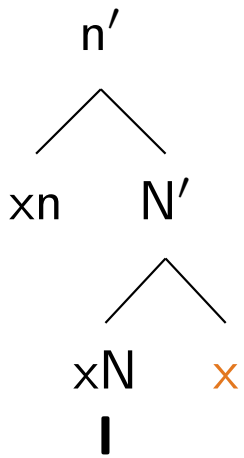


[ɛ]/[e]



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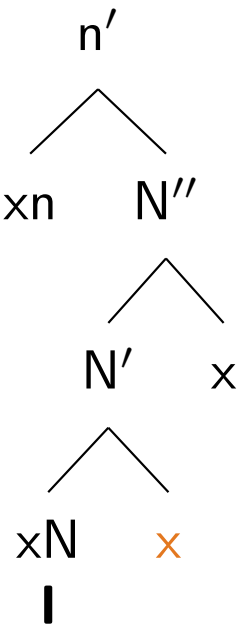

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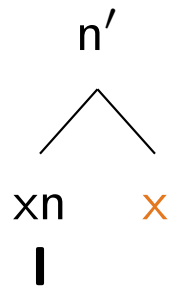

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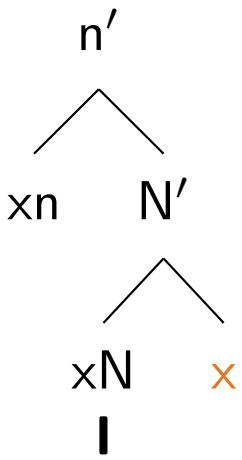

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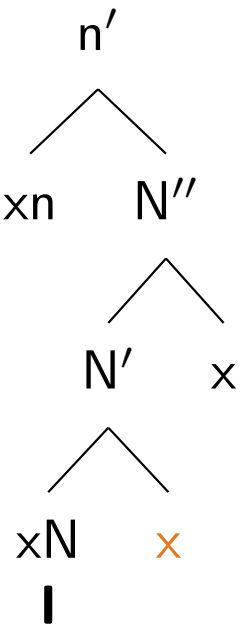

2. Melody in lowest head, whose complement (orange) expresses tense/lax.
3. Melody in non-heads: offglides in diphthongs.
4. Number of empty positions measure of openness.

Binding

1. Asymmetry [ɔɪ]/*[ɛʊ]:

[ɔ]	[ɪ]
"**A**"	
U	**I**

*

[ɛ]	[ʊ]
"**A**"	
I	**U**

"**A**" = structure to replace **A**

Binding

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2. Similarity to binding in syntax:

a. John saw Mary.
b. Mary saw John.
c. He saw himself.
d. *Himself saw he.

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3. **Binding**: **I** can bind **U**, but **U** must not bind **I**.

Binding formalised

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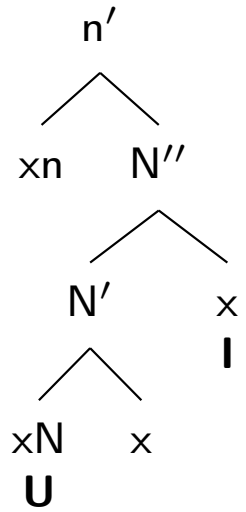
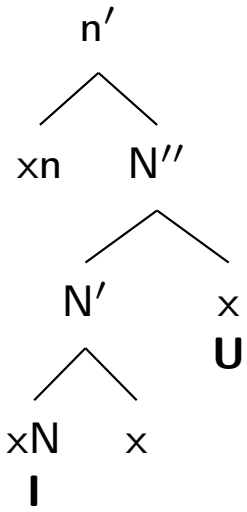
4. English [ɔɪ] (*void*) *vs.* *[ɛʊ]:

[ɔɪ]

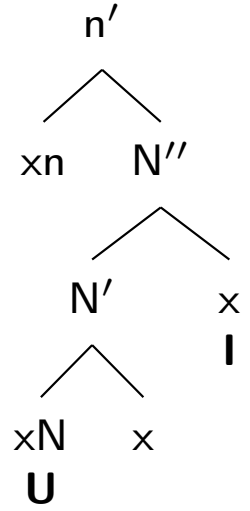


*[ɛʊ]

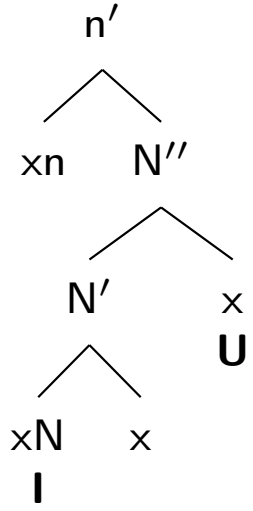


Structural asymmetry

[ɔɪ]



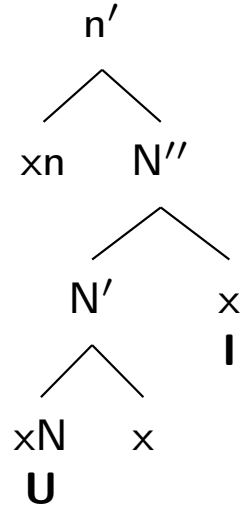
*[ɛʊ]



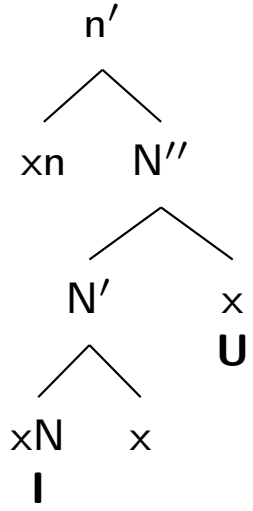
1. C-command requires structural asymmetry: If **I** and **U** were sisters, they would c-command each other; both [ɔɪ] *and* [ɛʊ] out.

