
doi:

Article

Stød in unexpected morphological contexts in Standard Danish – an experimental approach to sound change in progress

Nina Grønnum, Nicolai Pharao and Hans Basbøll2

Abstract

In recent years stød has been heard in words where the current principles of its distribution would have it absent. Thus, a disyllabic stem like [ˈsiːðə] side ‘page’ is without stød, but has been heard with stød in [ˈb̥ɑwˌsiːˀðə] bagside ‘backside.’ – We designed an experiment requiring speakers to produce 40 compounds consisting of known words with primary stress succeeded by simple disyllabic nonce nouns, uninflected and inflected. – The results indicate that the context for stød is indeed expanding. Furthermore, within this new environment stød patterns in the same manner as in the existing vocabulary: more stød in nouns (1) in the definite singular, (2) with short stressed vowels, (3) after a monosyllabic word if the stressed vowel of the nonce noun is short. That strengthens our belief that we are not dealing with spurious mistakes, but a systematic change which will eventually partially suspend a word structure non-stød principle.

Keywords: Danish, experimental phonology, morphology, non-stød principle, productivity, prosody, sound change, stød, word structure
1. INTRODUCTION

In the chapter “Danish stød – towards simpler structural principles?” Grønnum and Basbøll (2012) present a collection of words with unexpected occurrences of stød which Nina Grønnum culled from radio broadcasts in the late 1990s and the noughties, from speakers who did not otherwise deviate from the Standard Danish pronunciation norm. We suggested that the putative changes implied by NG’s corpus would lead to modifications (simplifications) in the principles of stød assignment as these principles have hitherto applied, and we concluded a section about the theoretical implications of such changes thus: ‘The productivity of this purported change in the nature of the stød governing principles can be tested in fairly straightforward production experiments’ (p. 44). The three of us now pick up where two of us left off.

Section 2 contains an overview of the phonetic nature of stød, its phonological function, and its present distribution in mono-morphemic lexemes, in inflection and derivation, and in compounds. We also take a brief look at similarities with the word accents of Swedish and Norwegian word accents. The account is based on Basbøll’s Non-Stød Model (2005, 2008, 2014), with certain, mainly terminological, deviations.

Section 3 summarizes the contents of NGs corpus and shows how the words in the collection would surprise a speaker of Standard Danish.

Section 4 describes the experiment. It falls squarely within the well-established experimental phonology paradigm; see, for instance, Ohala & Jaeger (1986). In so far as the method proves fruitful in our context, and we can explain the results, production studies like this may have a role to play more generally in questions about on-going, synchronic sound change.
Section 5 presents the results and finds that an apparent propensity for stød in the definite singular in the test words may be have its origin in an analog overweight of stød in the definite singular in existing words in the Danish lexicon.

Finally, Section 6 discusses the theoretical implications and outlines the

2. STØD – ITS FUNCTION AND DISTRIBUTION

Stød is laryngealization, a specific kind of creaky voice: non-modal voice with aperiodic vocal fold vibrations and irregular amplitude, often but not invariably accompanied by a local fundamental frequency (F₀) perturbation, an abrupt and brief F₀ dip. Such is its prototypical appearance, but the manifestation may be considerably weaker and resemble modal voice more: a somewhat compressed voice quality lacking creak proper and/or lacking F₀ perturbation, normally associated with some gradual decrease in intensity towards the end of the rhyme – as opposed to the comprehensive and very irregular decrease in intensity in the creaky manifestation (see Fischer-Jørgensen 1987, 1989a, 1989b; Grønnum & Basbøll 2001, 2007, 2012; Hansen 2015).

Stød is associated with syllables – not specific segments, nor words. (i) It occurs only in syllables with more than zero stress, and (ii) it requires a long sonority rhyme: either a long vowel or a short vowel followed by a sonorant consonant (in either case succeeded or not by one or more consonants) – so-called stød-basis (see Martinet 1937, Hansen 1943). Thus, [seːˀ ʂɡ̊ æːˀb̥ seːˀnd̥ ɛːˀsd̥] se, skab, sent, bæst ‘see, closet, late, monster’ have long sonority rhymes and stød-basis, as do [pʰɛnˀ pʰɛlˀs halˀm] pen, pels, halm ‘nice, fur, straw’; but [duto dɪd hɛs̥tʰɛs̥d] du, dit, hest, tekst ‘you, yours, horse, text’ do not. Syllables with long sonority rhyme and more than zero stress are heavy in Danish phonology according to Basbøll (e.g. 2005). Note that ‘heavy’ is not synonymous with ‘stød.’ Heavy syllables also occur without stød, as
Even though the laryngealization extends over the whole syllable rhyme, convention transcribes stød with a raised glottal stop symbol, [ʔ], after the vowel if it is long, and after the first postvocalic consonant if the vowel is short.

2.1. The Non-Stød Model


In sections 4.1–4.5 below we present an outline of Hans Basbøll’s Non-Stød Model. Note, however, that we do not exploit it to its full potential. We have omitted reference to suffix positions in the word and suffix productivity.

2.2 Native-like and non-native-like; word structure non-stød and lexical non-stød;

extra-prosodicity

In Basbøll’s Non-Stød Model (e.g. 2008, 2014) the vocabulary is bipartitioned into native-like and non-native-like where stød is concerned. There are two types of stød principles, and they apply somewhat differently within the two groups of words. Word structure non-stød principles (which are the further subject of sections 4.3–5 below) apply exclusively within the native-like vocabulary. But they are not the only principles in evidence among native-like
words. Lexical non-stød is responsible for the absence of stød (1) in certain words ending in a short vowel succeeded by one sonorant consonant, like [ˈvɛn ɣul leð] ven, guld, led ‘friend, gold, joint’ (but not in others of similar structure, e.g. [mænʰ halˈ viːʔə/ viðʔ] mand, hal, hvid ‘man, hall, white’); (2) in words ending in a final (stressed or unstressed) short full vowel, like [nu ˈvila ˈveːtə] nu, villa, veto ‘now, villa, veto’; (3) in words like [tɔːsɡʰ fæːʂɡʰ] torsk, fersk ‘cod, fresh’ which were previously pronounced with unvoiced consonantal [ɣ], hence without stød-basis. However, the words in (1) and (2) appear with stød in inflection, thus in the def.sg. [ˈvɛnʰ ɣulʰɤ ˈleðʰɤ ˈnuːʔ ˈviːlɛːʔ ˈveːtʰə] vennen, guldet, leddet; nuet, villaen, vetoet. That is because in the uninflected words, the word final consonants in (1) and the length in (2) are marked as extraprosodic and thus do not enter into the heavy~light syllable account, i.e. the syllables are not heavy, hence without stød. But add a suffix and these elements are no longer word final, therefore not extraprosodic, wherefore the syllables become heavy and stød appears. By contrast, the words with long vowel sounds in (3) remain without stød throughout.

In the non-native-like vocabulary, lexical non-stød is general. Thus, recent English and French loans are without stød, as in [tʰiːm hæːŋ sʰæŋ] team, band, spin and [faˈsʌŋ pʰaˈtʰe] facon, paté. But if the vowel is short such words acquire stød in inflection, just like native words, as in the def.sg. [ˈsʰæŋnɒ faˈsʌŋʰn] spinnet, faconen and [pʰaˈtʰeːn] patéen. Words with long vowels remain without stød throughout, like def.sg. [tʰiːmˈdɔ ʰæːnːdɔ] teamet, bandet, exactly like torsk and fersk in the native vocabulary. In other words, lexical non-stød applies in the same manner to native and non-native words alike. See further Basbøll (2008:155–160).

We are concerned only with the native-like vocabulary in the context of the experiment which is the subject of this paper.
2.3 The stød principles are productive in modern Danish

Although stød versus non-stød is distinctive (see above), presence or absence of stød is to a very large extent predictable from morphological structure according to the word structure non-stød principles, and they are productive in modern Danish. Thus, German names as well as Greek and Latin loans have stød in heavy syllables, like [ˈmoːˌsaːˈd̥] Mozart, [ˈhɛnˈd̥l̩] Händel, and [ʰbaːms] Brahms; Greek and Latin [ˈneːmos ˈsenofoˈbiː ʰeməɡloˈbiːn] nemesis, xenofobi, haemoglobin, herbarium. These are all well-established names and loans in Danish and not per se proof of productivity to-day. But here are a couple of composers whom we have only just discovered, Johann Joseph Abert (1832–1915) and Melchior Vulpius (1570–1615), whose last names we unhesitatingly pronounce with stød, [ˈæːb̥ɐd̥ˈvulpʰius]. In the same way, we would say [ˈɛmˈpʰem] empym ‘pus in the pleural space,’ [imˈpʰeːˀtʰiɡ̊o] impetigo ‘an acute contagious staphylococcal or streptococcal skin disease characterized by vesicles, pustules, and yellowish crusts,’ and [bɔbɔˈmiː] borborygmi (pl. of borborygmus) ‘a rumbling or gurgling noise made by the movement of fluid and gas in the intestines,’ words which certainly (and fortunately) are not part of our everyday vocabulary. That is to say, the stød principles are productive, also in modern Danish, and they stipulate that (i) HEAVY SYLLABLES HAVE STØD, UNLESS (ii) LEXICAL NON-STØD or (iii) WORD STRUCTURE NON-STØD APPLY. Let us have a brief look at the word structure principles here and come back to them in the discussion in section 7.

