

DANISH VOWELS – SCRATCHING THE RECENT SURFACE IN A  
PHONOLOGICAL EXPERIMENT

by

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**Abstract**

*The paper presents the outcome of some very recent changes in the pronunciation of standard Danish vowels, changes which add to the already considerable inventory of surface vowel contrasts. It claims that a classical structuralist phonological account of the vowel inventory is not descriptively adequate. The only reasonable abstract representation is a morphophonological one whose putative psychological reality is at least not contradicted by the results of a phonological experiment.*

**1. Introduction**

Standard Danish distinguishes 16 vowel qualities phonetically in stressed syllables, as depicted in Fig. 1.

Until fairly recently these 16 vowel qualities could be derived unambiguously, by rather simple phonological rules, from 10 phonemes: /i e ε a y ø œ u o ɔ/, which all occur short, long and with stød. Add to this /ə/ in unstressed syllables. This was – on the whole – uncontroversial, see e.g. Andersen (1967), Diderichsen (1957), Ege (1965), Martinet (1937), and Rischel (1968). Although the special circumstances which arose through weakening of post-vocalic /r/ to a semivowel<sup>1</sup> and its subsequent complete fusion with preceding

1. i.e. [ʌ] or, more exactly, either [ɶ] or [ɷ], depending on the rounding of the preceding vowel.

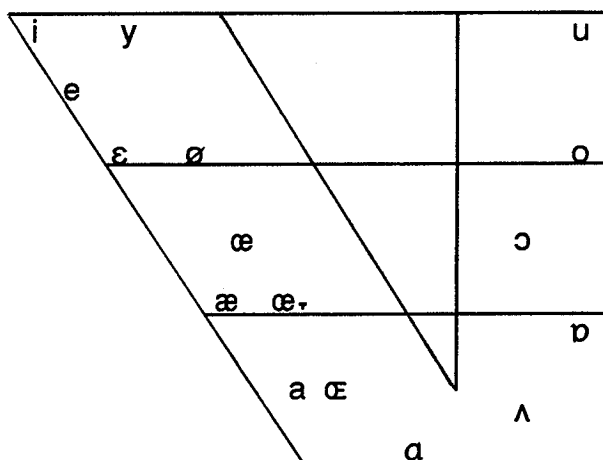


Fig. 1. Standard Danish vowel sounds plotted in the cardinal vowel space. Note that some of the symbols as used here and in the text below are rather far from the IPA-values traditionally associated with them. See also Appendix I.

/a ɔ/<sup>2</sup> were certainly noted and debated already by Grove (1927) and Uldall (1928). Kofoed (1964) suggested the phonological status of /a ɔ/, but his paper contains a number of flaws and he was severely criticized by Andersen (1965), who points out that on distributional grounds [a] is best analyzed as /ar/. – Basbøll (1968), in a classical structuralist framework, describing what was then Advanced Standard Copenhagen, posits /a/ as an autonomous vowel phoneme, and suggests that one may even have to set up a further item in the back series (/ʌ/). Hjelmslev's (1951) reductionist glossematic analysis eliminated /œ/ and /u/ from the list above as well as /ə/.

The four tongue heights in the unrounded front series are a serious obstacle to any binary vowel feature system and serve to make Danish an often quoted example in discussions of binary versus scalar features, cf. Fischer-Jørgensen (1975, pp. 220 ff.) and her references, Ladefoged (1967), Lass (1984, p. 104 ff.) and Rischel (1968). But worse is to come!

2. They are [a ɔ] before /r/ and become long in the process of fusion: [a: ɔ:].

## 2. Preliminaries

### 2.1 The transcription

The notation throughout is modified IPA. This is practical for an international readership, but it may be confusing for those who are accustomed to the Dania notation adopted by Danish dialectologists, and also in the three major sources of information about Danish pronunciation, i.e. Brink & Lund (1975), Lund et al. (1991), Molbæk Hansen (1990). Appendix I translates the IPA vowel symbols as I employ them here (which is in places rather far from their authorized values) into the corresponding Dania symbols. Note that I do not distinguish Dania's [ǣ] and [ɑ].