Structural asymmetry

[ɔɪ]



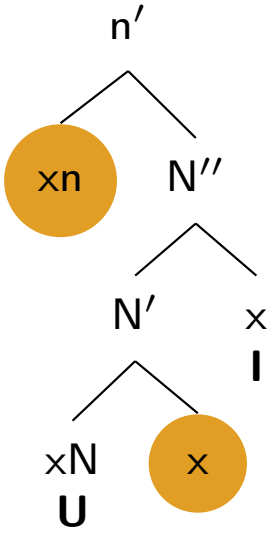
*[ɛʊ]



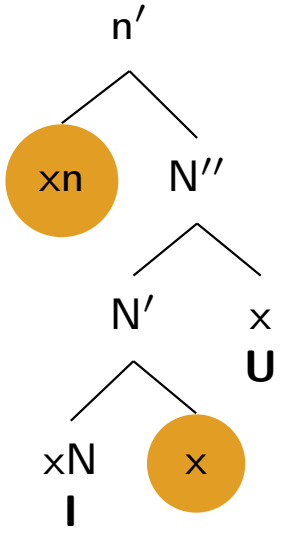
1. C-command requires structural asymmetry: If **I** and **U** were sisters, they would c-command each other; both [ɔɪ] *and* [ɛʊ] out.
2. Melody in *lowest* head? Because upper head relevant for ATR.

Structure of diphthongs

[ɔɪ]



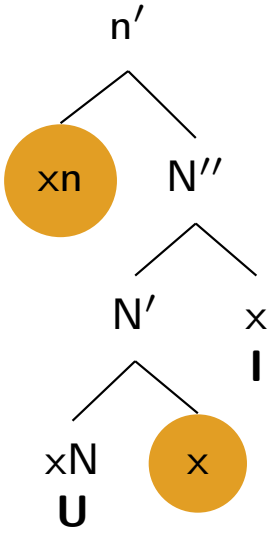
*[ɛʊ]



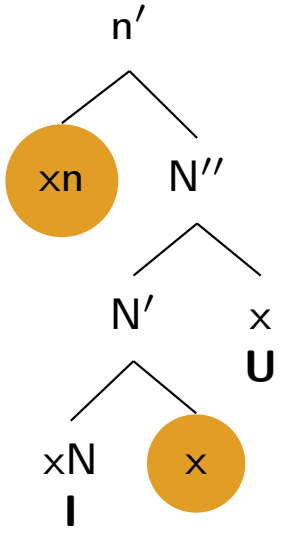
1. Two empty positions in each (yellow); head of diphthong thus mid.

Structure of diphthongs

[ɔɪ]



*[ɛʊ]



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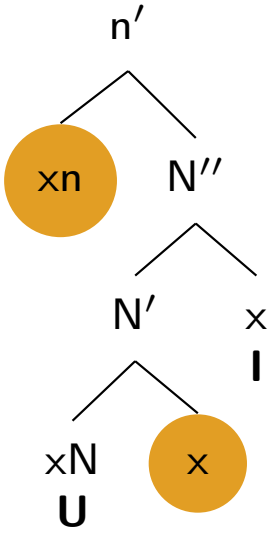
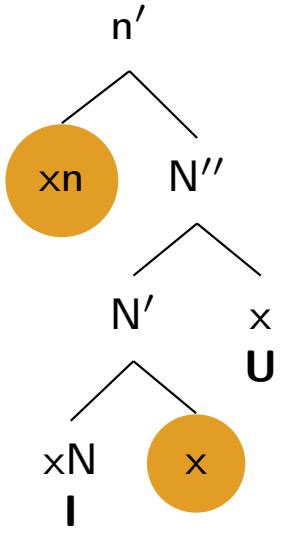
2. Offglide integrated into core. Core needs certain size for that embedding.

Structure of diphthongs

[ɔɪ]



*[ɛʊ]



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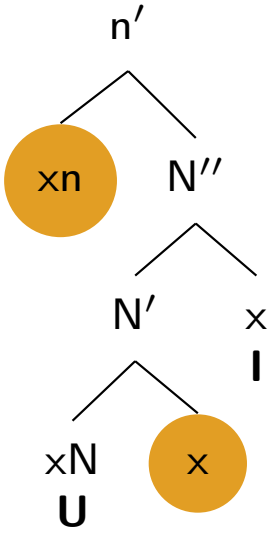
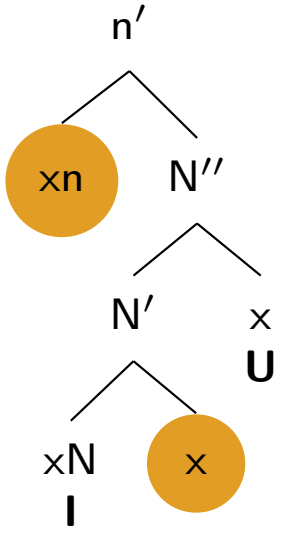


*[ɛʊ]



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2. Offglide integrated into core. Core needs certain size for that embedding.
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4. Adequate reinterpretation of "**A** in core, no **A** in offglide".

Urgent questions

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3. **The claim:** C-command, relying on hierarchy, essentially correct.
4. Furthermore: same asymmetries come back at different levels.

Mandarin rhymes (i.e. without onsets)

1. 6 relevant cases: (Živanovič & Pöchtrager 2010; Pöchtrager 2015)

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onglide	core	offglide
[i̯]	[e]	
	"mid"	
I	→	

b.

onglide	core	offglide
[i̯]	[o]	[u̯]
	"mid"	
I	←	U

c.

onglide	core	offglide
[i̯]	[a]	[u̯]
	"low"	
I		U

*

onglide	core	offglide
[u̯]	[o]	
	"mid"	
U	→	

onglide	core	offglide
[u̯]	[e]	[i̯]
	"mid"	
U	←	I

A1

*

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U		I

A2

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b.

onglide	core	offglide
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	"mid"	
I	←	**U**

onglide	core	offglide
[u̯]	[e]	[i̯]
	"mid"	
U	←	**I**

A1

c.

