

The synchrony and diachrony of Modern Standard Danish stop–glide alternations

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What's this?

- Very early version of talk for *Edinburgh Symposium on Historical Phonology*
 - If the abstract gets accepted!



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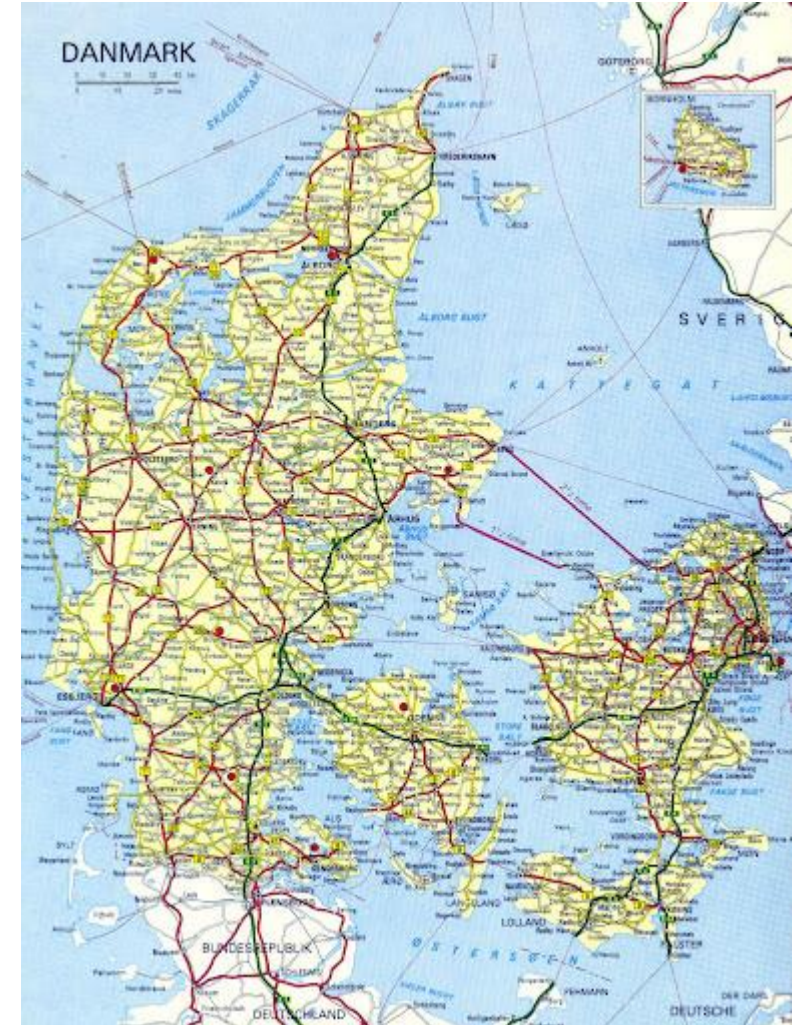


Henrik Jørgensen



Roadmap

- Standard analysis of Danish stop-glide alternations
- Why that analysis is problematic
- Evolutionary Phonology
- Natural history of stop-glide alternations



A primer on Danish stops

- Danish has six stop phonemes: /b d g p t k/
- In simple onset position,
 - /b d g/ are voiceless unaspirated [p t k]
 - /p t k/ are voiceless (highly) aspirated [p^h t^h k^h]
 - /t/ in particular has salient affrication [t^s]
- Aspirated stops are only found word-initially or foot-initially
- Unaspirated stops sometimes alternate with glides syllable-finally or before schwa (and /i/ in certain suffixes)



Standard analysis

Phoneme	Position	
	Strong	Weak
strong /t/	t	
weak /d/	d	d
		ð

Jakobson et al. (1951)

Sidebar: What's the deal with Danish [ǿ]?

- Good question!
- It's certainly not a dental fricative
- The only acoustic study finds that it's *very* vowel-like
- The only articulatory study finds that
 - There's some coronal approximation, but it's mostly (post-)alveolar
 - There's also significant dorsal approximation
- So... [ǿ̞]? or perhaps [ʎ]?
- This is not inconsequential for the phonological analysis!