I have departed from the (IPA) transcription in Basbøll & Wagner (1985) in that I do not distinguish the *a*-qualities in *sejle*, *lang* 'sail (vb.), long (adj.)' (their [ɑ]) and *arne*, *varm*, *var* 'hearth, warm, was' (their [ɑ]); on the other hand, they distinguish only two non-high rounded front vowels, [œ œ̃], where I also posit an intermediate [œɾ]. This [œɾ] absorbs some of Basbøll and Wagner's instances of [œ] (long vowels after /r/ as in *frø* 'frog') and some of their instances of [œ̃] (vowels before /r/ as in *gøre*, *dør* 'do, door'). Finally, the product of /ər/ fusion and the post-vocalic manifestation of /r/, as in *latter*, *smør* 'laughter, butter' are rendered as [ɐ ɐ̃], respectively, by Basbøll & Wagner, but as [ʌ ʌ̃] here. Any further ambiguities may be resolved by reference to Fig. 1 which serves as a key to the broad vowel transcriptions used throughout.

Vowels with *stød* are halflong phonetically. This halflength will be implicit in the *stød* symbol [ʔ] when it occurs after a vowel, thus: [muʔs] for the more accurate [muʔs̃].

[p t k] and [b d g] are convenient abbreviations for the aspirated (affricated) [pʰ tʰ kʰ] and unvoiced [p̥ t̥ k̥], respectively.

Stress in polysyllables is marked only if it is not word initial.

### 2.2 Phonological issues

There is hardly any of the numerous problems in the rather intricate Danish segment phonology whose solution does not have repercussions elsewhere, and I have to make a number of a priori assumptions/decisions:

#### 2.2.1 *Stød* is a prosody

*Stød* is a kind of creaky voice, whose occurrence is accordingly restricted to **voiced** segments. For a very thorough account of its phonetic properties, see Fischer-Jørgensen (1987). It is a prosody because:

(i) The occurrence of stød is very largely predictable from segmental and morpho-syntactic structure;

(ii) its location in the syllable is fixed – being timed relative to the stressed vowel onset, which means that it will hit the end of a vowel which is long, else the succeeding consonant, cf. [peʔn penʔ] *pæn – pen* ‘nice – pen’;

(iii) stød is lost and inserted, respectively, under certain morpho-syntactic conditions, cf. [huʔs husə] *hus – huse* ‘house – houses’; [kənə beʔkənʔə] *kende – bekende* ‘know – admit’.

Such behaviour is uncharacteristic of segments.

### 2.2.2 Stød vowels are long

Vowels with stød have durations in between short vowels and stødless long vowels, cf. Fischer-Jørgensen (1955, 1987), so phonetically there are no obvious grounds for classification as either short or long. However,

(i) in monomorphemic native words, vowels with stød and long vowels without stød are in complementary distribution: long stødless vowels do not occur in true monosyllables (\*[pɛ:n]), vowels with stød do not occur in dissyllables ending in /ə/ (\*[peʔnə]); and they both contrast with short vowels, cf. [guʔl gul] and [ku:lə kulə] *gul – guld, kugle – kulde* ‘yellow – gold, ball – cold’.

(ii) Otherwise, stød vowels and long vowels have similar distributions, i.e. neither occurs before [ŋ], which is a reflection of a more general restriction: they do not occur before homomorphemic clusters, with the exception of a dozen words with /sk/ and /st/, namely *påske, kiste, faste, hoste* ‘Easter, coffin, Lent, cough (n.)’ (with long stødless vowels) and *besk, slesk, træsk, bæst, fast!, host!, pust!* ‘acid, obsequious, crafty, beast, fast!, cough! blow!’<sup>3</sup> (with stød vowels).

(iii) In monomorphemic dissyllables we have stressed long [æ: ɔ:] and short [a ʌ], respectively, as in [hæ:nə hɔ:nə vanə vʌnə] *hane, hâne, vande, vânde* ‘tap, mock, water (vb.), agony’, never \*[a: ʌ:]. When such stems acquire stød through affixation, we get [æʔ ɔʔ] never \*[aʔ ʌʔ], cf. [mæ:lə mæʔlʌ] (not \*[maʔlʌ]) *male – maler* ‘paint (inf. – pres.)’ and [mɔ:lə mɔʔlʌ] (not \*[mʌʔlʌ]) *måle – måler* ‘measure (inf. – pres.)’.