onglide	core	offglide
[i̯]	[a]	[u̯]
	"low"	
I		**U**

*

onglide	core	offglide
[u̯]	[a]	[i̯]
	"low"	
U		**I**

A2

2. Observations:
   - Core must have a certain minimal size (openness); *cf.* English.
   - Asymmetry with respect to sharing (arrows, asymmetry A1)
   - Asymmetry with respect to **I**/**U**; [i̯au̯]/*[u̯ai̯] (asymmetry A2)

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b.

onglide	core	offglide
[i̯]	[o]	[u̯]
	"mid"	
I	←	**U**

onglide	core	offglide
[u̯]	[e]	[i̯]
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U	←	**I**

A1

c.

onglide	core	offglide
[i̯]	[a]	[u̯]
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A2

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   - Asymmetry with respect to sharing (arrows, asymmetry A1)
   - Asymmetry with respect to **I**/**U**; [i̯au̯]/*[u̯ai̯] (asymmetry A2)
3. (Note: there *is* [u̯ai̯], but with different constituent structure.)

First asymmetry (A1)

a.

onglide	core	offglide
[i̯]	[e]	
	“mid”	
I	→	

❶

b.

onglide	core	offglide
[i̯]	[o]	[u̯]
	“mid”	
I	←	**U**

onglide	core	offglide
[u̯]	[o]	
	“mid”	
U	→	

onglide	core	offglide
[u̯]	[e]	[i̯]
	“mid”	
U	←	**I**

A1

First asymmetry (A1)

1

a.

onglide	core	offglide
[i̯]	[e]	
	“mid”	
I	→	

onglide	core	offglide
[u̯]	[o]	
	“mid”	
U	→	

b.

onglide	core	offglide
[i̯]	[o]	[u̯]
	“mid”	
I	←	**U**

onglide	core	offglide
[u̯]	[e]	[i̯]
	“mid”	
U	←	**I**

A1

2 Sharing the melody: Right (offglide) takes precedence over left (onglide).

Flat vs. hierarchical

1. Reminiscent of syntactic "closeness":

German [*Komm* [[*mir*] *zuliebe*]]

(lit. "come me on-behalf-of"), pronoun gets case from postposition.

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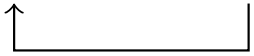

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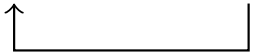
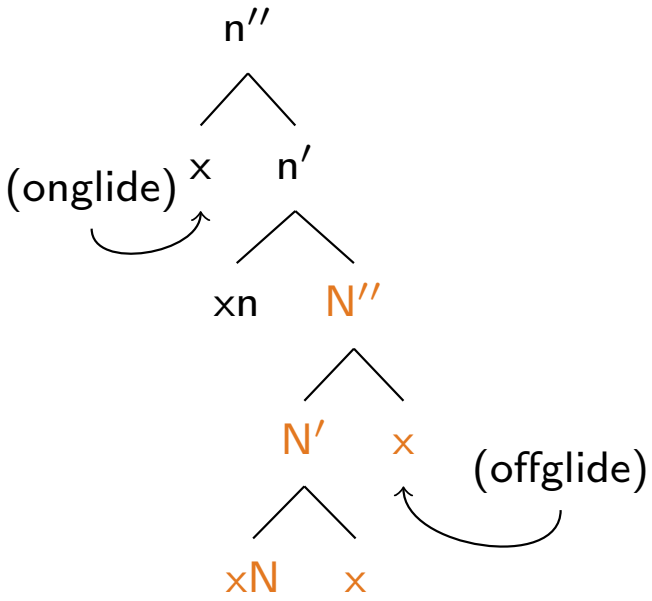


(lit. "come me on-behalf-of"), pronoun gets case from postposition.

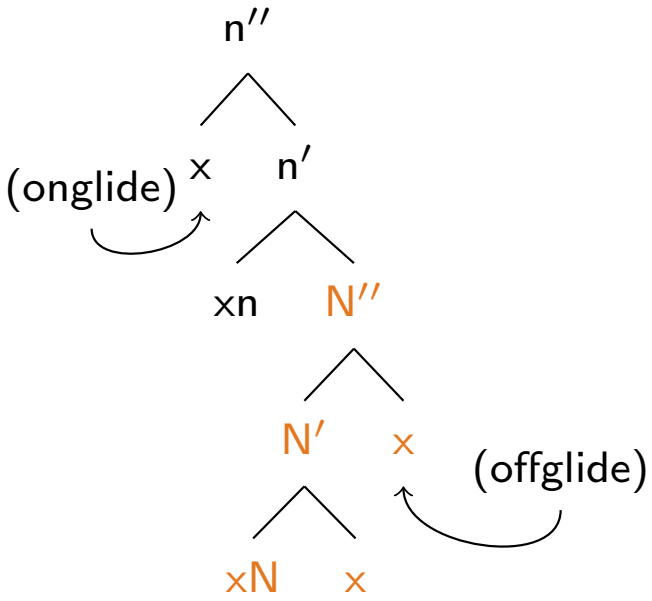
2. Linearly, *mir* is *equidistant* to verb and postposition, hierarchically (definable in terms of c-command) closer to postposition.
3. Right precedence over left follows from hierarchy.

General structure of the nucleus



1. Tree structure captures asymmetry/closeness (c-command).

General structure of the nucleus



1. Tree structure captures asymmetry/closeness (c-command).
2. Orange part embeds offglide and expresses openness of core.