2.4 Stød in monomorphemic lexemes

THE PENULTIMATE SYLLABLE OF LEXEMES HAS NO STØD, hence

[ˈmuːsa] muse ‘muse (n)’

[ˈtærŋd̥a] tante ‘aunt’

[ˈbamsə] bamse ‘teddy bear’
[ˈbaːlɑŋsə] balance ‘equilibrium’

[məˈmɑləd̥] marmelade ‘marmalade’

which is why [ˈɛmˀbeːd̥ə] embeđe, mentioned in section 2 above, is surprising.

If they are not penultimate, heavy syllables have stød, hence

[kʰoːʔ] ko ‘cow’

[muːʔs] mus ‘mouse’

[pʰan’d̥] pant ‘lien’

[vam’s] vams ‘doublet’

[ɡaːlan’d̥] galant ‘chivalrous’

[el’a fan’d̥] elefant ‘elephant’

[ˈkʰanˀaða] Canada

[ˈfluːʔd̥ ɔm] fluidum ‘fluid (n)’

There are two types of exceptions to this principle. (i) About 400 lexemes (of approximately 650) ending in |al əl ər| do have stød, marked in the lexicon, as in [ˈɛŋˀɡ̊l̩]


[ˈɔːb̥m̩] åben ‘open,’ [ˈald̥ e] alter ‘altar.’ (If | assimilates to a neighbouring vowel or sonorant consonant, and |ər | fuse into [ɛ],) (ii) A couple of hundred heavy monosyllables, principally nouns, with short vowel and a single postvocalic sonorant consonant are marked for lexical non-stød, as are words ending in short full vowels (see section 4.1 above).

2.5 Stød in inflection and derivation

Matters are more complex in inflected and derived words: some suffixes have no effect on the stem; others are integrated into the stem; others again vacillate, depending on the composition of the stem. A further complication arises from the fact that a number of suffixes which rank as non-integrating, nevertheless do get included into certain stems. There is no principled
difference between inflection and derivation in this respect (but see Basbøll 2005:471–489), so examples from inflection suffice:

The noun plural morpheme |ə|, which is no longer productive, is invariably integrated into the stem, the ensemble behaves like a disyllabic lexeme, and the penultimate syllable appears without stød, as in

[pʰelːs] pels ‘fur’       [’pʰelsə] pelse ‘furs’
[huː?] hus ‘house’       [’huːsə] huse ‘houses’

That is why [ƅe’tɛnˀd̥ə] betjente ‘police officers’ (sg. [ƅe’tɛnˀd̥] betjent), mentioned in section 2 above, is surprising.

The noun plural morpheme |ər|, which is the productive plural suffix, generally has no effect on the stem (except when added to a word final extraprosodic consonant, see section 4.1), hence

[’tʰanɗə] tante ‘aunt’       [’tʰanɗɐ] tanter ‘aunts’
(|ə|+|ə| contract to /ə/ and |ər| fuse into [ɐ]).

But there are exceptions, and integration does occur with certain stems, thus for instance also with [’fɔːˀm] form ‘shape,’ which is why it is normally pronounced [’fɔː:mr] without stød in the plural. Therefore [’fɔː?mr] with stød, mentioned in section 2 above, is surprising.

Infinitive |ə| is integrated into a monosyllabic stem, the ensemble looks like a disyllabic lexeme, accordingly the penultimate syllable appears without stød, as in

[ɡʰiːˀb] grib! catch!       [’ɡʰiːbə] gribe ‘catch’
[veŋd̥] vent! wait!        [’veŋdɔ] vente ‘wait’

but it is not integrated into a polysyllabic stem, as in

[ƅeˀ’ɡʰiːbə] begripe ‘comprehend’
[fx’veŋdɔ] forvente ‘expect’
The different ways that different suffixes interact (or not) with the stem are coupled to their productivity in the inflectional and derivational morphology; see further Basbøll (2005, 2014).

In this manner, absent any lexical specification, phonology (heavy versus light syllables) and morphology/word structure predict the presence or absence of stød. Conversely, stød or its absence may disambiguate word structure as mentioned in the introduction to section 4.

2.6 Stød in compounds
Compounding does not generally entail neither deletion nor addition of stød. With two exceptions: (i) loss of stød may occur in the first part, if it is monosyllabic and well established initially in compounds. Thus, for example, absence of stød in [ˈsoːlˌb̥ælɐ] *solbriller* ‘sun glasses’ (as well as every other *sol*-compound) from [soːl] *sol* ‘sun’ and [ˈb̥ælɐ] *briller* ‘glasses,’ whereas stød is retained in [ˈɡ̊ʌlfˌkʰl̥u̯nə] *golfklub* ‘golf club’ (as well as every other *golf*-compound) from [ɡ̊ʌlf] *golf* ‘golf’ and [kʰl̥u̯] *klub* ‘club’.

(ii) addition of stød is quite common to verbs, verbal derivatives, and adjectives as second members of compounds. Hansen (1943) lists numerous examples of non-initial infinitives and adjectives, for example [ˈfɔːɐˌɡ̊ɶjəlɐ] *foregøgle* ‘pretend’ and [ˈmoðˌsɒʁæːˀn̩ə] *modstræbende* ‘reluctant,’ whereas [ˈɡ̊æjlə] *gøgle* ‘joke (v.)’ and [ˈsɒʁæːˀn̩ə] *stræbende* ‘striving’ in isolation are without stød. However, the presence of stød in such compounds is not without exception. Again, Hansen (1943) lists a number of instances – less common words in the vocabulary according to him – where stød vacillates, for instance [ˈd̥øðˌb̥æŋn̩ə]/[ˈd̥øðˌb̥æŋn̩ə] *dødbringende* ‘lethal’ from [d̥øːˈd̥]/[døː] *død* ’death’ and [ˈb̥æŋn̩ə] *bringende* ‘bringing.’ – Brink & Lund (1975) tracked the development of pronunciation in Copenhagen in speakers born between 1840 and 1950. They note (pp. 499–507) that a verb in second position in a compound normally acquires stød, but after an initial
adjective or noun stød is not compulsory. Non-initial adjectives acquire stød much like verbs according to them. – We believe that stød addition to non-initial verbs and verbal derivatives in compounds is expanding in modern Danish. For instance, there are a couple of words in Nina Grønnum’s corpus which we have never come across: [ˈvalðɔ liː̃t̪nə] hvalpelignende (literally:) ‘puppyresembling’ from [ˈvalðɔ] hvalpe ‘puppies’ and [liːntə] lignende ‘resembling’ (mentioned in section 2 above) and [ˈje:su,tɔːjɔ:ntə] Jesustoende (literally:) ‘Jesusbelieving’ from [ˈje:su] Jesus and [tɔːjɔ:ntə] troende ‘believing.’ They look like ad hoc compounds and were likely created on the fly. – Brink & Lund also state that simple nouns hardly ever acquire stød in second position in a compound, for instance not in [fløːdɔ,kanəvæːdənt̪nə] flødekande, underverden ‘cream jar, underworld.’ But Nina Grønnum did observe stød in similar nouns, as in [ˈjɛmə,siːdəˈhuːd̪,faːwɔˈhʌn,kl̪eːdəˈliːs,gleːdəˈuːd̪,ɡəːwɔˈviːn,ɡɔmɪ] hjemmeside, hudfarve, håndklæde, livsglæde, udgave, vingummi ‘homepage, skin colour, towel, cheerfulness, edition, wine gum.’ In fact, such nouns even represent the single largest group of words, 150 in all, in Grønnum’s corpus (see section 2). – Here is a promising line of inquiry, and so the propensity for stød in simple disyllabic nouns in second position in two-word compounds is what the production experiment was designed to reveal.

Note that there are no monosyllables in the test material presented in section 5.1. Recall from section 4.3 that the vast majority of monosyllables with long sonority rhyme has stød. Therefore they would teach us nothing new about addition of stød to a noun in second position in a compound. But, true enough, a couple of hundred monosyllables with a short vowel and only one succeeding sonorant consonant are indeed without stød in the indef.sg., like [ven ɡul leð] ven, guld, led ‘friend, gold, joint,’ as mentioned in section 4.1. – However, firstly, there is no way we could give monosyllabic nonce words an orthographical representation that would ensure that they be conceived as stødless in isolation by our
speakers. Secondly, existing words of this structure invariably have stød in the def.sg. and some of them in the two plural forms as well.

2.7 Accent, compounds, and monosyllables in Swedish and Norwegian

Our enterprise has a certain similarity with similar investigations in Swedish and Norwegian. Thus, Bruce (1974) finds that varieties of Southern Swedish treat accents in compounds differently from the Central Swedish norm. In central Swedish a compound word as a whole invariably has Accent II, but in, e.g., Malmö the compound accent depends on the first word. If the first word is disyllabic the whole word takes over its accent, be it Accent I or Accent II. But if the first word is a monosyllable – which by definition has Accent I – there are two possibilities: (1) if the second word is stressed on its first syllable so that a stress clash arises, the ensemble has Accent I; (2) if the second word has a pretonic syllable, the ensemble has Accent II.

Kristoffersen (1992) reports a similar vacillation in compound accentuation in East Norwegian: A polysyllabic first word’s accent applies to the ensemble, but a monosyllable (with Accent I) first can lead to Accent I as well as Accent II on the whole word, with a tendency that the longer sonority rhyme is in first word, the greater is the likelihood of Accent II over the whole compound.