(iv) Furthermore, the rule for composition will generally deprive a monosyllabic first member not ending in a vowel of its stød but it may retain vowel length, cf. [soʔl sol:sgenʔ] *sol – solskin* ‘sun – sunshine’.<sup>4</sup> This is not an acquired

3 *kiste, pust!* may also be pronounced with short vowels.

4 The rule may no longer be productive, or it applies only in well established compounds, cf. [oʔmmeʔdʌ] not [o:mmeʔdʌ] *ohmmeter* ‘ohm-metre’.

vowel length since short vowels never lengthen due to composition, cf. [søl sɔlɤæŋ?], not \*[sɔ:lɤæŋ?] *sølv* – *sølvring* ‘silver – silver ring’.

### 2.2.3 Length is a prosody

Although length – unlike *stød* – is indisputably lexical, it is – like *stød* – subject to morpho-syntactically conditioned deletion and insertion, cf. [hu?s husbæn] *hus* – *husbond* ‘house – husband’, [beð be:ðə] *bed* – *bede* ‘flowerbed (sg. – pl.)’.

### 2.2.4 Diphthongs are VC-sequences

(i) Falling diphthongs as combinations of a short vowel + a consonant (/v j r/) is supported by their distribution and the occurrence of *stød* – both of which exactly parallel VC<sub>[+voi]</sub>-sequences<sup>5</sup>: Diphthongs and VC-sequences are both excluded before [ŋ]. In monosyllables, some diphthongs and some VC<sub>[+voi]</sub>-sequences have *stød*, others do not, cf. group III in Table II. Long vowels in monosyllables always have *stød*.

(ii) Verb stems ending in a vowel do not add schwa in the infinitive, cf. [se? se?] *se!* – *se* ‘see (imper. – inf.)’; stems ending in a consonant do, cf. [køš køsə] *kys!* – *kysse* ‘kiss (imper. – inf.)’, and so do stems ending phonetically in a diphthong, cf. [sdɛj? sdɛjə (> sdɛji)] *støj!* – *støje* ‘make noise (imper. – inf.)’.

(iii) Certain diphthongs alternate with vowel + consonant pronunciation in inflection and derivation, cf. [køʊ? købd], [ləʊ? løfdə], [sbɛj? sbɔgd], [kloʌ? klo'ʁið?] *køb!* – *købt*, *lov!* – *løfte*, *spøg* – *spøgt*, *klor* – *klorid* ‘buy! – bought, promise! – promise (n.), joke (n.) – joked (pret.), chlorine – chloride’. See further Basbøll (1968, 1969, 1975, 1985, 1988a).

### 2.2.5 Syllable boundaries

I shall presume a phonological syllable boundary (●) in /-VCV-/ sequences to the right of C when the succeeding vowel is schwa, thus: [le:v●ə] = /le:v●ə/ *leve* ‘live (vb.)’, and to the left of C before a full vowel, thus: [li:v●a] = /li:v●a/ *Liva* (*proper name*), because this enables us to account succinctly for the manifestation of obstruents and /r/ in Danish in terms of initial vs. final position in the phonological syllable. See further Basbøll (1972, 1974, 1980).

5. What matters here is that the consonant be phonetically voiced. I characterize it as [+voi] rather than [+son] to avoid having to take a stand on the sonorant or obstruent status of [ð] (= /d/) and [ʌ] (= /r/).

### 2.3 'Older Danish'

A provisional note about what is to be understood below by 'former' stages in the language development: I never look back further than to the generation born in the second half of the 19th century, which – with a few anecdotal exceptions – is as far as Brink & Lund (1975) take us. Four characteristics of my (great-)grandparents' speech are relevant in this context:

(i) They had three *a*-sounds (outside /r/-contexts): [æ: a a(:)] (as do their successors).