Siem (2019), Brotherton & Block (2020), Schachtenhaufen (in prep)

Standard analysis

Phoneme	Strong	Weak
/p/	[p ^h]	[p]
/t/	[t ^h]	[t]
/k/	[k ^h]	[k]
/b/	[p]	[p ~ w]
/d/	[t]	[ð]
/g/	[k]	[k ~ w ~ j ~ Ø]
/v/	[v]	[w]
/j/	[j]	[j]

Standard analysis

Phoneme	Weak
/p/	[p]
/t/	[t]
/k/	[k]
/b/	[w]
/d/	[ð]
/g/	[j]
/v/	
/j/	

Standard analysis

- Schwa assimilation processes are very widespread in Danish, whereby (phonetic) sonorants become syllabic

- /m n ŋ l/ → [m̩ n̩ ŋ̩ l̩] / _ ə, ə _

- And also

- [w ɔ̃ j] → [ʊ ɣ ɪ] / _ ə, ə _

- Leading to the uncomfortable situation where [k] alternatives with [ʊ, ɪ]

Standard analysis

- Lines of evidence come from alternations with irregular morphology
- Such as the verbalizing suffix *-ere* [-¹e:²ɐ], which causes stress shift and resyllabification of final consonants

- <i>galop</i>	[kæ ¹ lʌp]	‘gallop’ (n.)
- <i>galopere</i>	[kæ ¹ lʌ ¹ p ^h e: ² ɐ]	‘to gallop’
- <i>vat</i>	[¹ væt]	‘cotton wool’
- <i>vattere</i>	[væ ¹ t ^h e: ² ɐ]	‘to apply cotton wool’
- <i>lak</i>	[¹ lak]	‘lacquer (n.)’
- <i>lakere</i>	[la ¹ k ^h e: ² ɐ]	‘to lacquer’

Standard analysis

- Or the derivational suffixes *-ik* [-'ik] and *-itet* [-i't^he:ʔt], which also cause stress shift and resyllabification of final consonant

- <i>solid</i>	[so'lið]	‘solid’
- <i>soliditet</i>	[soliti't ^h e:ʔt]	‘solidity’
- <i>metode</i>	[me't ^h o:ʌ]	‘method’
- <i>metodik</i>	[met ^h o'tik]	‘methodology’

Standard analysis

- Or from the irregular past tense suffix *-te* [-tə]
- (Note that the infinitive ending is underlyingly a schwa)
- This ending *sometimes* shortens the preceding vowel, which *sometimes* leads to a change in vowel quality

- <i>slæbe</i>	['slɛ:ʊ] or ['slɛ:ɛp]	‘to drag’
- <i>slæbte</i>	['slɛptə]	‘dragged’
- <i>føde</i>	['fø:ʌ]	‘to give birth’
- <i>fødte</i>	['fø:tə]	‘gave birth’

Standard analysis

- For /g/, alternations with [∅, j, w] depend on the quality of the preceding vowel
 - [j] after front vowels; [w] after back vowels; ∅ after high vowels

- <i>smage</i>	[ˈsmæ:ɪ]	‘to taste’
- <i>smagte</i>	[ˈsmaktə]	‘tasted’
- <i>koge</i>	[ˈkʰɔ:ʊ]	‘to boil’
- <i>kogte</i>	[ˈkʰʌktə]	‘boiled’
- <i>bruge</i>	[ˈpʁu:u]	‘to use’
- <i>brugte</i>	[ˈpʁɔktə]	‘used’

Standard analysis

- Some words alternate between [j w] *but never* [k]
- These are words that undergo vowel shortening in compounds
 - This is *not* a regular process though

- <i>flag</i>	[¹ flæ: [?] j]	‘flag’
- <i>flagstang</i>	[¹ flawstɑŋ [?]]	‘flagpole’
- <i>bag</i>	[¹ pæ: [?] j]	‘back’
- <i>bagdel</i>	[¹ pawte: [?] l]	‘behind (n.)’ (lit. back-part)

Standard analysis

- Nina Grønnum's formalization of the /g/ alternations:

$$g \rightarrow [\gamma] / \left\{ \begin{array}{c} \vee \\ [-nas] \end{array} \right\} _$$

- But note that $[\gamma]$ isn't found in synchronic Danish, and hasn't for 100+ years!
- Hans Basbøll assumes that these alternations are generated at the interface between morphology and phonology
 - Then he doesn't have to assume that it's a rule-based process

Our critique

Neutralizations cannot be dissolved

- Many words show no stop-glide alternations
 - *kage* [k^hæ:ɪ] ‘cake’ – does it have underlying /j/ or /g/?
 - *lov* [lʌw] ‘law’ – does it have underlying /v/ or /g/?