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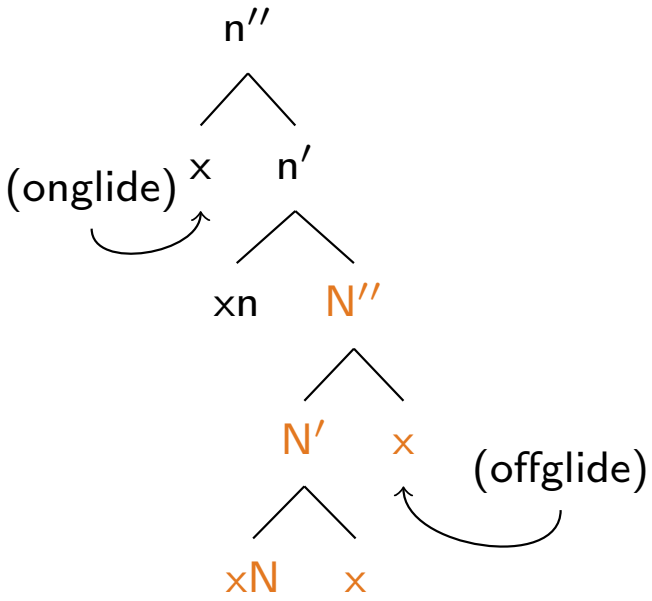
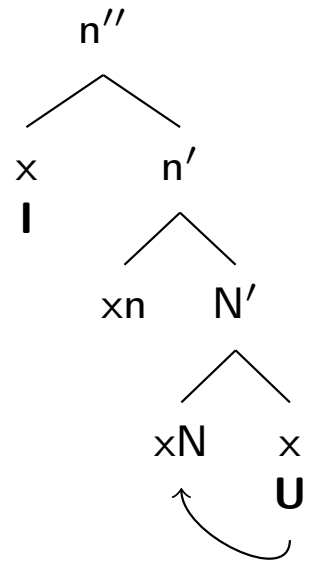


1. Tree structure captures asymmetry/closeness (c-command).
2. Orange part embeds offglide and expresses openness of core.
3. Same structure required by A1 will *also* explain A2.

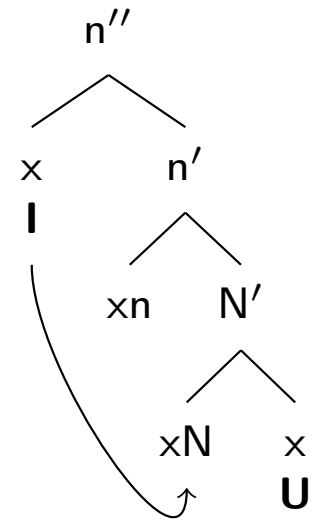
[iou] and *[ieu]

Onglide and offglide:

[iou]



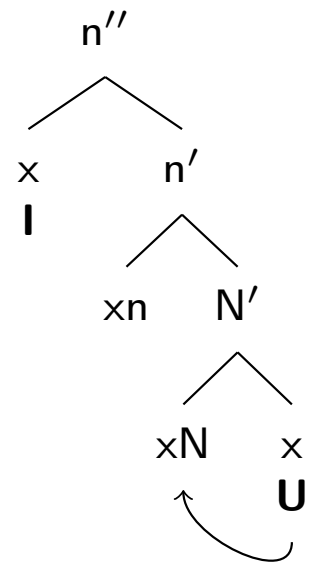
*[ieu]



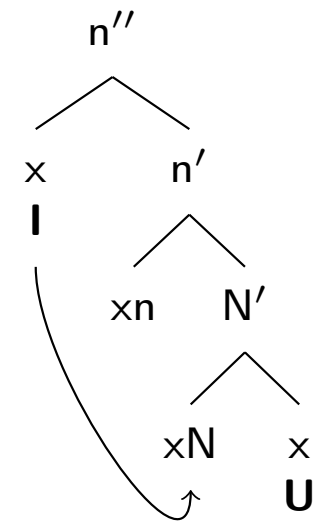
[iou] and *[ieu]

Onglide and offglide:

[iou]



*[ieu]

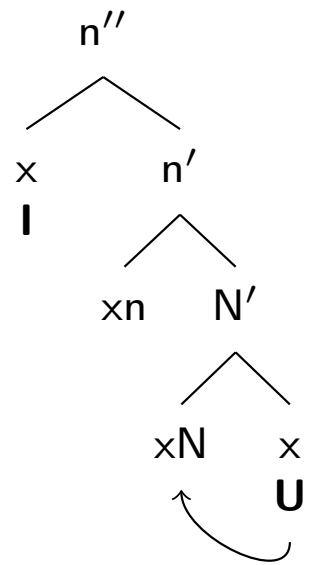


1. **U** closer to xN than **I** is, spreads into it.

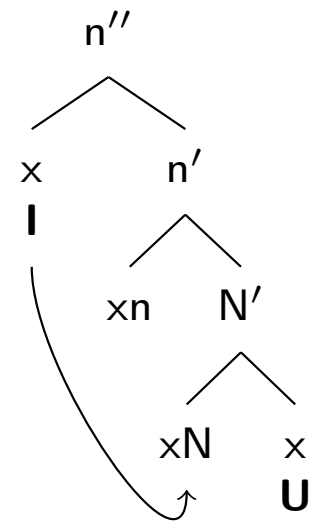
[iou] and *[ieu]

Onglide and offglide:

[iou]



*[ieu]

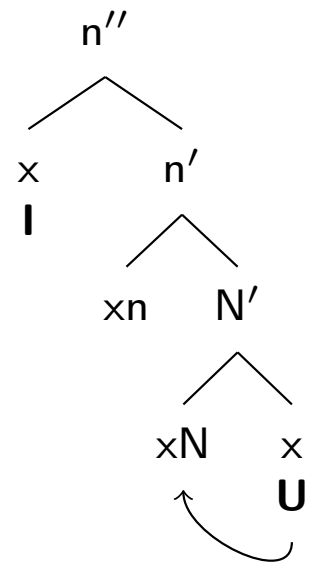


1. **U** closer to xN than **I** is, spreads into it.
2. **U** thus interpreted as part of the mid vowel represented by core: [o].