(ii) /r/ had already been vocalized to [ʌ] in certain positions: intervocalically before unstressed vowels (an [ʌ] which assimilated completely to preceding [a ɒ] which were consequently lengthened): [væʌʌ snuʌi pæ:ŋ fɔi:ə] *værre, snurring, parring, forrige* 'worse, curious; copulation, previous (pl)'; in final position after long vowels: [seʔʌ] *ser* 'sees'; after short vowels before /b d g v/ and sonorant consonants: [byʌʔd bjæʌʔɣ djæʌʔu uʌnə] *byrd, bjerg, djæru, urne* 'lineage, mountain, bluff (adj.), urn'.

Consonantal – and unvoiced – [ɣ] occurred, however, after short vowels word finally and before /p t k f s/: [iɣ kaɣ tɔɣb uɣd paɣg væɣs] *ir, kar, torp, urt, park, vers* 'verdigris, vessel, thorp, herb, park, verse'.

(iii) They had a voiced velar fricative/approximant, [ɣ], which in their great-grandchildren's speech has been replaced by semivowels: [ɪ] (after front vowels and /l/) and [ʊ] (elsewhere). Thus [læʔɣ valʔɣ lɔʔɣ bjæʌʔɣ] became [(læʔɪ >) læɪʔ valʔɪ (lɔʔʊ >) lɔʊʔ bjæʌʔʊ] *lag, valg, låg, bjerg* 'layer, choice, lid, mountain'.

(iv) /v/ is pronounced [ʊ] postvocally as in [hau] *hav* 'sea', but after long vowels [v] was facultative beside [ʊ], thus it was either [hæ:və] or [hæ:ʊə] *have* 'garden' and [læ:v] or [læ:ʊ] *lav* 'low'. (This state of affairs prevailed until very recently. But the young generation to-day have generalized post-vocalic [ʊ]).

(v) Finally, a brief account of postvocalic segments, before and now, is called for. Present-day [ð ʊ ɪ ʌ] can be considered manifestations of /d v j r/. It presupposes an analysis of the set of stop consonants where the /p t k/ vs. /b d g/ contrast is considered to hold initially as well as finally, although aspirated stops do not occur postvocally: in initial position in the phonological syllable the contrast is one of aspiration and finally it is downgraded to a stop (unaspirated) versus approximant contrast. In other words, [mad] is analyzed as /mat/ *mat* 'lustreless' and [mað] consequently as /mad/ *mad* 'food'. [ɣ] and [ʌ] are in complementary distribution, initial and final in the phonological syllable, respectively, so [ʌ] = /r/ is straightforward. However, beneath present-day [ʊ] (=v/) lies both older [ʊ] (=v/) and [v] (=v/) as well as

[ɣ] (= /g/); and beneath [-i] (= /j/) we find [i] (= /j/) **as well as** [ɣ] (= /g/). Thus, older [lɔʔu] / [lɔʔv] (= /v/) **and** [lɔʔɣ] (= /g/) *lov!*, *låg* 'promise!', *lid* 'are all [lɔuʔ] (= /v/) now, and older [galɣə talɪə] (= /g j/) *galge*, *talje* 'gallows, waist' now rhyme: [-alɪə] (= /j/).

### 3. Vowel contrasts in modern Copenhagen

Copenhagen vowels have been in a state of flux, both as regards quality and quantity, for a very long time, cf. Brink & Lund (1975), and they still are. It is therefore crucial for any synchronous description to narrowly define the characteristics of the speakers whose language is under investigation, and the style of speech. Under scrutiny here is Copenhagen Danish as spoken conversationally but distinctly by the young (20-25 years old) middle class generation. Relevant to the point I want to make are particularly two features of their speech:

(i) They possess three different *a*-sounds: [æ], [a] and [ɑ], cf. Fig. 1 (whereas [a] is missing from young *lower* class Copenhagen speech where it has become [æ]).

(iia) Monosyllables with stød and post-vocalic [ð ɪ ʊ ʌ], are invariably produced with short vowel sounds and, consequently, stød in the consonant. Thus e.g. older [søʔð seʔʌ] have become [søðʔ seʔʌ] *sød*, *ser* 'sweet, sees'.

(iib) Vowel duration in dissyllables before [ð ɪ ʊ ʌ] + [ə] or [ʌ] (i.e. /d j v r/ + /ə/ or /ər/) exhibits a confusing pattern. Formerly we had both long and short vowel sounds before [ð ʌ], whereas vowels were long before [v/ʊʔ ɣ], and short before [ɪ].