Our critique

Some alternating sounds share few phonetic or phonological properties

- Stops will have to be *radically* underspecified (major place features only)

Phoneme	Strong features	Weak features	Shared features
/b/	voiceless bilabial stop	voiced labial-velar glide	oral consonant with labial component
/t/	voiceless alveolar stop	voiced postalveolar-velar (?) glide	oral consonant with coronal component
/k/	voiceless velar stop	voiced labial-velar <i>or</i> palatal glide	oral consonant with dorsal component

Our critique

The morphophonological evidence is limited and problematic

- All evidence for the standard analysis comes from irregular morphology
- None of this morphology is productive
 - The only study of productivity of these patterns is an MA thesis with mixed results (Pharao 2004)
- Many of these forms are highly irregular (with the exception of *-te* past tense)
 - **In fact, Bleses (2000) finds that children acquire the *-te* past tense at around 8 years old. We assume that core phonology is roughly in place at this point.**

Our critique

Our solution

- Irregular morphology must be stored in the lexicon
 - **Stop-glide alternations are suppletive**
- /v/ ↔ [w]
- /j/ ↔ [j]
- We've yet to make up our minds about [ð], which is somewhat less problematic

Evolutionary Phonology

- Core philosophy
 - Paraphrasing Jespersen (1899), to truly understand a linguistic system we must know how it came to be
 - Phonological phenomena can often be explained with reference to common, phonetically motivated sound change
 - If a diachronic explanation is available, no synchronic explanation is necessary

Evolutionary Phonology

Typology of changes

- Change
 - X is misheard as Y due to perceptual similarities
- Chance
 - X is phonologically ambiguous, causing L to categorize it differently from S
- Choice
 - Due to variation in the pronunciation of X , L associates it with a different prototype or phonological category than S

Evolutionary Phonology

- Change
 - *X* is misheard as *Y* due to perceptual similarities

[apda] → [abda]

- If [p] is unreleased, it is impossible to determine the boundary between the bilabial closure and the alveolar closure, and thus difficult to determine the phonological origin of closure voicing

Evolutionary Phonology

- Chance

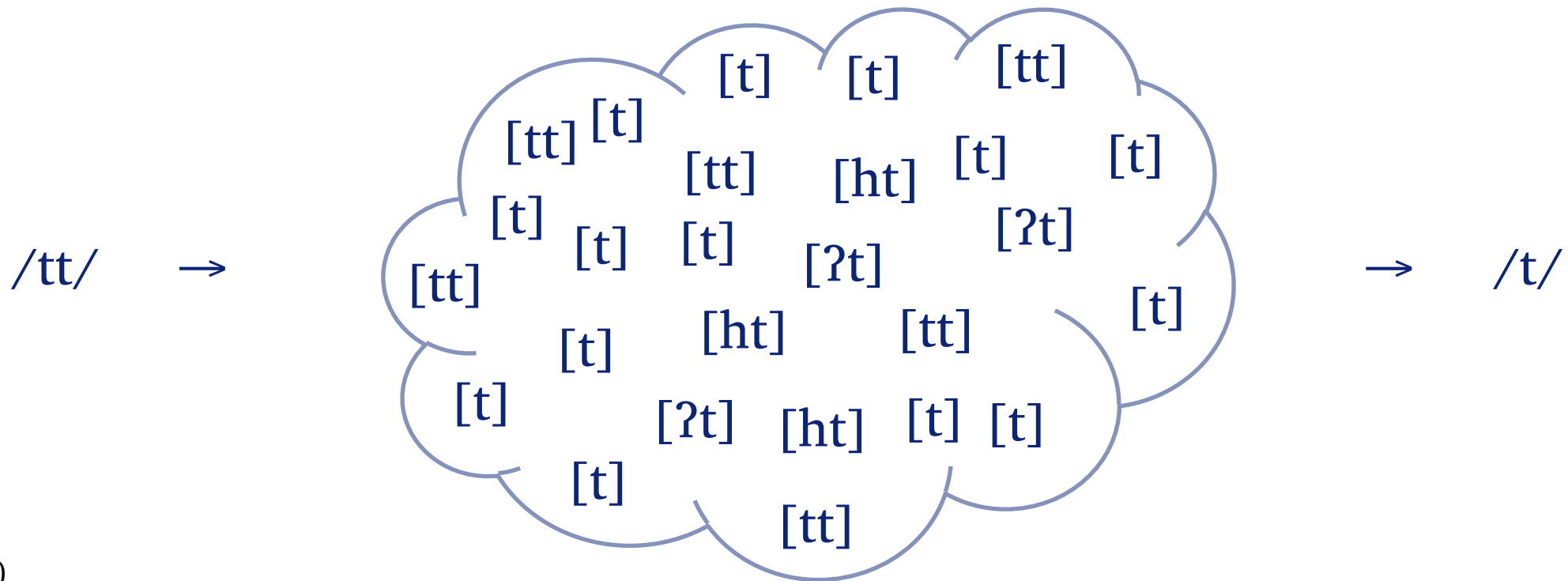
- X is phonologically ambiguous, causing L to categorize it differently from S