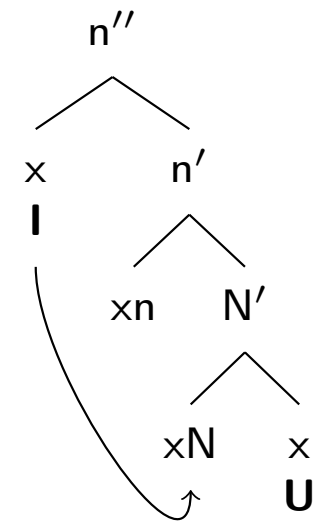
[iou] and *[ieu]

Onglide and offglide:

[iou]



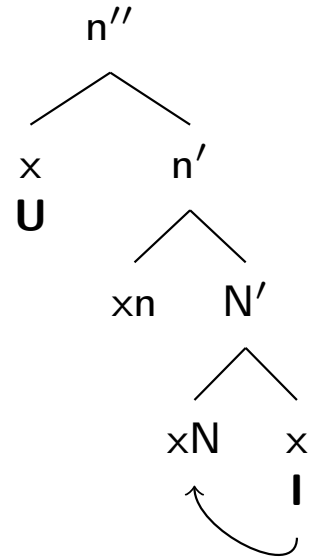
*[ieu]



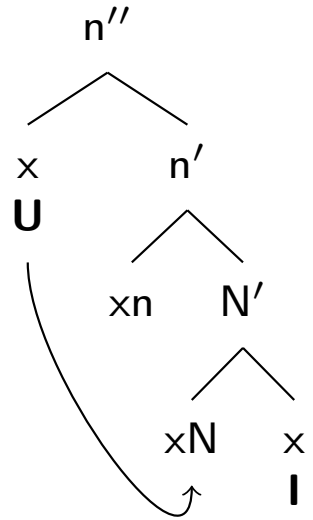
1. **U** closer to xN than **I** is, spreads into it.
2. **U** thus interpreted as part of the mid vowel represented by core: [o].
3. *[ieu] impossible because closer spreader (**U**) skipped: **minimality.**

[u̯ei̯] and *[u̯oi̯]

[u̯ei̯]

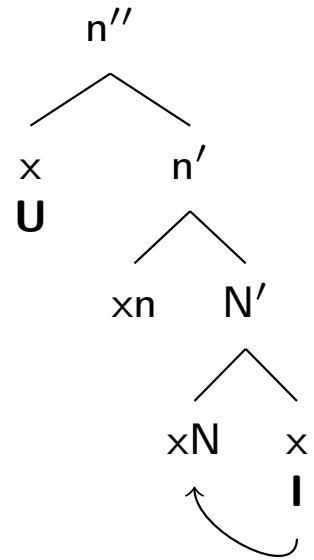


*[u̯oi̯]

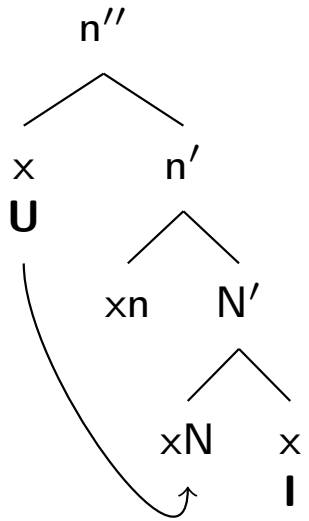


[ue̯i̯] and *[uo̯i̯]

[ue̯i̯]



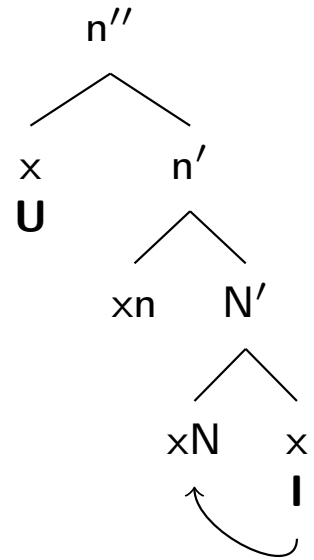
*[uo̯i̯]



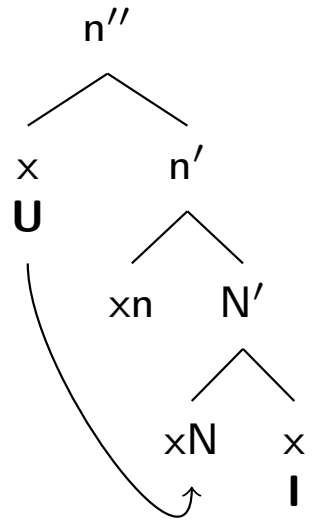
1. This time, **I** is closer.

[ue̯i̯] and *[uo̯i̯]

[ue̯i̯]



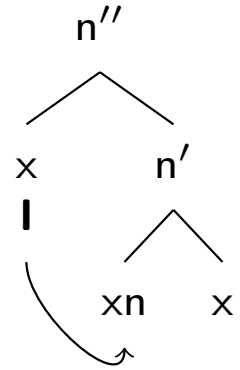
*[uo̯i̯]



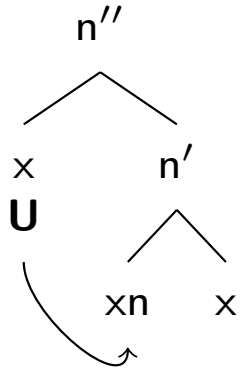
1. This time, **I** is closer.
2. *[uo̯i̯] out for the same reason as *[ie̯u̯] was.

