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## A simpler view of Danish stød

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## Abstract

In this paper, I argue that Danish stød should be analyzed as a separate phonation type, similar to creaky voice, following the phonetic analysis of Fischer-Jørgensen 1989, and not as surface manifestation of an underlying HL tonal pattern (contra Riad 2000). Furthermore, I argue that the distribution of stød needs to be treated in terms of lexical phonology, since it is in fact the morphology which plays a primary rôle in determining its appearance. Previous work has neglected the use of lexical phonology (e.g. Basbøll 2005), which captures the interplay of phonology and morphology better than any other system to date. However, I also believe Optimality Theory has a part to play in the analysis, and it is used to account for the failure of stød to appear in syllables where it would be otherwise predicted by the lexical phonological rules.

# A Simpler View of Danish Stød

Jonathan Gress-Wright

## 1 Introduction

Stød is an important feature of Danish phonology which has not received adequate treatment in a generative framework in English. Currently the major English work in Danish phonology, *The Phonology of Danish* by Hans Basbøll, gives a highly detailed treatment of stød which is nevertheless complicated by a rather obscure theoretical approach to the morphology. A simpler and more readable introduction can be found in *Danish* by Michael Herslund, but here the presentation is marred by a confusion between historical and synchronic patterns. For example, in discussing the lexicality of stød, regarding words like *hal* [hal'] and *tal* [tal], he points to the cognate Swedish *hall*, with a real geminate *l*, in order to support his interpretation of the Danish final *l* as an underlying geminate. Clearly native Danish speakers have no idea that this word even has a cognate when they are learning the language, and there is no other evidence in Danish for geminates of any kind (other than long vowels), so trying to attribute stød to underlying geminates is too abstract given the evidence.

The purpose of such abstract analyses is to allow phonological rules to be postulated which can predict stød for all or at least most syllables. The purpose of this presentation is to point out the fallacy in such an approach. Wherever we are confronted with a highly complicated and irregular distribution of a feature, as we do with stød, we ought to avoid a strictly phonological approach, which basically assumes that stød is not present underlyingly and is entirely predictable by rules. Our thesis is that stød is present underlyingly in certain words, and not in others, and that it is sometimes added or taken away by morphophonological processes. Phonology does in fact play a role in predicting the appearance of stød, but only where it cannot occur, not where it can occur.

The best way to understand the data is to look at it historically, since the synchronic rules which predict stød, such as there are, are generally opaque and deeply embedded in the morphology; moreover, stød is clearly lexicalized for many words. By following the development of the language over the centuries, one learns at what point various mergers and splits occurred, and thus what the current underlying forms ought to be. For instance, the notion that stød appearing on final sonorants can be attributed to a HL tonal pattern as realized on a monosyllable (see Ito and Mester 1997, Riad 2000) is hard

to maintain when one learns that many such monosyllables had become disyllables already in the Middle Ages, and yet the distinction between old monosyllables and old disyllables is still encoded through *stød* (as it is through accent in Swedish).

This presentation begins with a brief outline of the phonetics of *stød* and what that can tell us about the phonology. We then discuss the apparent phonological rules for *stød* and show that the only thing we can predict is where it does not occur. Finally we look at morphology, and conclude that, in terms of lexical phonology, we can in fact make some predictions, namely that morphological Level 1 affixes remove *stød* from stems, and Level 2 affixes add it. A phonological surface filter then prevents *stød* appearing on certain syllables where it would otherwise be predicted by the morphophonological rules.