(1) Long front vowels tend now to be shortened before [ð], to produce mergers of former [he:ðə] *hede* 'moor' with [heðə] *hedde* 'be called' and [ge:ðʌ] *geder* 'goats' with [geðʌ] *gedder* 'pikes'. This is a change in progress, and long vowels may still be heard in this context, but this is clearly a matter for investigation.

(2) Contrariwise, short vowels are lengthened before [ʌ], creating mergers of former [sviʌʌ] *svirre* 'whirr' with [svi:ʌ] *svire* 'booze (vb.)', [kuʌʌ] *kurre* 'coo' with [ku:ʌ] *kure* 'glide'. This lengthening is perhaps more generalized than the shortening before [ð], but the conclusive data remain to be collected.

(3) The long vowels before former [v/ʊ ɣ] (which have now merged in

6. As noted above, [v] was facultative beside [u], after long vowels.

[ɥ]), may still be long, e.g. [leɥə lɔɥə] or – with assimilation of [ə] and deletion of the semivowel – [leu lɔu] *leve, love/låge 'live, promise (vb.)/wicket'*. But if the (numerous) speakers in the experiment described below are to be believed, shortening is well under way also here, and [leɥə lɔɥə], both, are possible, cf. section 8.1.2.b.

(4) Short [a ɛ] – which were the only two vowels to occur before [i] – tend to be lengthened now, but perhaps only when [ə] is simultaneously assimilated and the semivowel deleted, so we get either [vɑi bɛi] or [vɑiə bɛiə], not [vɑiə bɛiə] *veje, bøje 'weigh, bend'*.

Another factor to be reckoned with in the account of vowel duration, which may complicate the picture further in modern standard Copenhagen, is the more general lengthening of short vowels in *lower* Copenhagen speech. This is yet another area which needs to be documented, and I am not certain just how pervasive (in terms of syllable and word structure) this lengthening is. But it is unmistakable in /VCə(C)/ dissyllables – which is what concerns me here – and putative mergers of [pɑɡə pɑ:ɡə] *pakker, parker 'parcels, parks'* into [pɑ:ɡə] are often quoted examples. Since present-day Copenhagen speech exhibits a number of features which were formerly exclusive to lower class speech, cf. Brink & Lund (1975), there is no reason why short vowel lengthening should not, in the course of time, penetrate into the speech of the middle classes as well, and I conjecture that a conscious or unconscious awareness of the phenomenon may play a role in subjects' treatment of the inflectional paradigms presented below in section 8.2.

There are further developments in modern Copenhagen. These were lower Copenhagen characteristics until very recently indeed, but they are general now:

(iii) Lowering (and retraction) of short /ɛ/ between /r/ and dentals or labials, leading to a merger with /a/. Thus, former [ʁad] (= /ɛ/) and [ʁad] (= /a/) *ret – rat 'rather – steering wheel'* are both [ʁad] now, and former [sgʁabə] and [sgʁabə] *skræppe – skrappe 'chatter – hard (pl.)'* merge in [sgʁabə]. Before velars, however, /rɛ/ and /ra/ are clearly distinguished, cf. [tʁag] vs. [tʁag] *træk – trak 'draught – pulled'*.

(iv) Lowering of /ɛ:/ from [ɛ:] to [æ:] before /r/. This creates mergers of former [hɛ:Λ vɛ:Λ] (/ɛ:/) *hære, være 'armies, be'* with former [hæ:Λ væ:Λ] (/ɛ:/) *herre, værre 'lord, worse'*, now lengthened, so both are [hæ:Λ] and [væ:Λ], respectively.

(v) Lowering of /u(:)/ to [o(:)] after /r/, merging e.g. *rude 'window pane'* with *rode 'mess (vb.)'*: [ʁo:ðə]; and yielding [kʁod] from [kʁud] *krudt 'gun powder'*.