The similarity with Danish is superficial, however: There is nothing in the existing Danish compound vocabulary to suggest that the structure of either word in a compound (in terms of number of syllables or stress location) determines the presence or absence of stød in either word. – Most notable is that Danish differs decisively from Swedish and Norwegian in that compounds may have more than one “accent.” Stød in the first member may be succeeded by either stød or no stød in the second member; and stød in the second member may be preceded by either stød or no stød in the first member. Oxytone/monosyllabic first members have no
special status. If they are well established as first members of compounds – and hence without stød, they are without stød irrespective of what follows across the word boundary. Here is a list of compounds to illustrate the various compound types, including heavy monosyllables which are without stød in isolation as well as disyllables of the |al an ar| type some of which do have stød in isolation:

(1) Monosyllabic first member (not well established as such) with stød, which remains, [+gʃl f tœːʔ] golf, te ‘golf, tea,’ succeeded by mono- and disyllables with and without stød, respectively, and a trisyllable stressed on the second syllable:

[ʼɡʃl f, søːʔ: ʼɡʃl f, tœːj ʼɡʃl f, hæːnøː] golfsko, golføj, golfbane ‘golf shoe, golf clothes, golf course’; [ʼtœːʔ, sœːj ʼtœːʔ, kʰanøː ʼtœːʔ, hæːnøː] ʼtœːʔ:kʰam, sœːmøː] tesi, tekande, tehandel,

*tekomsammen* ‘tea strainer, tea pot, tea shop, tea gathering.’

(2) Monosyllabic first member (well established as such) with stød, [vær ˈsøːʔl] vand, sol ‘water, sun,’ which disappears, succeeded by mono- and disyllables with and without stød, respectively, and a disyllable stressed on the second syllable:

[ʼvan, ˈbaːd ʼvan, ˈgaːj ʼvan, kʰanøː ʼvan, veːʔsn] vandbad, vandgang, vandkande, vandvæsen ‘water bath, blunder/disappointment, watering can, waterworks’; [ʼsoːl ˈbaːdneŋ ʼsoːl ˈsɡ̊ en ʼsoːl ˈseːm ʼsoːl ˈsɡ̊ en] solbadning, solskin, soleksem ‘sun bathing, sunshine, sun eczema.’

(3) Disyllabic first member without stød, [ˈsøːmæ] sommer ‘summer,’ succeeded by mono- and disyllables with and without stød, respectively:

[ʼsøːmæ, søːgəː ʼsøːmæ, tœːj ʼsøːmæ, hæːnøː] sommersko, sommertoj, 

*summerhandel, sommerkjole* ‘summer shoe, summer clothes, summer trade, summer dress.’

(4) Disyllabic first member with stød, [ʼmøːʔb ʼæŋˈɡil] møbel, ankel ‘peace of furniture, ankle’ which remains, succeeded by mono- and disyllables with and without stød, respectively:
furniture art, cabinetmaker, furniture care’; [ˈanəˈɡləˌlæŋˀˌlæŋˀ ˈanəˈɡləˌleð ˈanəˈɡləˌsɡæːðə] ankellang, ankelled, ankelskade ‘ankle length, ankle joint, ankle injury.’

3. STØD IN UNEXPECTED CONTEXTS

Nina Grønnum’s corpus contains a total of 555 different words with unexpected stød, as in the examples in (xx)-(xx) below. (The normal stødless pronunciation is given in parenthesis after each example.)

There are 38 verbs, like

(xx) [ˈfølˈjə] følger ‘follow(s)’ ([ˈføljə])
[ˈfʁ̥iːəðə] friede ‘proposed in marriage’ ([ˈfʁ̥iːəðə])
[ˈd̥ ɑwˌd̥ ʁɶmˀd̥ ə] dagdrømte ‘daydreamed’ ([ˈd̥ ɑwˌd̥ ʁɶmd̥ ə])

There are 148 adjectives – all compounds, like

(xx) [ˈfʌlɡəˌkʰɛːˀɐ] folkekære ‘popular’ ([ˈfʌlɡəˌkʰɛːɐ])
[ˈɡ̊ ʁʌˌb̥ ʁuːˀnə] gråbrune ‘grey-brown’ ([ˈɡ̊ ʁʌˌb̥ ʁuːnə])
[ˈhalˌsuːˀɐ] halvsure ‘semi-acid’ ([ˈhalˌsuːɐ])

Among the 148 adjectives there are 87 verbal adjectives, like

(xx) [ˈvalb̥ əˌliːn̩ˌnə] hvalpelignende ‘puppy-rembling,’ ([ˈvalb̥ əˌliːn̩ˌnə])
[ˈand̥ eːlsˌɑjˀð̩ ə] andelsejede ‘share owned’ ([ˈand̥ eːlsˌɑjð̩ ə])
[ˈlɔɡ̊ neŋsˌtˢʁ̥uːˀð̩ ə] lukningstruede ‘threatened with closure’ ([ˈlɔɡ̊ neŋsˌtˢʁ̥uːð̩ ə])
Among a total of 369 nouns there are 35 simple nouns, like

(xx)  [ˈɛmˌbeːˀðə] *embede* ‘office (post)’ ([ˈɛmˌbeːːðə])
[beˈtɛnˀd̥ə] *betjente* ‘police officers’ ([beˈtɛnˀd̥ə])
[ˈfɒːˀmɐ] *former* ‘shapes’ ([ˈfɒːːmɐ])

There are 150 compounds with simple nouns in the second position, like

(xx)  [ˈliwsˌglæːðə] *livsglæde* ‘cheerfulnes’ ([ˈliwsˌglæːðə])
[ˈfɑːɑˌsoːn̩] *farezonen* ‘the danger zone’ ([ˈfɑːɑˌsoːn̩])
[ˈɔwˈflæːðn̩] *overfladen* ‘the surface’ ([ˈɔwˈflæːðn̩])
[ˈfʁ̥iheðsˌɡ̊ ʁɑːðɐ] *frihedsgrader* ‘degrees of freedom’ ([ˈfʁ̥iheðsˌɡ̊ ʁɑːðɐ])
[ˈsɔɡ̊ ɐˌʁoːɐn̩ə] *sukkerroerne* ‘the sugar beets’ ([ˈsɔɡ̊ ɐˌʁoːɐn̩ə])

There are 83 compounds with verbal nouns in second position, like

(xx)  [saˈtˢɛŋˌvɛwˀneŋ] *satinvæning* ‘satin weaving’ ([saˈtˢɛŋˌvɛwneŋ])
[ˈsɔnheðsˌsd̥ yːɐn̩ə] *Sundhedsstyrelsen* ‘the National Board of Health’
([ˈsɔnheðsˌsd̥ yːɐn̩ə])
[ˈsɔməˈtʰiˌd̥ anˀl̩s] *symmetridannelser* ‘symmetry formations’ ([ˈsɔməˈtʰiˌd̥ anˀl̩s])
[ˈjɔɐ̯ˌpʰʁ̥œ̞ːwɐn̩ə] *jordprøverne* ‘the soil samples’ ([ˈjɔɐ̯ˌpʰʁ̥œ̞ːwɐn̩ə])

There are 91 compounds with agent nouns in second position, like
There are only 4 compounds with stød added to the first member, like [ˈkʰveːˀlɐˌɡ̊ ʁæːˀb̥] kvælergreb ‘strangle hold’ ([normally [ˈkʰvæːlɐˌɡ̊ ʁæːˀb̥]). And there are and only 6 compounds whose second member is monosyllabic, like [ˈsʌɡ̊ əˌhʌlənɐ] sokkeholderne ‘the sock holders’ ([ˈsʌɡ̊ əˌhʌlənɐ]).

Altogether there are 510 compound words in the corpus, 490 of which are composed of only two words. Accordingly, we feel justified in disregarding longer compounds in the design of the experiment and the discussion which follows the presentation of the results.

In order to appreciate why stød in the examples above is unexpected and which principles are offended, the next section presents a brief outline of the relevant aspects of the phonology of Danish stød. Detailed and comprehensive accounts can be found in Basbøll (2005, 2008, 2014), Grønnum & Basbøll (2001, 2007, 2012), and Grønnum et al. (2013).

4. THE EXPERIMENT

4.1 Test material

Test words would have to be indubitably new in the speakers’ experience – otherwise how could we know if a stød was produced from memory or online, so to speak? In order not to unduly tax our speakers’ patience, we limited the test material to 40 nonce nouns, 37 disyllables and 3 trisyllables, 12 in the indef.sg., 10 in the def.sg., 10 in the indef.pl., and 8 in the def.pl. (mirroring the inflectional proportions among the 150 corresponding nouns in Nina
Grønnum’s corpus). They conform to the phonotactics of Danish, they are stressed on the initial syllable, they have long sonority rhyme, i.e. stød-basis, but presumably they are without stød in isolation. Semantically the words were intended to belong in three different realms: zoology/insects, trade/tools, and environment/pollution. The 40 nonce nouns were added as second member to 40 existing words as first member: 29 nouns, 7 verbs, 4 adverbs; 13 were monosyllables, 3 words were oxytonic disyllables, and 24 were disyllables with stress on the first syllable. The resulting compounds, with primary stress on the first word, secondary stress on the nonce noun, were inflected (or not) and inserted in meaningful sentences. Having no empirically founded notions about what would constitute a lesser or greater phonological propensity for stød attribution to disyllabic nouns like these, in this specific context (vowel length? type of intervocalic consonant? number of intervocalic consonants? etc.), we introduced a number of variables in the 40 compounds which make up the test material:

- Long or short stressed vowel (20:20).
- Higher or lower stressed vowel (13:27).
- Long stressed vowel succeeded by an obstruent or a sonorant consonant (9:11).
- Short stressed vowel plus sonorant consonant succeeded or not by another consonant (7:13).