## 2 Phonetics and Phonology

The position of *stød* in the syllable (when it occurs) is completely predictable, based on vowel length and sonority of the coda. *Stød* consists of a constriction of the glottis, pronounced at the same time as a vowel or sonorant in the syllable coda; it is never pronounced with an obstruent:

- (1) *pæ'n* 'nice' ~ *pen'* 'pen' ~ *ven* 'friend'

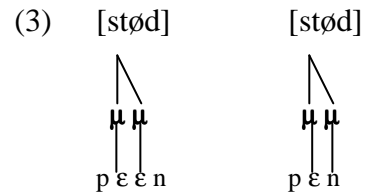
It always occurs on a stressed syllable; if a word or syllable which has *stød* in isolation loses stress in the course of an utterance, it loses *stød*. Syllables where it is pronounced on the sonorant invariably have a short vowel; syllables where it is pronounced on the vowel generally show an underlying long vowel in morphological alternations (and there is no evidence such vowels are ever short):

- (2) *pæ'n* ~ *pæne*, *bi'* 'bee' vs. *vi* 'we'

Thus, all evidence points to *stød* as a property of the syllable.

A moraic analysis of the syllable, as elaborated by Hans Basbøll, still yields the best results: in Danish, only [+son] segments project moras, and *stød*, as an autosegmental feature of the syllable, attaches itself to the second mora of a syllable, if it exists (i.e. where the vowel is long, or if short, followed by a sonorant in the coda); if not, no *stød* occurs, even if predicted by other rules. In his earlier work Basbøll described *stød* as signaling the second mora in the syllable, but later phonetic work with Nina Grønnum proved that the phonetic effects of *stød*, both in production and perception, were distrib-

uted over the whole syllable rhyme. Hence our analysis below:



Phonologically, stød is predictable as to where it does NOT occur, rather than where it occurs; i.e. it is a classic *surface filter*. Surface filters are ideally expressed in terms of constraints rather than rules<sup>1</sup>, so an OT representation is appropriate. In OT terms, stød should be part of the *input*.

Constraints:

ALIGN-stød(μμ): align stød with two moras

The first example is somewhat superfluous, since the evidence suggests that simple lexemes either have or don't have stød according to historic factors:

/huus/ + stød	MAX
hu:s	*!
☞ hu:ˈs	

However, here's an example of where we might expect stød for morphophonological reasons, namely with a suffixed article (cf. *venn'en* ~ *ven*):

*læsset* (the load)

/læs/ + /et/ + stød	ALIGN-stød(μμ)	DEP	MAX
☞ læsset			*
læss'et	*!		
læ'sset	*!		
læ:ˈsset		*!	

As regards morphology, we are dealing with a highly complicated distribution involving various defaults, categorical exceptions and individual excep-

<sup>1</sup>Actually, I prefer to think of constraints acting on rules rather than underlying forms, but that has nothing to contribute directly to this matter.

tions, which is typical for the lexicon and for morphology, but is not expected for phonology. Whether or not stød becomes assigned to a syllable depends on the morphological rules or the lexical specifications; only after stød is assigned in that way can it become input to the simple set of constraints given above.

Phonetic correlates include frequently a higher F0 preceding the stød, followed by a drop in F0; however, production of stød does not necessarily interfere with the normal word intonation, which consists of a rising tone on stressed syllables in Copenhagen, or falling in e.g. East Jutland. This is important, since it contradicts a belief among some phonologists that stød still reflects an underlying tonal accent (basically, a HL pattern, similar to Accent 1 in Swedish). Apart from stød, there is no evidence of any lexical or morphological tone or pitch accent in Danish; stress, of course, is independent, as in Swedish. In fact, evidence points to stød as a distinct phonation type, like creaky voice, breathy voice, or plain voice; in Danish it does not occur together with lexical tone, although in other languages it does or may do, e.g. Burmese, Lithuanian. The best work on the phonetics of stød which is also easily available is the article in *Phonetica* 46, 1989, by Eli Fischer-Jørgensen (her more substantial book on the subject from 1987 is hard to find).