[i͡e] and [u͡o]

[i͡e]

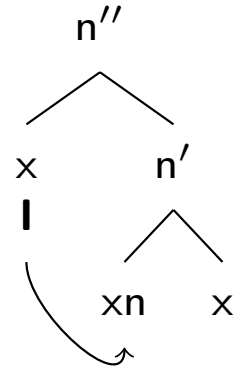


*[u͡o]

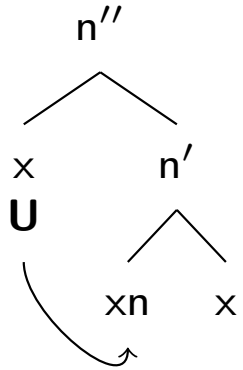


[i̯e] and [u̯o]

[i̯e]



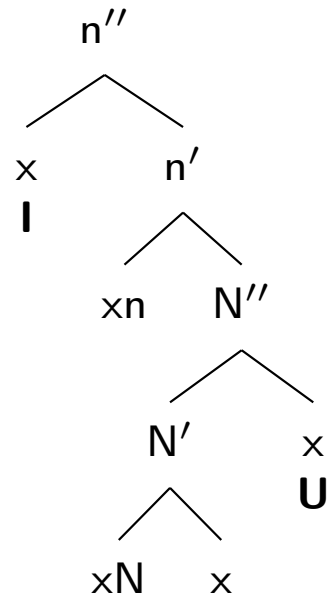
*[u̯o]



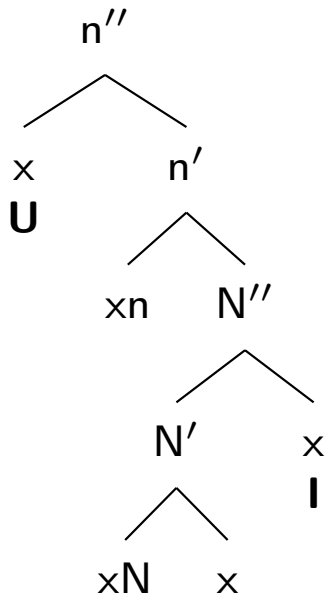
1. Onglide but no offglide, so onglide can colour core.

[i̯au̯], *[u̯ai̯], and the second asymmetry (A2)

[i̯au̯]

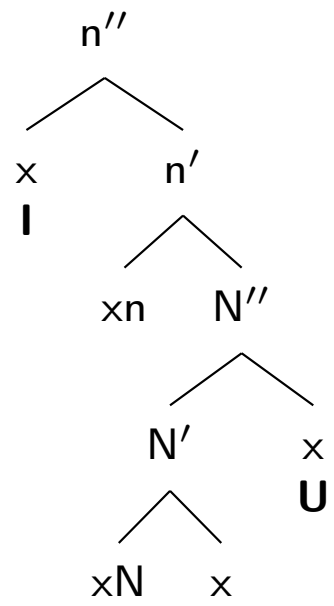


*[u̯ai̯]

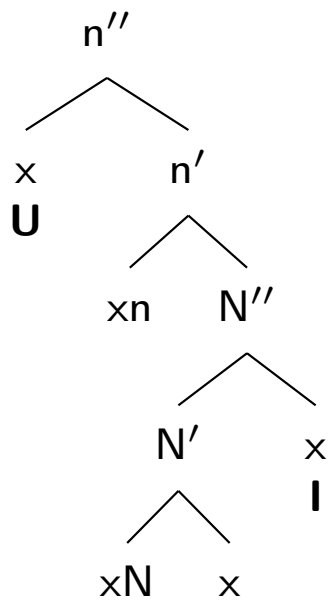


[i̯au̯], *[u̯ai̯], and the second asymmetry (A2)

[i̯au̯]



*[u̯ai̯]



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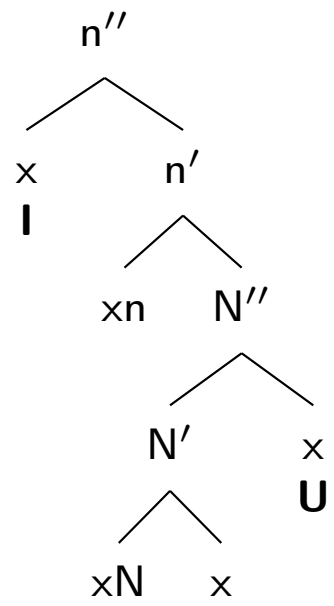
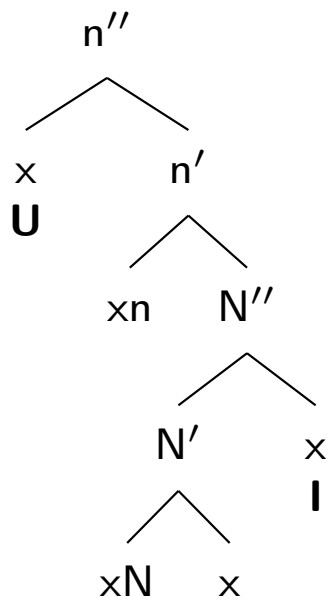
[i̯au̯], *[u̯ai̯], and the second asymmetry (A2)

[i̯au̯]



*[u̯ai̯]



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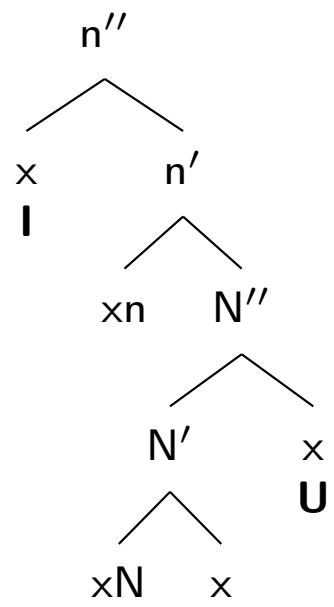
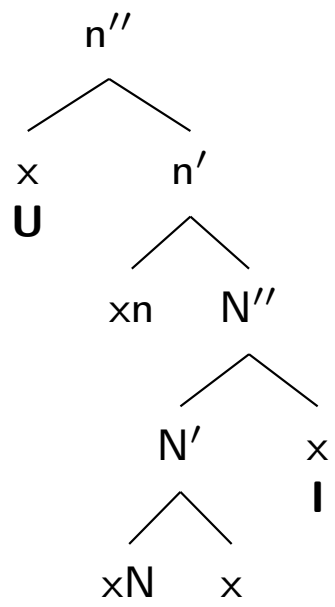
[i̯au̯]



*[u̯ai̯]