3 nonce words were trisyllables ending in ‘-else’ [əlsə], and 37 were disyllables, 31 of which ended in ‘-e’ [æ]. 3 disyllables ended in ‘-um’ [əm], and 3 in ‘-ing’ [ɛŋ]. The latter 6 were to appear only in the indef.sg., because inflexion normally introduces stød and secondary stress in such nouns, as in [ˈałbɔm ˈał, ˈɔlˌbɔmˀ] ˈalˌbɔmˀ ˈalˌbɔmˀnˌt管辖ˈ ˈt管辖ŋˈ ˈt管辖nˌ管辖ˈ ˈt管辖nˌ管辖ˈə管辖] album, albummet, alburner, albummerne; tegning, tegningen, tegninger, tegningerne ‘album, the album, albums, the albums; drawing, the
drawing, drawings, the drawings,’ and we would learn nothing new from them in inflected form.

12 nonce words were neuter (indefinite article ‘et,’ def.sg. suffix [əd]), the rest were common (indefinite article ‘en,’ def.sg. suffix [ən]), reflecting the proportions in Nina Grønnum’s corpus.

The appendix contains the complete list of 40 compounds and the sentences in which they were inserted – after three introductory practice sentences with existing compound nouns.

4.2 Speakers and design

The participants in a phonetics course at the Department of Nordic Studies and Linguistics at Copenhagen University were invited to participate. 13 self-proclaimed speakers of Standard Copenhagen Danish accepted. They took the test in the sound proof recording studio at the department, reading off a computer screen, recording directly on to compact discs, with professional quality recording equipment.

<Figure 1 about here>

The first screen, in Figure 1, presented the broadly formulated purpose of the experiment and the procedure to follow: ‘we are interested in what happens when words are joined in compounds; therefore we have created a number of new words to be added to existing words; the new words belong within three semantic fields: zoology/insects; trade/tools; environment/pollution; each new word is presented with its meaning together with a sentence in which to insert the word; read only the sentence aloud, not the word and its meaning; first three known compound words for practice.’
Next came 3 screens for practice, succeeded by 40 test screens in randomized order; see the example in Figure 2.

Having completed this part, the following screen asked speakers to read aloud in succession the 40 sentences, interspersed with ten sentences with existing compounds to create some diversion, i.e. 50 sentences in all, 10 per screen. In this way, we doubled the number of responses and also introduced a measure of the consistency from the first to the second trial run. The continuous list was devoid of specific information about the nonce words, i.e. their gender and their disyllabic structure. – The speakers controlled the flow of screens (the page down button) themselves. The experimenter was present in the studio during the whole session, available for questions etc. The test took on average 15 minutes to complete.

5. RESULTS

5.1 Facts and statistics

Three speakers turned out during the recordings to have non-standard traits in their pronunciation and were excluded from further processing. – 40 words, 2 conditions, and 10 speakers ideally yield 800 responses. But mistakes were inevitably made, a screen was skipped over, a short vowel produced where we had intended a long one, or vice versa, the second member of the compound received the main stress, vowel–consonant metatheses occurred etc., etc., leaving us with a total of 761 valid responses.

Speakers differed considerably among themselves, one did not produce a single stød in the nonce part of the compounds in his valid responses, with 13 instances of stød by the highest scoring speaker. But the distribution across variables is not qualitatively different across speakers, i.e. speakers with fewer stød overall still have more stød in the def.sg. than elsewhere. – Tables 1 through 5 exhibit the results pooled across speakers.
67 nonce words, i.e. 9% of the total, were produced with stød. So, first off, there seems to be a tendency, albeit a rather weak one, for the word structure non-stød principle to be suspended in non-initial disyllabic nouns in compounds.

The majority of stød occurred in the second run of the test – reading sentences aloud in succession – without specific information about the nonce nouns, namely 38 compared to 29 stød in the first run. But the distribution across the 40 words, and the four inflections, is similar in the two conditions, i.e. the words that received the highest number of stød in the first trial run are the same words that received the highest number of stød in the second trial run. Note specifically that in the highest scoring group of words, the def.sg., there are only 3 more stød in the list reading (23) than in the first trial (20). Thus, we can pool responses from the two conditions and treat the 761 valid responses as one data set in the statistical calculations to follow below.

It is immediately evident that only words in the def.sg. received a significant number of stød, 22%, as against next to nothing, 2%, in the indef.sg., and very modest 6% in either plural form. One word, engtillet (14), stands out from the rest, with farvekralset (8), plastkyven (6), gammabålen (6), and borestællen (4) as runners-up. But there are more significant factors in the data. A CART (Classification And Regression Tree) analysis (see
Baayen 2008) was performed. We used the latest version of the package rpart (Therneau et al. 2018), implemented in R 3.0.3. The results are reproduced in Figure 3.

(1) The figure tells us, not surprisingly, that the first split in the data is in inflection, i.e.

def.sg. scores 43 stød in 194 responses (= 22%), versus 24 stød in 567 responses (= 4%) in the other three forms together.

(2) Within the def.sg., vowel length creates the next split, nouns with short stressed vowels exhibiting stød three times more often (27 stød in 75 responses = 36%) than those with long vowels (16 stød in 119 responses = 13%).

(3) Furthermore, when the stressed vowel in the nonce word is short, a monosyllabic first member induces stød in the second noun more often than does a disyllable (14 stød in 18 responses = 78% versus 13 stød in 57 responses = 23%). – No other variable in the data, among those listed in section 5.1, had a significant effect on responses.

We also fit a multiple logistic regression model with all of the factors and interactions found in the CART analysis and with a random intercept for speaker to the data. The model was stepped down from a full model, and the summary of the final model is shown in Table 6. Note that the interaction of inflectional type and vowel length did not emerge as significant.

Table 6 displays the significant factors apparent in the data. The (tripartite) factor inflection is calculated with reference to the def.sg. and shows how the other three forms differ – and to a highly significant degree as shown by the low p-values in the rightmost column: the negative estimates (-2.22; -1.90; -3.39) indicate that stød is less likely to occur than in the def.sg. Vowel length in the nonce word is apparently not a significant factor (p = 0.37); but the number of syllables in the first word plays a significant role (p = 0.0004), and the positive
estimate (1.36) tells us that stød is more likely in the nonce word when the first word is monosyllabic. However, nonce word vowel length and first word number of syllables interact significantly – and with a negative estimate (-2.12), as seen in the bottom row in Table 6. This means that the effect of first word length is suspended when the vowel in the nonce word is long. In other words, only when the vowel in the nonce word is short does monosyllabic first part increase stød likelihood in the second part. That is also how the lowest/rightmost split in the regression tree in Figure 3 would have it.

According to these analyses engtillet (def.sg., short stressed vowel in tillet, monosyllabic eng), ought to be the top scorer in the results, as indeed it is with 14 instances of stød in 18 valid responses (=78%).

(4) Add to the statistically significant effects an apparent trend in the results in the def.sg.: Within the four nonce words with short stressed vowel (tillet, kralset, spanten, stællen) there are two orthogonal properties. (i) Two words are neuter gender (tillet, kralset) with 38 valid responses, 22 (= 58%) of which have stød. (ii) Two words are common gender (spanten, stællen) with 37 valid responses, only 5 (= 14%) of which have stød. Offhand, it would seem that neuter gender favours stød over common gender. But one of the two neuter words is also the one with a monosyllabic first part, (eng)tillet, and gender alone cannot be shown to significantly increase the likelihood of stød in the second part. A larger database is required to settle the issue.

(5) Finally, it appears in Table 1 that the only two nonce words pronounced with stød in the indef.sg. are the two trisyllables, stæbelse (3) and tærkelse (1).

5.2 Explaining the results

5.2.1 Definite singular
Our speakers produced stød much more often in the def.sg. (43 instances) than in the other three inflections together (24 in all); see Table 5 and Figure 3. Is there anything about the suffixes per se, [ad æn], which would favour stød in the stems as opposed to the indef.pl. [ær] and def.pl. [na]? Perhaps not in the phonology, but the pronunciation of the def.sg. suffixes differs from that of the plural suffixes: [o ƞ] versus [u] and [uæ]. Syllabic consonants are presumably perceptually less salient than vowels: the words in the def.sg. might have more perceptual affinity with monosyllables than with disyllables and thus be stød receptive. Thus, the segmental sequence ['tʰilɔ] would be more akin to the sequence [tʰild] – which must have stød – than to the sequence ['tʰila] – which cannot have stød (see section 4.3). – If there is any likelihood at all of such a proposal, could it be that the reduction in salience pertaining to posttonic syllabic consonants is even more pronounced when the whole word is under secondary stress only? – We do not know of any empirical studies to support such a proposal, so it must remain an uncertain possibility. Perhaps it cannot be excluded as a contributing factor, but it is hardly the only one. If it were, one would expect stød to be more evenly distributed across the 9 disyllabic def.sg. nonce words (i.e. all but kavelsen).