### 3 Facts: Which words have stød and which do not?

#### 3.1 Accent 1 and Accent 2

A feature of most East Scandinavian dialects is the tonal distinction between Accent 1, and Accent 2. Words which were monosyllables got Accent 1; polysyllables got Accent 2:

- (4) *bur'en* 'the cage' (*en bur*) ~ *bur'en* 'borne' (*att bära*) (Sw) *sval'en*  
*(en sval)* 'the porch' ~ *sval'en* 'the swallow' (*en svale*) (Nw)  
 [exx. from Haugen 1982]  
 H\*L = '     H\*LH = `

Subsequent changes (e.g. vowel epenthesis before non-syllabic /r/) obscured this state of affairs:

- (5) Swedish *vinter* Accent 1 (cf. ON *vetr*)  
*sommar* Accent 2 (cf. ON *sumar*)

Danish does not preserve the accentual distinction, although most agree that the language used to share it along with other ESc languages. This is based on the widespread lexical correspondence in Danish and Swedish between

forms with stød and forms with Accent 1 on the one hand, and forms without stød and Accent 2 on the other:

- (6) Danish vin'ter sommer  
cf. definite vintren, sommeren

One important phonological difference between Accent 1 and stød is that Accent 1 appears on *all* original monosyllables in Swedish, regardless of syllable structure, whereas stød in Danish only appeared on syllables with the structure outlined above (long vowel or short vowel and sonorant); this is evidence that stød is *not a tonal phenomenon*, and hasn't been for some time. It also appears, as we shall see, that monosyllables with original short vowels and *single final sonorants* did not get stød; only those with final *geminate sonorants* got stød; this distinction became opaque once geminates were simplified in Danish:

- (7) *hund* 'dog' ~ *hun* 'she'  
*se'n* 'late' ~ *sind* 'mind'  
*læs* 'load'

etymologies<sup>2</sup>: *hund* < ON *hundr* < PGmc *\*hunda-*  
*hun* < ON *hón* < PN *\*ha:nu*

This means that the learner no longer has evidence that stød is phonological. That *original* monosyllables got Accent 1 (HL) which *subsequently* turned into stød, under the right conditions, is crucial in accounting for much of the following distribution; equally crucial is the fact that polysyllables without stød originate in Accent 2 (HLH), and that lack of stød has in fact nothing to do with polysyllabicity *per se*.

What follows is a brief outline of the sound changes which gave rise to stød:

- 1) HL assigned to monosyllables, HLH to disyllables
- 2) syllabic structures merge, tone no longer predictable
- 3) borrowings get assigned default accent (i.e. HL)
- 4) HL > stød

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<sup>2</sup>*hund* went through a stage /hunn/, though never written as such; cf. *pen* ' < /penn/ < LG *penne*; *sen* < ON *seinn* < PG *\*sainus*, *sind* < /sinn/ < LG *sin*, acquiring the geminate after borrowing (see Haugen on lengthening of short syllables); *læs* < *lass*, *læss* << ON *hlass*

- 5) possibly a period in which stød is default
- 6) stød no longer default, and subsequent borrowings would generally *not* get stød, unless some kind of analogy or productive morphophonemic rule were at work

### 3.2 Stød-basis: The phonological ‘rules’

Synchronically, all long vowels, glides ([j, w, ɔ]), nasals and liquids can have stød. Glides arising from lenited /g/ and /d/ were formerly fricatives which did not bear stød; the stød instead was on the long vowel. Often, old-fashioned Danish grammars will prescribe a pronunciation with stød on the vowel in these cases, but nowadays the stød is almost universally on the glide (while the vowel has shortened before such glides).

Some have thought that nasals and liquids which bear stød are still synchronically long. However, this is hard to maintain because phonemic length otherwise does not appear on any consonants (see Basbøll 2005 for discussion of his previous espousal of this theory). The problem is analogous to theories that stød still reflects underlying tone, which otherwise does not occur in Danish (Ito and Mester 1997).

The phoneme /r/ is underlyingly a uvular/pharyngeal fricative, which nowadays becomes vocalized after a vowel (after /a/ it merges with the vowel, otherwise it is a low central glide). Before vocalization occurred, it assimilated in voicing to following sounds, i.e. it was a voiceless fricative before voiceless stops, and hence could not bear stød. But now that it becomes a voiced glide in these positions after a vowel, stød has gradually spread to such words (be lexical diffusion in some cases, by generalization of morphophonological rules in others), e.g. *sport*, *ar't*; *vir*k ~ *vir'k*; *kørsel* ~ *kør'sel*.