$/aʔ/ \rightarrow [ʔaʔ] \rightarrow /ʔa/$

Evolutionary Phonology

- Choice

- Due to variation in the pronunciation of *X*, *L* associates it with a different prototype or phonological category than *S*



Danish around 1700

Phoneme	Strong	Weak
/p/	[p]	[p]
/t/	[t]	[t]
/k/	[k]	[k]
/b/	[b]	[β]
/d/	[d]	[ð]
/g/	[g]	[ɣ]

- Weak /b d g/ allophones spirantize to retain laryngeal contrast

- Voicing is difficult to maintain during closure, *especially* in final position (Westbury and Keating 1986)

- Final [b d g] are more likely to be *misperceived* than [β ð ɣ]
→ [β ð ɣ] fare better in *natural selection* (Wedel 2006)

Choice as primary /b d g/ allophones change

Sidebar: 500 years earlier...

Phoneme	Weak allophone
[β]	/b/
[ð]	/d/
[ɣ]	/g/
	/f/
	/θ/
	/h/

- Stops had a similar distribution, but the voiced fricatives were reanalyzed as allophones of the voiceless fricatives
- This is due to **chance**
 - [β ð ɣ] were phonologically ambiguous, and thus reclassified

Danish around 1700

Phoneme	Strong	Weak
/p/	[p ^h]	[p]
/t/	[t ^h]	[t]
/k/	[k ^h]	[k]
/b/	[p]	[β]
/d/	[t]	[ð]
/g/	[k]	[ɣ]

- **More loss of obstruent voicing**

- Initial stop voicing is *also* difficult to maintain
- Aspiration is introduced to retain laryngeal contrast

Choice as primary allophones change

Danish around 1700

Phoneme	Strong	Weak
/p/	[p ^h]	[p]
/t/	[t ^h]	[t]
/k/	[k ^h]	[k]
/b/	[p]	[β]
/d/	[t]	[ð]
/g/	[k]	[ɣ]

- Why this difference in strategies in syllable-initial and syllable-final position?
 - Syllable-final segments are overall shorter
→ greater tendency for gestural undershoot
(Keating et al. 2004)

Danish around 1850

Phoneme	Strong	Weak
/p/	[p ^h]	[p]
/t/	[t ^h]	[t]
/k/	[k ^h]	[k]
/b/	[p]	[β]
/d/	[t]	[ð]
/g/	[k]	[ɣ]

- **More loss of obstruent voicing**

- Voicing is easier to retain in approximants than fricatives

- Two options: *devoicing* or *approximation*

- Several regional varieties “chose” devoicing

- Copenhagen Danish “chose” approximation

Recategorization: Change

S		L
[β̥]	→	[w]
[ɥ̥]	→	[w]
[ɥ]	→	[j]
[ɥ̥]	→	∅

Recategorization: Change

This is rooted in **change**

- [β̞] and [w] are inherently similar
 - Labial and dorsal approximation both serve to lower F2
- [ɥ̞] is very prone to coarticulation
 - Fine control of the tongue body is more difficult than the tongue tip (Vilain et al. 1998; Ouni 2014)
 - *Labial and dorsal approximation both serve to lower F2*
 - [ij] and [uw] are terrible diphthongs

Recategorization: Change + Chance

S		L
/b/	→ [w]	→ /v/
/g/	→ [w]	→ /v/
/g/	→ [j]	→ /j/
/g/	→ zero	→ nothing

Summary of main claims

- The stop-glide alternations in synchronic Standard Danish are rooted in **suppletion**, not phonology or morphophonology
- Two reactions to the pressure against obstruent voicing (**choice**)
 - *Initially*: Loss of voicing, development of aspiration in /p t k/
 - *Finally*: Approximation of /b d g/ (gestural undershoot is more common syllable-finally)
- [β̥ ɣ̥] misperceived as existing [w j (∅)] due to well-known perceptual pressures (**change**)
- The now-ambiguous [w j (∅)] are recategorized as /v j (∅)/ (**chance**)

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Tak for jeres opmærksomhed!



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Bij ons leer je de wereld kennen