The question of monosyllables versus disyllables turns up in another guise. In principle, all the nonce nouns in the def.sg. are open to two different parsings, thus for instance tillet, kyven, spanten as either til(l)-et, kyv-en, spant-en, or tille-t, kyve-n, spante-n.Parsed as monosyllables they would have stød in the indefinite, and the def.sg. suffix does not alter that.Parsed as disyllables they would be without stød in isolation, remaining unaffected by the suffix. – Of course, we cannot know what went on in the minds of our speakers, but we have to assume that they made use of the information about word structure provided on the screen in the first trial run (see Figure 3) and treated the nonce nouns there as disyllabic. We were, however, alert to the fact that that information might have been forgotten in the second (list reading) trial run. And that might have invited reinterpretation as monosyllables and hence
presumably also rendered stød in the def.sg. If so, there should be more stød in the second than in the first trial run. That is not – or barely – the case: there are 43 instantiations with stød in the definite singular, 20 are from the first run, 23 from the second run, i.e. only slightly more in the list reading (see Table 5). Therefore we are confident that reinterpretation as monosyllables across the board did not take place. It may have applied in some words with some speakers, but it is hardly a major factor in the interpretation of the results. We shall return briefly to this question again in section 6.2.4.

Could the existence of rhyming nouns in the existing vocabulary have influenced our speakers? If a nonce noun in the def.sg. in the test rhymed with existing words with stød, it might score higher in the stød account than otherwise. Or vice versa, if it rhymed with existing words without stød, we would expect the stød score to be low. Table 7 contains examples of rhyming words with and without stød.

<Table 7 about here>

Except for *kralset*, which does not rhyme with anything, all the nonce nouns rhyme with words with stød as well as without stød. We are forced to conclude that there is no discernible influence from rhyming words in the existing vocabulary upon the appearance of stød or not in the nonce nouns in the test.

Our final recourse is statistical in nature. The test results may reflect the way stød is distributed across corresponding existing Danish non-compounded nouns. The stød principles in section 4.3–4 apply to types, but do not inform us about tokens: speakers may well be influenced by the number of polysyllabic nouns with stød they hear in daily spoken Danish, and when new disyllabic nouns are encountered, the preponderance, if any, of stød in any given inflectional form may override what the principles would stipulate.
Ideally, we would search a phonetically annotated, representative Danish spoken language corpus for pointers. But none is available, adequate to our purpose. – The DanPASS corpus, created for phonetic analysis of non-scripted speech (see Grønnum 2009), is phonetically annotated, but it is not comprehensive enough in our context. Although it contains a total of approximately 73,500 running words, there are only 2,110 orthographically different word forms, not all of them nouns, of course. – The LANCHART corpus of sociolinguistic interviews (see Gregersen et al. 2014) would certainly be comprehensive enough – with its more than 6.5 million running words and more than 77,000 word types. But it is not searchable in terms of phonological features like stress placement, number of syllables in the word, vowel length, stød, or stød-basis. We would have to first extract a large lexicon from LANCHART and then mark that up for the features we need in order to attempt to explain our test results, a prohibitively time consuming project. – Accordingly, we settled for a dictionary search and turned to The Department of Language and Communication, University of Southern Denmark at Odense. They have access to a database with associated coding and analytic systems, developed in close collaboration with Claus Lambertsen, Berlin: the OLAM database. (The name is a fusion of OLA, short for ‘Odense Language Acquisition (Project)’ and ‘Lambertsen;’ see Madsen et al. 2002). It contains 41,375 lexical entries, supplied with orthographic, morphological, phonological, and segmentation information, as well as a conventionalized broad phonetic transcription. The basic phonetic forms in OLAM are those of Molbæk Hansen’s pronouncing dictionary, Dansk Udtale (1990). Other forms in OLAM are generated by the OLAM system itself. In other words, the transcriptions in OLAM are prescriptive and normative, not descriptive of any actual speakers of modern Danish, nor do they tell us anything about frequency of occurrence in running speech. Nevertheless, we did learn something useful as will transpire below.
There are 21,876 different nouns in OLAM, 6,617 of which are prosodically basic nouns – or PBNs. According to Basbøll et al. (2011:86–87 et passim) PBNs are nouns which in the indefinite singular have one stress only, on the first syllable – and succeeding syllables, if any, are exclusively unstressed, i.e. no secondary stresses occur. The definition has been modified recently to apply across all four noun forms (indefinite and definite, singular and plural; Hans Basbøll, personal communication). – The nonce nouns in our experiment are perfect instances of OLAM’s polysyllabic prosodically basic nouns. – We restrict our search in the database to PBNs whose stressed syllables have stød-basis. In the indef.sg. there are 4,806 such nouns, 1,599 monosyllables and 3,207 polysyllables.

Table 8 displays the number of polysyllabic and monosyllabic prosodically basic nouns with stød-basis (in the original PBN definition, excluding nouns which do not have an indef.sg. form), with and without stød. Numbers across the four inflections for a given syllable structure are similar but only sporadically identical in the table, because not every noun in the language occurs in every form. For instance fusen – as in at tage fusen på nogen ‘to fool somebody’ – occurs only thus, in the def.sg.; penge ‘money’ exists only in the plural; and non-countables, like smør, mælk ‘butter, milk,' exist only in the singular.

Polysyllabic PBNs are the non-stød environment par excellence (see section 4.3), clearly reflected in the relatively low stød percentages (around 20%) in Table 8, top half, and the def.sg. does not stand out from the rest. – Monosyllabic PBNs with stød-basis are the prime environment for stød. When they are inflected in the def.sg. – whether with common gender |ɔn| or neuter gender |əd| – they invariably become disyllabic, and they retain their stød because the def.sg. suffixes do not interfere with the stem, as in [biːl ˈbiːl hːs ˈhuːs sːmː]
Those relatively few (293) without it invariably attract stød in the def.sg., like [ven ˈvenˀn̩ ˈɡuð ˈɡuːˀðn̩ tˈal ˈtalˀð̩] ven, vennen; gud, guden; tal, tallet ‘friend, the friend; god, the god; number, the number.’ Because monosyllabic nouns become disyllabic in the def.sg. and acquire stød in the process if they do not have one already, the percentage stød among them is practically 100%. In absolute numbers there are (2312+6=) 2318 def. sg. nouns, all polysyllabic, without stød in OLAM; but there are also (595+1361=) 1956 def.sg. nouns with stød, enough – we think – to have induced our speakers to produce 43 nonce nouns (see Tables 2 and 5) in the definite singular with stød. The situation is somewhat different in the plural of monosyllabic nouns – with fewer instances of stød than in the def.sg. – because one of the two plural suffixes, |ə|, which is no longer productive, is invariably integrated into the stem, turning it into a non-stød environment, as in [huːˀs ˈhuːsə ˈhuːsn̩ə ˈɡɔː ˈɡɔːɐ ˈɡɔːɐnə] hus, huse, husene; går, gårde, gårde ‘house, houses, the houses; farm, farms, the farms.’ The productive plural |ɔr|, which is added to new words in the language, may likewise be integrated into certain stems, as in [ˈfɔːm ˈfɔːme] form, former ‘shape, shapes’ (see section 4.4). Furthermore, some nouns are identical in the indefinite singular and plural, hence without stød in the plural if the singular is stødless, as in [eɗ ˈbuː] et bud, [ɗi ˈtiː ˈbuː] de ti bud ‘a Commandment, the ten Commandments.’

5.2.2 Short versus long vowel

Within the 194 valid responses to nonce words in the def.sg. 119 had a long stressed vowel, 75 a short stressed vowel. 16 of the 119 long vowels (13%) had stød, whereas 27 of 75 nouns with short vowels (36%) had stød (see Tables 1-5 and Figure 3). Molbæk Hansen’s Dansk Udtale was published in 1990. That is a good whole generation ago, and in certain respects the pronunciation now appears somewhat conservative. Specifically where the duration of
vowels succeeded by any of the four glides [w ð j ɹ] is concerned: Molbæk Hansen prescribes long stød vowels before [w ð], as in [ˈæːðl̩ ˈleːʍ] adel, lever ‘nobility, liver,’ but to-day’s younger generation produces short vowels, [ˈæð] ‘lew’. And where Molbæk Hansen prescribes short vowels in disyllables before [ð ɐ̯], as in [ˈɡ̊eðð̩ ˈbuɐ] gedde, burre ‘pike, burdock,’ young Copenhageners now produce long vowel sounds, [ˈɡ̊eːð̩ ˈbuːɐ]. We have recategorized the vowels in Tables 9 and 10 below to better mirror the pronunciation of our speakers.

<Table 9 about here>

There are two slightly different ways to search the OLAM database for a pointer why short vowel syllables would attract more stød than long vowel syllables.

(i) Among nouns with stød in the def.sg., how large is the percentage with short stressed vowels? Table 9 displays the counts.

Among prosodically basic nouns with stød in the def.sg. there are practically equal numbers of words with short and long stressed vowels.

(ii) Another way to search for putative parallels between our experimental results and the wider language context would be to ask which category contains the larger proportion of stød: heavy syllables with short vowels or heavy syllables with long vowels? Table 10 contains the OLAM counts as they apply to nouns in the def.sg.