That some words, like *ven*, which could in principle bear stød, yet nevertheless do not, shows that stød can be lexically specified. Lack of stød arose from final consonant extrametricality at the time HL > stød, so that only geminate sonorants allowed stød (see ex. 6). That a following definite article adds stød (*venn'en*) shows that stød is productive, but at the morphophonological (or lexical phonological) level only. Since it is a disyllable, stød cannot be accounted for in an analysis which predicts no stød for disyllables. Moreover, one cannot claim that *ven* has stød underlyingly (with extrametricality applying on the surface), since there are plenty of words of otherwise identical structure which DO have stød on the surface (e.g. *vend'*, ‘turn!’). Certain endings seem to add or remove stød, but often only in certain word classes, and no phonological generalizations can account for the whole distribution.

### 3.3 The morphological ‘rules’

Rules for adding and removing stød may appear to make reference to phonological structure, but they are restricted to certain endings and word classes. Whereas in Swedish the suffixed article simply has no effect on the tonal pattern of the noun, in Danish we see that it actually *adds* stød to forms that can receive it (*venn'en, gud'en*). The plural ending *-er* is now default stød-adding (*Chagall ~ Chagall'er*), but only to syllables which can receive it. Plural *-e* is stød-removing within a closed class of nouns (*hu's, huse*). Stød is lost on first elements of compounds, and added to second elements (*land', mand', landmand'*). Whether or not this arose from HL being confined to the right boundary (see Riad 2000), we see no reason to believe this is still the case in Danish, since there are several exceptions (*land'smands', ta'bstal*).

Function words like pronouns, prepositions and conjunctions usually have stød when stressed, no stød when not. We can predict that loss of stress invariably results in loss of stød, but gaining stress does not automatically result in gaining stød. This also applies to verbs, which frequently lose stress when not undergoing pragmatic focus (e.g. by intonation), and by losing stress they lose stød (*han spiser kagen ~ han spi'ser kagen*).

Unlike nouns, verb stems usually bear stød if the syllable structure allows, if we can rely on the evidence of affixless imperatives (exceptions mainly include stems ending in /r/ and voiceless segment). Mostly infinitives and weak preterite endings have no stød (*tale, talte, hentede*), while imperatives always have stød (*ta'!*). Present tense in *-er* usually has stød (*ta'ler*), except verbs from the old weak II conjugation (*hente, henter, hentede*) and heavy stem weak I (*sende, sender, sendte*) (more evidence for morphology). In these cases the present tense stem can be said to end in an unstressed vowel in the UR, so that it cannot bear stød; an alternative analysis would say that the ending *-er* in these cases was not stød-adding. Past pple. suffixes *-en/-et* do not add stød (*hentet* 'fetched'), but *-t* does (*spi'st ~ spiste*).

Words borrowed when Danish was still tonal got Accent 1, the default accent. The distinction between the two accent types became opaque after e.g. vowel epenthesis occurred (see ex. 4), so accent 2 was now found only in closed class. These words then got stød by regular change HL > stød. It's possible that afterwards some rule arose giving stød to final stressed syllables of polysyllables, which would explain why many Latin borrowings have stød (*generel', situatio'n*, via German and French, respectively). Also, a rule giving stød to monosyllabic words ending in *-el, -er* may explain why it's found in relatively recent borrowings like *sa'bel, fly'gel*, borrowed after the time most believe stød arose (both from modern High German). The exact chronology needs to be worked out however (Danish is hampered by a lack

of a dictionary chronicling the date of first attestations). But there's no evidence that addition of *stød* before these endings is still productive in the phonology (e.g. *charter*).