Table I

Vowel sounds as pronounced by the generation born around 1970. Shaded and starred cells are explained in section 8.3. A: short vowels without preceding /r/. »C« is any non-syllabic sound not further specified to the right.

	in open syllable	before C	before nasal	before [ð]	before [ðʔ]	before [i]	before [iʔ]	before [u]	before [uʔ]	before [ʌ]	before [ʌʔ]
i	di	lid	pinjə	bið	biðʔ *2				liuʔ	iʌ	siʌʔ *8
e	de	led	venʔ	beð	beðʔ *2		neiʔ		leu	peʌ	seʌʔ
ɛ	mɛ	lɛd	vɛnʔ	mɛð	vɛðʔ *1		leiʔ		heuʔ		
æ					bæðʔ		læiʔ		læuʔ	bæʌ	sæʌʔ *2
a	va	lad	vanʔ	bað	baðʔ						
ɑ	vɑ	lag	vamʔs			mai	laiʔ	hau	tauʔ		
y	ʁæ'vy	tysd	syns	syð	gyðʔ				lyuʔ	fyʌ	fyʌʔ *1
ø	mil'jø	øsd	pønʔd	sgøð	gøðʔ *1		søiʔ		løuʔ		føʌʔ
œ			sgœnʔ						mœuʔ		
œ·										hœ·ʌ	fœ·ʌʔ *1
Œ						tŒi	lŒiʔ				
u	du	kusg	hunʔ	sguð	tuðʔ					sguʌg	uʌʔ *7
o	jo				foðʔ				jouʔ	soʌd	oʌʔ
ɔ	pɔ	kɔsd	ɔnʔ		bɔðʔ				tɔuʔ		
ɒ	vɒ							tɒu	sɒuʔ		
ʌ	sʌ	kʌsd	ʌnʔ	sgʌð	sgʌðʔ						

**B:** short vowels after /r/.

	in open syllable	before C	before nasal	before [ð]	before [ðʔ]	before [i]	before [iʔ]	before [u]	before [uʔ]	before [ʌ]	before [ʌʔ]
ɪ		ɪd	ʊɪn	vɪð	ɪðʔ				dʊiʔ		ɪʌʔ
e											
ɛ											
æ		væɡ	ɛæŋʔ	fæð	æðʔ *1		tɛæiʔ	dɛæu	dɛæuʔ		æʌʔ
a		ɛag	dɛaŋʔ								
ɑ	fɑ	ɛag	ɛaŋʔ	ɑð	ɡɑðʔ		dɛaiʔ	ɛau	ɡɛauʔ		
y		kʊys	bɛyŋjə	sɛyð	bɛyðʔ *1				kɛyuʔ		ɡɛyʌʔ
ø											
œ											
œ·		dʊœ·s	ɡʊœ·nʔd		œ·ðʔ		œ·iʔ		œ·uʔ		œ·ʌʔ
œ			ɡʊœnʔd				œiʔ	dœu	œuʔ		
u											
o	fɔ	kɔd		bɔð	oðʔ				dɔuʔ	bɔʌ	oʌʔ
ɔ		ɔɔsd	ɔɔmʔ		ɔðʔ				kɔuʔ		
ʊ								ɛʊ	ɡɛʊʔ		
ʌ		kʌb	ɛʌmʔ	bʌð							

C: long vowel sounds with stød.

not after /r/	in open syllable	before C	before nasal	before [ð/ɪ/ʊ/ʌ]		after /r/	in open syllable	before C	before nasal	before [ð/ɪ/ʊ/ʌ]
i?	si?	ki?l	vi?n			ki?	ki?	gki?s	gki?n	
e?	se?	ke?l	ve?n			ke?				
ɛ?	fɛ?	ke?l	pɛ?n			ke?				
æ?	hæ?	kæ?l	mæ?n			kæ?	kʌæ?	kʌæ?s	gʌæ?n	
ɑ?	hɑ?	kɑ?l	bɑ?n			kɑ?	kɑ?	kɑ?s	kɑ?n	
y?	sy?	ky?l	fy?n			ky?	ky?	fky?s	gky?n	
ø?	sø?	kø?l	mø?n			kø?				
œ?						kœ?				
œ?						kœ?	fkyœ?	fkyœ?s	dkœ?n	
u?	du?	su?s	tu?n			ku?				
o?	to?	o?s	so?n			ko?	ko?	ko?s	tko?n	
ɔ?	tɔ?	ɔ?s	hɔ?n			kɔ?	kɔ?	fkyɔ?s	gkyɔ?n	
ɒ?	tɒ?	ɒ?s	tɒ?n			kɒ?	sgkyɒ?			