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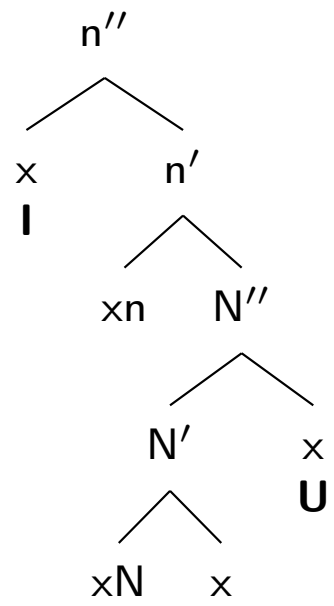
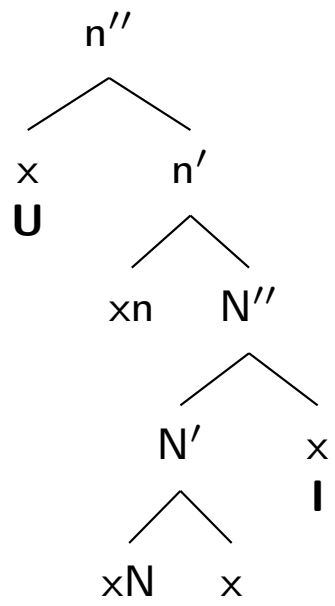


*[u̯ai̯]



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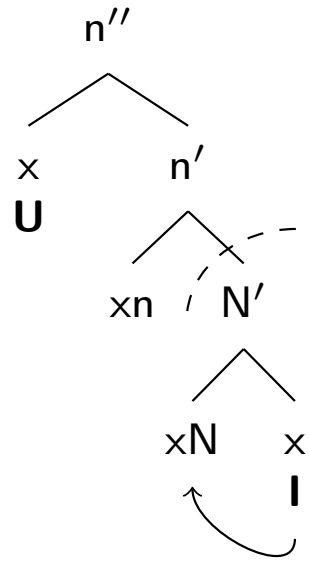
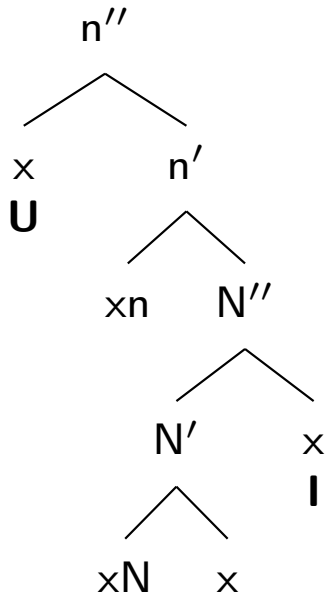
4. Offglide does not make it into xN (distance?), gives [a].

[u̯ei̯] and *[u̯ai̯]

[u̯ei̯]

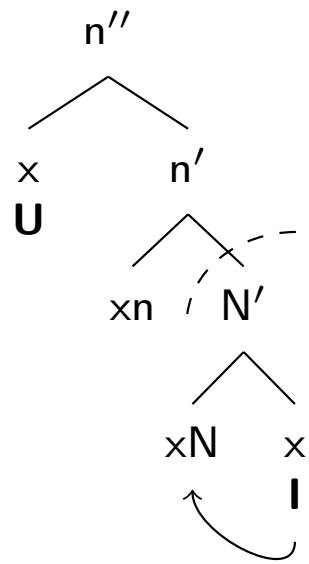


*[u̯ai̯]



[uei] and *[uai]

[uei]



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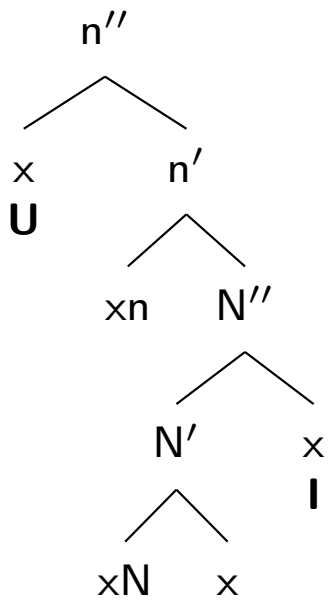
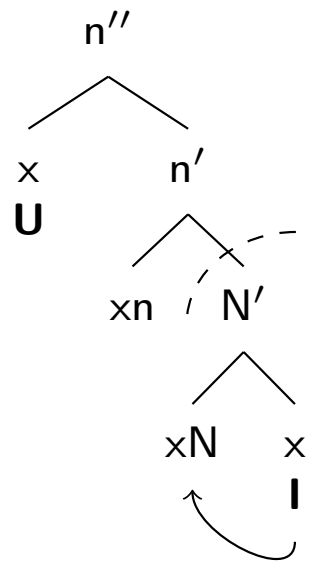


1. Both A1 *and* A2 follow from the proposed structure.

[uei] and *[uai]

[uei]



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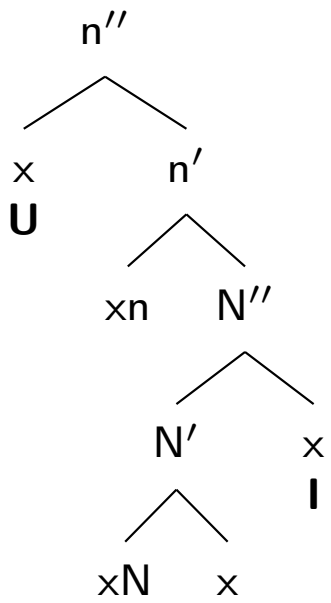

1. Both A1 *and* A2 follow from the proposed structure.
2. In both cases **U** c-commands **I**.

[uei] and *[uai]

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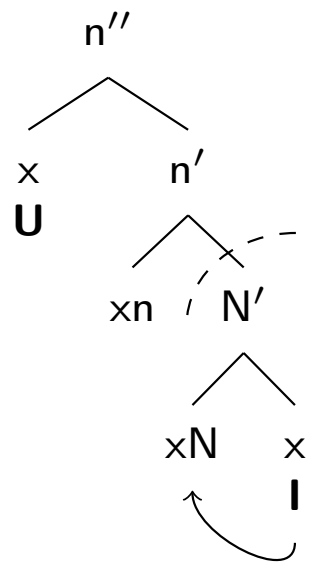