Overall, some lexicalization of *stød* is not incompatible with certain morphophonological rules predicting it in certain derived and inflected forms. We shall present the suggested rules in terms of lexical phonology (see tables at end). Firstly, there are morphemes which appear to take away *stød*. This kind of alternation between *stød* on the basic form, and its absence on the affixed form (e.g. *hu's*, *huse*) must be very old, since it must date from the time when HL accent was assigned to monosyllables, and HLH to polysyllables. That distinction already became lexicalized by the 13<sup>th</sup> century, and the change of HL to *stød* happened by around 1500. The productive plural affix in modern Danish is *-er*, which certainly has no effect on *stød* in new words like *bi'l*, *bi'ler*. Therefore, affixes which appear to remove *stød* should be placed in Level 1, where very specialized alternations occur, while productive affixes should be Level 2 (cf. the 'k-palatalization' rule in English, e.g. *opaque* ~ *opacity*; this only applies before a restricted class of Latinate affixes, and never appears before more productive affixes, e.g. *opaque-ish*).

Next, there are affixes which appear to add *stød*; these are Level 2. For example, *-er* plural *ven*, *venn'er*, or present tense *-er*, *ta'ler* ~ *tale* (the infinitive ending *-e* is Level 1, added to the stem *ta'l*). That these endings add *stød* now owes itself to the originally non-syllabic character of the ending *-r*, found in both certain ON plurals and present tense forms. In the Old Danish period, this ending acquired a vowel, and hence the presence of *stød* in the preceding syllable was learnt as a morphological, rather than a phonological rule.

As far as stems go, these seem to have underlying specification for *stød* or without. There is an interesting difference in treatment for nouns and verbs, however. Nouns, when they surface as bare stems, either have *stød* or not. Verbs, when they surface as bare stems, i.e. in imperatives (or in the small class of monosyllabic infinitives), always have *stød*. It is possible there is or was a rule adding *stød* to the imperative (hence spread of *stød* to syllables which formerly couldn't bear it, e.g. *vir(')k*). Moreover, there are many verb stems which never lose it, even before apparently Level 1 affixes (so *tale*, but *beta'le*). At the end of the handout, we have tried an analysis where the prefix adds *stød* at level 2, after *stød* had been taken away at level 1. When a compound is derived, preceding and following elements have opposite effects. This may not be as simple as we would like, but the facts are themselves complicated, and it is quite common for languages to acquire difficult and irregular patterns in the morphology; on the other hand, it is

quite uncommon for such irregularity to be found in the sound system alone. Therefore, it only seems reasonable to conclude that *stød* is not phonologically predictable.

Lexical phonology:

stem	/hu's/	/hu's/	/ven/	/ven/
Level 1	-	+ <i>-e</i>	-	-
-stød	-	hu:s-e	-	-
Level 2	-	-	-	+ <i>-en</i>
+stød	-	-	-	ven'-en
	<i>hu's</i>	<i>huse</i>	<i>ven</i>	<i>venn'en</i>
stem	/ta'l/	/ta'l/	/ta'l/	/kend/
Level 1	-	+ <i>-e</i>	-	+ <i>-er</i>
-stød	-	ta:l-e	ta'l	kend-er
Level 2	-	-	+ <i>-er</i>	-
+stød	-	-	ta'l-er	-
	<i>ta'!</i>	<i>tale</i>	<i>ta'ler</i>	<i>kender</i>
stem	/ta'l/	/fø'r/	/bro'/	
Level 1	+ <i>-e</i>	+ <i>-else</i>	+ <i>-ste'n</i>	
-stød	ta:l-e	fø:r-else	bro-ste'n	
Level 2	+ <i>be-</i>	+ <i>jævn-</i>	-	
+stød	be-ta'l-e	jævn-fø'r-else	-	
	<i>beta'le</i>	<i>jævnfø'relse</i>	<i>broste'n</i>	

#### 4 Bibliographical Note

The best sources for the facts are Jespersen (1949) and Hansen (1943); both are in Danish. They are also becoming out of date as the language changes and *stød* spreads to new words and classes of words. For this, see Brink and Lund (1975), also in Danish (although some editions are available with an English summary), covering changes from 1840 to 1950. Basbøll (2005) alludes to some ongoing changes.

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