<Table 10 about here>

Among prosodically basic nouns with short vowels in the def.sg. the proportion of words with stød is appreciably larger than among nouns with long vowels (57.5% versus 34.5%).
Altogether, the short vowel advantage in prosodically basic nouns with stød in the def.sg. in
the Danish vocabulary may suffice to explain why our speakers applied stød more often in the
def.sg. in nonce nouns with short stressed vowels than in nonce nouns with long stressed
vowels. – As an aside one may wonder why the vocabulary developed in this manner: why
would a short vowel succeeded by a sonorant consonant be more prone to have or develop
stød than a long vowel? Is there something about the articulatory and laryngeal dynamics of a
VC sequence that favours creaky voice? Perhaps the rapid transition from greater to lesser
intensity? – We know that normally even the weaker stød manifestation, the compressed
voice quality without any F₀ perturbation (see section 3), exhibits intensity reduction towards
the end of the rhyme (Fischer-Jørgensen 1987, 1989a, 1989b). Conversely, intensity reduction
alone can induce stød perception in resynthesized long stødless vowel stimuli (Mortensen,
unpublished). It may be a long shot to infer from the synchronic state of affairs to the
development of stød over time, however, and we shall have to leave it, speculatively, at that.

5.2.3 Monosyllabic versus disyllabic first part

Among the 75 nonce nouns in the def.sg. with a short stressed vowel, 18 were preceded by a
monosyllable and 57 by a disyllabic word. 14 of the 18 (77.8%) had stød, while that is true of
only 13 of the 57 (22.8%) (see Table 1a-d and Figure 3). Why would that be? Actually, the
situation is equivalent to what we know to be true of compound verbs: ‘stød is rarer the
heavier the first element of such a verb is’ (see Basbøll 2005:500). – And we observe in the
next section that a principle which used to apply only to verbs before certain vowel suffixes
may be spreading to any word which ends in a suffix-like vowel, hence also to nouns. Then
why would something which is true of verbs in compounds not also generalize to nouns in
compounds?
5.2.4 Neuter versus common gender

Among 75 renderings of four nonce words in the def.sg. with short stressed vowel, neuter gender *tillet* had stød in 14 instances, *kralset* in 8 instances, whereas common gender *spanten* had 1 and *stællen* 4 stød, respectively (see Table 2). But *tillet* also has a monosyllabic first part, *eng* ‘meadow,’ and that is a statistically significant factor in stød attribution to nouns with short vowels in the def.sg. Which is why gender, in and of itself, cannot be shown to significantly increase the likelihood of stød in this context. But iff we had had reason to suspect that our speakers had reinterpreted at least some of the nouns as monosyllables in the definite, and thus with stød, would neuter gender nouns have had a lead over common gender nouns? Do relations within the existing vocabulary support such a contention?

Table 11 shows that among the neuter gender nouns in the lexicon, there are twice as many monosyllables than polysyllables (553 versus 299), and among the common gender nouns, there are thrice as many polysyllables than monosyllables (2759 versus 925). That is, monosyllables are indeed in the majority in the neuter gender and in the minority in the common gender. But there are also altogether twice as many polysyllables than monosyllables (3207 versus 1599). Given the overall majority of polysyllabic nouns with stød-basis in the existing vocabulary, and given also our reasoning in section 6.2.1 about reinterpretation, we are inclined to trust that our speakers interpreted the nonce words as disyllables, as intended, but – as we say – more data are needed to establish the role of gender, if any, in stød assignment in disyllabic nouns in second position in compounds. Furthermore, if neuter gender had invited reinterpretation of *tillet*, *fæset*, and *kralset* as monosyllables in the def.sg., we may wonder why *fæset* was not pronounced with stød, not once. – Except, of course, that
the stressed vowel is long, [ˈfeːsɒ], not short (see section 6.2.2). If that is why føset never received stød, then any influence from gender on the interpretation of word length – in terms of number of syllables – in nouns is subordinate to the phonology of the word, hence it cannot be a very decisive factor. – We may be justified in dismissing it.

5.2.5 Substantivizing suffix -else

If it is not pure accidence that indef.sg. kontaktstæbelse (neuter) and rørtærkelse (common) received 4 and 1 stød responses, respectively (see Table 1), then why? The suffix is one of those which do not interfere with a monosyllabic stem but induces stød in polysyllabic (oxytonic) stems, as in [ˈkʰenʃə beˈkʰenʃə] kend(else), bekend(else) ‘verdict, confession.’ But perhaps, if stæbelse and tærkelse were not infallibly perceived as derived, but rather as trisyllabic lexemes, we would be dealing with non-penultimate syllables in lexemes, and they normally have stød if they have stød-basis (see section 4.3).

6. DISCUSSION

The point of departure for our experiment was the many occurrences in unexpected locations of stød in Nina Grønnum’s collection – particularly in disyllabic nouns in the second position in compounds, nouns which in isolation do not have stød. Would speakers of modern Danish replicate these observations under controlled circumstances? – They did, but the number of stød in our experiment is not overwhelming. That was hardly to be expected either, given that the phenomenon is a relatively new one, absent in speakers born before 1950 (see Brink & Lund 1975). On the other hand, the fact that stød – within this new environment – exhibits the same distributional pattern as in the existing vocabulary, namely more stød in nouns (1) in the definite singular, (2) with short stressed vowels, (3) after a monosyllabic word if the stressed vowel of the nonce noun is short – strengthens our belief that we are not dealing with spurious
deviating pronunciations without any staying power – but a systematic change which will eventually partially suspend a word structure non-stød principle.

If the trends we have observed are consolidated in the future, more heavy syllables will have stød than previously. So far, we can assert with some confidence that penultimate heavy syllables in inflected nouns tend to acquire stød in second place in compounds. With 3 exceptions (drejesilber 4, skruedaller 3, and skovtannerne 5) stød attribution in the plural was negligible. – In other words, the definite singular is the major trigger, most pronouncedly so in nouns with short vowels, and within that category particularly when the first word in the compound is monosyllabic. – Note that it is word structure non-stød which is undergoing change. Not the phonological structure requirement – stød-basis is unaffected. So are the lexical non-stød principles.

What are, more specifically, the word structure non-stød principle(s) under siege here? There are several involved: penultimate syllables in lexemes do not have stød (section 4.3); def.sg. suffixes |ən əd| do not interfere with the stem, nor do indef.pl. |ər| or def.pl. |nə| (section 4.4); nouns do not acquire stød through compounding (section 4.5). – They all appear to be suspended in those compounds where our disyllabic nonce nouns were pronounced with stød. Is there any way to make good sense of that, beyond the specific arguments we brought to bear in section 6.2 – to bring them all in under one hat? Perhaps. Recall from section 4.4 that infinitive |ə| is integrated into a monosyllabic stem, making the ensemble look like a disyllabic lexeme, and accordingly the penultimate syllable appears without stød, as in ['ɡ̊r̥iːb̥a] gribe ‘catch’ from [ɡ̊r̥iːˈb̥] grib! ‘catch!’; but not if the stem is polysyllabic as in [b̥ɛˈɡ̊r̥iːb̥a] begribe ‘comprehend.’ – In a progression of arguments, Grønnum & Basbøll (2012) suggested that this principle is on its way to a much more general application: IN ANY WORD WHICH PHONETICALLY RESEMBLES A STEM + A SYLLABIC SUFFIX, ONLY MONOSYLLABIC STEMS HAVE NO STØD. “Any word” includes nouns, of course, and the noun inflection suffixes
are indeed syllabic. The critical concept is “stem.” If our compounds were parsed by the
speakers as {stem+stem}+{suffix} rather than {stem}+{stem+suffix}, for instance
plastkyve+n rather than plast+kyven, the stems were indeed not monosyllabic, hence they
would be stød receptive: According to Basbøll’s Non-Stød Model, the difference between a
monosyllabic and a polysyllabic first part of a compound is accounted for by the non-stød

Grønnum & Basbøll (2012) concluded that the net result of the changes they observed in
Grønnum’s corpus – to which we can now add our observations – is that more and more
heavy syllables will have stød, and the need to formulate word structure principles for its
absence will diminish. They suggested that the driving force behind such a change is the
simplification it entails for the speaker against the concomitant loss in morphological
specificity. Thus, for instance, [ˈpʰl̥asʤˌmuːˀsŋ] will become ambiguous between a muse
and a mouse made of plastic.

The change concerns a phonological property, a prosodic feature, but it is conditional on
morphology (inflection) and grammar (word boundaries), generalizing the occurrence of stød
in heavy syllables. It is also a generalization across word classes: a phenomenon which was
previously associated with verbs and adjectives is now on its way to also apply to nouns – but
so far only in specific contexts.

ACKNOWLEDGEMENTS

We are grateful to Laila Kjærbæk, University of Southern Denmark, and Claus Lambertsen,
Berlin, for generous assistance with the OLAM analyses. We are also very appreciative of the
extremely helpful and extensive comments and questions from three anonymous reviewers.