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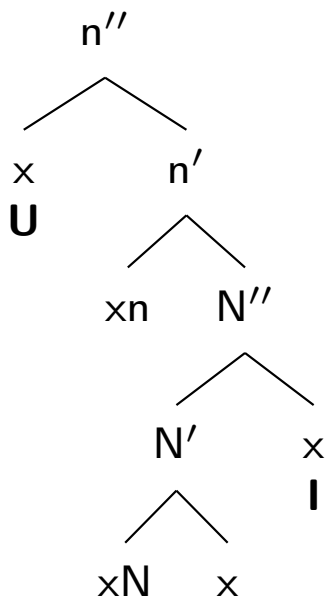

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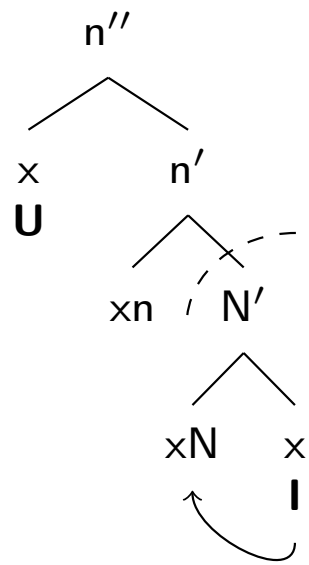
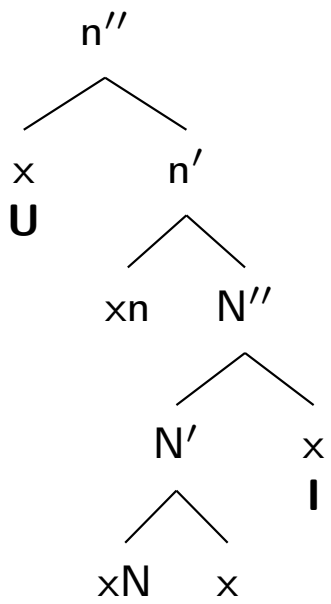
3. If **U** must not bind **I**, then how could [uei] ever be possible?

[uei] and *[uai]

[uei]



*[uai]



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4. [uei]: **I** spreads; seems to "immunise" against binding (creates island).

I/**U** asymmetries widespread

1. **I**/**U** asymmetries can be found in pretty much any language.

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2. Should allow us to submit the theory of binding to a large-scale scrutiny.

Japanese glide+vowel sequences

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3.

y-series:	**yi*	**ye*	*ya*	*yo*	*yu*
w-series:	**wi*	**we*	*wa*	**wo*	**wu*

Binding gets Japanese for free

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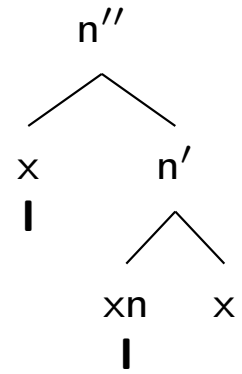
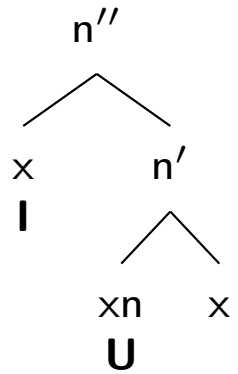
2. | | | | | | |
   |---|---|---|---|---|---|
   | *y*-series: | **yi* | **ye* | *ya* | *yo* | *yu* |
   | *w*-series: | **wi* | **we* | *wa* | **wo* | **wu* |

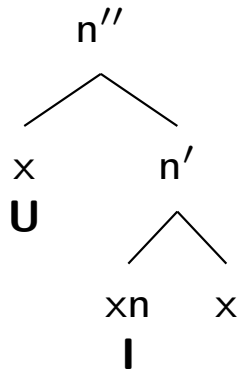
**yi*



**yu*



**wi*



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4. Can (some of the) asymmetries be derived from Binding?

Vowel harmony and Binding

1. [y]: **I** & **U**.

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   1. **I** spreading onto *u* (Finnish, Hungarian) or
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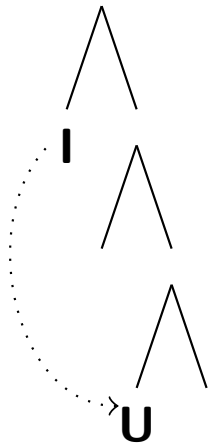
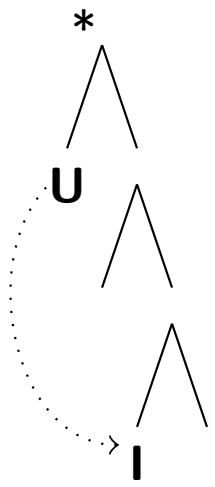
4. Would require **U** to c-command **I**, ruled out by binding.

Grammatical "creation" of [y]



[iCu] → [iCy]

Ungrammatical "creation" of [y]



[uCi] → [uCy]

More **I**/**U** asymmetries

1. Turkish, Finnish, French (word-finally): two *e*-type vowels (involving **I**), but only one *o*-type vowel (involving **U**) (Pöchtrager 2009).

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3. Binding might serve as a test to probe into internal structure of those objects.
4. Only seems possible in hierarchical models, not in purely linear ones.

1. Setting the stage
2. Binding in phonology
3. Conclusion

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1. Hierarchy & recursion not only useful, but necessary for phonology.

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Conclusion

1. Hierarchy & recursion not only useful, but necessary for phonology.
2. Applying syntactic thinking to phonological problems turns out to yield fruitful results.
3. The machinery used by syntax and phonology to build structure might not be so different after all, while there certainly is a difference in the set of objects glued together.

Thank you!

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