APPENDIX
**Test material**

Three introductory well-established compounds inserted in sentences:

(a) *hud + farve: hans mørke hudfarve gjorde ham til et nemt offer for mobning*

‘skin’ + ‘colour’: ‘the dark colour of his skin made him an easy target for mobbing’

(b) *over + størrelse: hun måtte købe tøj i overstørrelse, da hun kom i syvende måned*

‘over’ + ‘size’: ‘she had to buy oversized clothing when she came in the seventh month’

(c) *rød + strømper: det er længe siden, at fire rødstrømper gik med bare bryster på Strøget*

‘red’ + ‘stocking’: ‘it has been a long time since four red-stockings [feminists] went with bare breasts on Strøget’

40 new compound words and the sentences in which they were inserted; “(neu)” indicates neuter gender nouns; all other nouns are common gender:

INDEFINITE SINGULAR (12 words)

(1) *sølv + ilum: på køkkenbordet lå der en død sølvilum*

‘silver’ + ‘ilum’: ‘on the kitchen table was a dead silver-ilum’

(2) *metal + svile: man kan bruge en metalsvile til at stramme hovedlåsen*

‘metal’ + ‘svile’: ‘you can use a metal-svile to tighten the main lock’

(3) *under + stylling: uden en understylling falder stilladset sammen*

‘lower’ + ‘stylling’: ‘without a lower-stylling the scaffolding will collapse’

(4) *top + skæling: der skal sidde en topskæling oven over tagvinduet*

‘top’ + ‘skæling’: ‘there should be a top-skæling above the skylight’

(5) *inder + spæle (neu): hvis ikke sammenføjningen skal være synlig, må du sætte et inderspæle på*

‘inner’ + ‘spæle’: ‘if the joints are not to be visible, you must mount an inner-clamp’

(6) *mudder + slænning: efter stormen lå der en stor mudderslænning på fortovet*

‘mud’ + ‘slænning’: ‘after the storm there was a big mud-slænning on the sidewalk’
plast + velkum: man kan behandle med plastvelkum for at gøre overfladen skridsikker
‘plastic’ + ‘velkum’: ‘one can treat with plastic-velkum to make the surface non-slip’

slibe + stase (neu): kaklerne over håndvasken havde et grimt slibestase
‘grind’ + ‘stase’: ‘the tiles above the sink had an ugly grinding-stase’

sommer + tasum: vi sad på terrassen, og så kom der en gul sommertasum flyvende forbi
‘summer’ + ‘tasum’: ‘we sat on the terrace, and then a yellow summer-tasum came flying by’

kors + tamse: næste morgen sad der en tyk korstamse i de nyplantede roser
‘cross’ + ‘tamse’: ‘the next morning there was a fat cross-tamse in the newly planted roses’

kontakt + stæbelse (neu): der skal ligge et kontaktstæbelse i sammenføjningen
‘contact’ + ‘stæbelse’: ‘there should be a contact-stæbelse in the joint’

rør + tærkelse: vi behøver kun en enkelt rørtærkelse under cisternen
‘pipe’ + ‘tærkelse’: ‘we only need a single pipe-tærkelse under the cistern’

eng + tille (neu): det har regnet meget, så engtillet skal drænes før køerne kommer på græs
‘meadow’ + ‘tille’: ‘it has been raining a lot, so the meadow-tille must be drained before the cows are let out to grass’

dybde + fæse (neu): ifølge loddet og dybdefæset er der vand nok i tanken
‘depth’ + ‘fæse’: ‘according to the weight and depth-fæse, there is enough water in the tank’

farve + kralse (neu): penslerne og farvekralset er ikke blevet renset ordentligt
‘colour’ + ‘kralse’: ‘the brushes and the colour-kralse have not been cleaned properly’

plast + kyve: med lakken og plastkyven blev overfladen helt glat
‘plastic’ + ‘kyve’: ‘with the varnish and plastic-kyve, the surface became completely smooth’

(17) gamma + båle: antennen og gammabålen skal sikre en god radiomodtagelse

‘gamma’ + ‘båle’: ‘the antenna and gamma-båle should ensure good radio reception’

(18) pukkel + snæbe: koalabjørnen og pukkelsnæben får ikke unger i fangenskab

‘hump’ + ‘snæbe’: ‘the koala bear and hump-snæbe do not have cubs in captivity’

(19) mose + spante: efter afvandingen kunne man tydeligt se bunden og mosespanten

‘bog’ + ‘spante’: ‘after the drainage, one could clearly see the bottom and the bog-spante’

(20) lang + slade: man kan kende et vikingeskib på rælingen og langsladen

‘long’ + ‘slade’: ‘you can know a Viking ship by the rail and the long-slade’

(21) bore + stælle: hammeren og borestællen har deres faste pladser på væggen

‘bore’ + ‘stælle’: ‘the hammer and drill-stælle have their fixed places on the wall’

(22) tvær + kavelse: skorstenen og tværkavelsen er med til at holde stråtaget på plads

‘cross’ + ‘kavelse’: ‘the chimney and cross-kavelse help keep the thatched roof in place’

INDEFINITE PLURAL (10 words)

(23) dreje + silbe: de to drejesilber skal renses for rust

‘turn’+ ‘silbe’: ‘the two turning-silber must be cleaned of rust’

(24) kyst + fyse (neu): der blev bygget tre nye kystfyser efter stormen

‘coast’ + ‘fyse’: ‘three new coastal-fyser were built after the storm’

(25) olie + dole: de fire oliedoler faldt overbord under stormen

‘oil’ + ‘dole’: ‘the four oil-doler fell overboard during the storm’

(26) høvle + stulle: vi har kun to høvestuller, men der er fire lærlinge

‘plane’ + ‘stulle’: ‘we only have two planing-stuller, but there are four apprentices’

(27) lampe + punse (neu): vi mangler to lampepunser til lygterne i gården
‘lamp’ + ‘punse’: ‘we are short of two lamp-punser for the lamps in the yard’

(28) gemse + blise: en hestebremse og et par gemsebliser gjorde dyrene i stalden urolige
    ‘gadfly’ + ‘blise’: ‘a gadfly and a couple of chamois-bliser made the animals in the
    stable uneasy’

(29) kloak + slænte (neu): fire kloakslænter måtte skiftes ud efter oversvømmelserne
    ‘sewer’ + ‘slænte’: ‘four sewer-slænter had to be replaced after the floods’

(30) blad + gæmpe: vi fandt et par bladgæmper i salatbedet
    ‘leaf’ + ‘gæmpe’: ‘we found a couple of leaf-gæmper in the salad bed’

(31) støtte + spale: der skulle bruges 16 støttespaler i konstruktionen
    ‘suppport’ + ‘spale’: ‘16 support-spaler were required in the construction’

(32) skrue + dalle: de to skruedaller havde han selv lavet
    ‘screw’ + ‘dalle’: ‘he had made the two screw-daller himself’

DEFINITE PLURAL (8 words)

(33) alfa + kilse (neu): teleskoperne og alfakilserne på de canariske øer skal finde sorte huller
    i universet
    ‘alpha’ + ‘kilse’: ‘the telescopes and alpha-kilser in the Canary Islands are intended to
    find black holes in the universe’

(34) frugt + mylte: ormene og frugtmylterne har spist godt af jordbærrene
    ‘fruit’ + ‘mylte’: ‘the worms and fruit-mylter have eaten quite a bit of the strawberries’

(35) mole + kluse (neu): kampestenene og molekluserne var dækket af slam efter højvandet
    ‘pier’ + ‘kluse’: ‘the boulders and pier-kluser were covered in sludge after the high tide’

(36) ramme + kolme: skruetvingerne og rammebolmerne hører til i værktøjskassen
    ‘frame’ + ‘kolme’: ‘the clamps and framing-kolmer belong in the toolbox’

(37) palme + snæde: bananfluerne og palmsnæderne angreb alle palmerne på sydkysten
‘palm’ + ‘snæde’: ‘the banana flies and palm-snæder attacked all the palm trees on the south coast’

(38) styre + stabe: stemmejernene og styrestaberne hører til i skuffen

‘guide’ + ‘stabe’: ‘the chisels and guiding-staber belong in the drawer’

(39) skov + tanne: myrerne og skovtannerne havde det dårligt i den fugtige sommer

‘forest’ + ‘tanne’: ‘the ants and forest-tanner were doing poorly in the humid summer’

(40) presse + falte: rullerne og pressefaltrne skal renenes med sprit

‘press’ + ‘falte’: ‘the rollers and press-falter should be cleaned with alcohol’

REFERENCES


henblik på sociolekterne i København. København: Munksgaard.


Figure 1 Power Point screen shot of the instructions to participants.

Figure 2 Sample test screen: a ‘stabe’ (tool) – ‘The chisels and the guiding-staber belong in the drawer.’

Figure 3 Regression tree depicting the three significant factors determining stød distribution in the data. See further the text.
Indledning

vi er interesserede i hvad der sker når man danner sammensatte ord;
derfor har vi lavet en række nye ord til at sætte sammen med kendte ord;
de nye ord hører til inden for tre betydningsområder: zoologi/insekter;
håndværk/værktøj; miljø/forurening

du får præsenteret hvert ord og dets betydning sammen med en sætning som
du skal sætte ordet ind i;
du skal kun læse sætningen højt, ikke ordet og betydningen
først tre kendte sammensætninger til opvarmning
en stabe (værktøj)

Stemmejernene og styrestaberne hører til i skuffen.
no stød/stød
694/67

indef.sg.
indef.pl.
def.pl.
543/24

def.sg.
151/43

long vowel
103/16

short vowel
48/27

first word
disyllabic
44/13

first word
monosyllabic
4/14
<table>
<thead>
<tr>
<th>INDEF.SG.</th>
<th>Valid responses</th>
<th>With stød</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st run</td>
<td>2nd run</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 sølvilum</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 metalsvile</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 understylling</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 topskæling</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 inderspæle (neu)</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 mudderslænning</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 plastvelkum</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 slibestase (neu)</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 sommertasum</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 korstamse</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 kontaktstæbelse (neu)</td>
<td>20</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12 rørtærkelse</td>
<td>20</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>219</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 1 Number of valid responses by 10 speakers to 12 nonce nouns in the indefinite singular, in second position in compounds, and the number of stød they produced in these words – in the first and second trial run, respectively. 3 words are neuter gender, marked (neu), the remaining 9 are common gender.
<table>
<thead>
<tr>
<th>DEF.SG. –</th>
<th>ød an</th>
<th>Valid responses</th>
<th>With stød</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st run</td>
<td>2nd run</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>engtillet (neu)</td>
<td>18</td>
<td>7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>dybdefæset (neu)</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>farvekralset (neu)</td>
<td>20</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>plastkyven</td>
<td>20</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>gammabålen</td>
<td>20</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>pukkelsnæben</td>
<td>20</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>mosespanten</td>
<td>19</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>langsladen</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>borestællen</td>
<td>18</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>tværkavelsen</td>
<td>19</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>194</td>
<td>20</td>
<td>23</td>
<td>43</td>
<td>22%</td>
</tr>
</tbody>
</table>

Table 2 Number of valid responses by 10 speakers to 10 nonce nouns in the definite singular, in second position in compounds, and the number of stød they produced in these words – in the first and second trial run, respectively. 3 words are neuter gender, marked (neu), the remaining 7 are common gender.
Table 3 Number of valid responses by 10 speakers to 10 nonce nouns in the indefinite plural, in second position in compounds, and the number of stød they produced in these words – in the first and second trial run, respectively. 3 words are neuter gender, marked (neu), the remaining 7 are common gender.
<table>
<thead>
<tr>
<th>DEF.PL. – [nə]</th>
<th>Valid responses</th>
<th>With stød</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st run</td>
<td>2nd run</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33 alfakilserne (neu)</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34 frugtmylterne</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 molekluserne (neu)</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36 rammekolmerne</td>
<td>19</td>
<td>1</td>
<td>9</td>
<td>6%</td>
</tr>
<tr>
<td>37 palmesnæderne</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38 styrestaberne</td>
<td>20</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>39 skovtannerne</td>
<td>19</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>40 pressefalterne</td>
<td>20</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>155</strong></td>
<td><strong>3</strong></td>
<td><strong>6</strong></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>

Table 4 Number of valid responses by 10 speakers to 8 nonce nouns in the definite plural, in second position in compounds, and the number of stød they produced in these words – in the first and second trial run, respectively. 2 words are neuter gender, marked (neu), the remaining 6 are common gender.
<table>
<thead>
<tr>
<th></th>
<th>Total number of valid responses</th>
<th>With stød 1st run</th>
<th>2nd run</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDEF.SG.</td>
<td>219</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>DEF.SG. –</td>
<td>[^ad àn]</td>
<td>194</td>
<td>20</td>
<td>23</td>
<td>43</td>
</tr>
<tr>
<td>INDEF.PL. –</td>
<td>[^ar]</td>
<td>193</td>
<td>4</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>DEF.PL. –</td>
<td>[^nà]</td>
<td>155</td>
<td>3</td>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 5 Summary of the contents of tables 1 through 4: Number of valid responses by 10 speakers to 40 nonce nouns, uninflected and inflected, in second position in compounds, and the number of stød they produced in these words – in the first and second trial run, respectively.
### Table 6 Model summary of multiple regression with mixed effects. See further the text.
<table>
<thead>
<tr>
<th></th>
<th>rhyming word with stød</th>
<th>rhyming word without stød</th>
<th>number of stød</th>
</tr>
</thead>
<tbody>
<tr>
<td>tillet</td>
<td>spild’-et ‘the waste’</td>
<td>gilde-t ‘the party’</td>
<td>7+7 (in 18)</td>
</tr>
<tr>
<td>fæset</td>
<td>fjæ’s-et ‘the face (coll.)’</td>
<td>flæse-t (adj.) ‘frilled’</td>
<td>0+0 (in 20)</td>
</tr>
<tr>
<td>kralset</td>
<td>NA</td>
<td>NA</td>
<td>4+4 (in 20)</td>
</tr>
<tr>
<td>kyven</td>
<td>ty’v-en ‘the thief’</td>
<td>flyve-n ‘flying’ (noun)</td>
<td>3+3 (in 20)</td>
</tr>
<tr>
<td>bålen</td>
<td>så’l-en ‘the sole’</td>
<td>stråle-n ‘the beam’</td>
<td>3+3 (in 20)</td>
</tr>
<tr>
<td>sneeben</td>
<td>flæ’b-en ‘the cry-baby’</td>
<td>kæbe-n ‘the jaw’</td>
<td>0+3 (in 20)</td>
</tr>
<tr>
<td>spanten</td>
<td>kan’t-en ‘the edge’</td>
<td>vante-n ‘the mitten’</td>
<td>0+1 (in 19)</td>
</tr>
<tr>
<td>sladen</td>
<td>ma’d-en ‘the food’</td>
<td>lade-n ‘the barn’</td>
<td>0+0 (in 20)</td>
</tr>
<tr>
<td>stællen</td>
<td>ell’-en ‘the alder’</td>
<td>fælde-n ‘the trap’</td>
<td>2+2 (in 18)</td>
</tr>
<tr>
<td>kavelsen</td>
<td>(be)ga’velse-n ‘the talent’</td>
<td>stavelse-n ‘the syllable’</td>
<td>1+0 (in 19)</td>
</tr>
</tbody>
</table>

Table 7 Ten nonce words in the definite singular (leftmost column), rhyming words with stød (second column) and without stød (third column) in the existing lexicon. The rightmost column contains the number of stød occurrences, in the first and second run, respectively, with the total number of valid productions of the nonce word in parentheses. Stød is indicated in the orthography with an apostrophe.
<table>
<thead>
<tr>
<th></th>
<th>INDEF.SG.</th>
<th>DEF.SG.</th>
<th>INDEF.PL.</th>
<th>DEF.PL.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polysyllabic PBNS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with stød</td>
<td>627</td>
<td>595</td>
<td>464</td>
<td>463</td>
</tr>
<tr>
<td>without stød</td>
<td>2580</td>
<td>2312</td>
<td>1756</td>
<td>1757</td>
</tr>
<tr>
<td>Total</td>
<td>3207</td>
<td>2907</td>
<td>2220</td>
<td>2220</td>
</tr>
<tr>
<td>Percentage stød</td>
<td>19.6%</td>
<td>20.5%</td>
<td>20.9%</td>
<td>20.9%</td>
</tr>
<tr>
<td>Monosyllabic PBNS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with stød</td>
<td>1306</td>
<td>1361</td>
<td>589</td>
<td>630</td>
</tr>
<tr>
<td>without stød</td>
<td>293</td>
<td>6</td>
<td>171</td>
<td>128</td>
</tr>
<tr>
<td>Total</td>
<td>1599</td>
<td>1367</td>
<td>760</td>
<td>758</td>
</tr>
<tr>
<td>Percentage stød</td>
<td>81.7%</td>
<td>99.6%</td>
<td>77.5%</td>
<td>83.1%</td>
</tr>
</tbody>
</table>

Table 8 Prosodically basic nouns with stød-basis in the OLAM database.
<table>
<thead>
<tr>
<th>Nouns with stød in the def.sg.</th>
<th>1956</th>
</tr>
</thead>
<tbody>
<tr>
<td>With short vowel sound</td>
<td>966</td>
</tr>
<tr>
<td>Short vowel percentage</td>
<td>49.4%</td>
</tr>
</tbody>
</table>

Table 9 Percentage of short vowels in prosodically basic nouns with stød in heavy syllables in the def.sg. in the OLAM database.
<table>
<thead>
<tr>
<th>Short vowel sound</th>
<th>1680</th>
<th>Long vowel sound</th>
<th>2867</th>
</tr>
</thead>
<tbody>
<tr>
<td>with stød</td>
<td>966</td>
<td>with stød</td>
<td>990</td>
</tr>
<tr>
<td>Stød percentage</td>
<td>57.5%</td>
<td>Stød percentage</td>
<td>34.5%</td>
</tr>
</tbody>
</table>

Table 10 Proportion of stød in heavy syllables in prosodically basic nouns in the def.sg. with short and long vowel sounds in the OLAM database.
Table 11 Number of prosodically basic monosyllables and polysyllables with heavy syllables in the indef.sg., in the neuter and common genders.

<table>
<thead>
<tr>
<th></th>
<th>PBNs indef.sg.</th>
<th>neuter gender</th>
<th>common gender</th>
<th>NA</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>monosyllables</td>
<td>553=11.5%</td>
<td>925=19.2%</td>
<td>121=2.5%</td>
<td>1599=33.3%</td>
<td></td>
</tr>
<tr>
<td>polysyllables</td>
<td>299=6.2%</td>
<td>2759=57.4%</td>
<td>149=3.1%</td>
<td>3207=66.7%</td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>852=17.7%</td>
<td>3684=76.7%</td>
<td>270=5.6%</td>
<td>4806</td>
<td></td>
</tr>
</tbody>
</table>