**D:** long vowel sounds without stød. Note that words ending in a sonorant consonant + [ə] may also be pronounced with loss of schwa and a syllabic consonant.

not after /r/	before C	before nasal	before [ð]	before [i/y]	before [u]	before [ʌ/ɒ]	after /r/	before C	before nasal	before [ð]	before [i/y]	before [u]	before [ʌ]
i:	mi:lə	mi:nə	bi:ðə	vi:i	li:u	svi:ʌ	ɛi:	pɛi:sə	gɛi:nə	ɛi:ðə	ɛi:i	gɛi:u	ɛi:ʌ
e:	me:lə	me:nə	be:ðə	ve:i	le:u	me:ʌ	ɛe:						
ɛ:	mɛ:lə	pɛ:nə	vɛ:ðə	vɛ:i	hɛ:u		ɛɛ:						
æ:	mæ:lə	mæ:nə	bæ:ðə	væ:i	læ:u	væ:ʌ	ɛæ:	kɛæ:sə	gɛæ:nə	vɛæ:ðə	tɛæ:i	gɛæ:u	pɛæ:ʌ
ɑ:	kɑ:bə	ɑ:nə		vɑ:i	hɑ:u		ɛɑ:	ɛɑ:sə	ɛɑ:nə	gɛɑ:ðə		gɛɑ:u	
y:	sylə	synə	sy:ðə	sɣy	ly:u	fy:ʌ	ɛy:	ɛy:bə	tɛy:nə	bɛy:ðə	ɛy:y	kɛy:u	ɛy:ʌ
ø:	sø:lə	fø:nə	sø:ðə	sø:y	lø:u	fø:ʌ	ɛø:						
œ:		hœ:nə					ɛœ:						
œ:						gœ:ʌ	ɛœ:	ɛœ:bə	dɛœ:nə	bɛœ:ðə	ɛœ:y	ɛœ:u	ɛœ:ʌ
u:	mu:lə	tu:nə	bu:ðə		du:u	ku:ʌ	ɛu:						
o:	mo:lə	to:nə	bo:ðə		to:u	po:ʌ	ɛo:	ɛo:sə	tɛo:nə	ɛo:ðə		dɛo:u	ɛo:ʌ
ɔ:	mɔ:lə	dɔ:nə	bɔ:ðə		lɔ:u		ɛɔ:	fɛɔ:sə	gɛɔ:nə	ɛɔ:ðə		kɛɔ:u	
ɒ:	vɔ:lə	vɔ:nə			tɒ:u	vɒ:ʌ	ɛɒ:						

Short vowels, stød vowels, and long vowels are presented separately, not after /r/ and after /r/, respectively, in Table I. The shaded cells contain the material in focus in this paper; see further below. Translation of the word material has been relegated to Appendix II.

#### 4. Structuralist accounts

For full length treatments of (the difference between) American (Bloomfieldian) and European (Trubetzkoyan/Praguan) structuralist phonology see Anderson (1985) and Fischer-Jørgensen (1975). And note that the picture of American and European structuralism, respectively, is not quite as uniform as I paint it. Within either school there are hardly two individuals who see eye to eye on every matter of putative controversy. So the outline below is a kind of greatest common measure, dogmas and principles which from a reserved distance appear to be characteristic and typical of the two trends in phonology.

I shall assume that a rigid American structuralist would deny the relevance of contrast in the characterization of phonemic elements and ignore matters of phonological system symmetry, whereas he would consider distributional pattern congruity. He would faithfully observe the bi-uniqueness principle and maintain that one and the same sound cannot be ascribed several phonological identities. Furthermore, for two sounds to be considered variants of the same phoneme they must be 'similar' – but he would be vague about what constitutes 'similarity' – and a phonetically reasonable rule must account for the difference in pronunciation. He would absolutely refuse to take morphologically conditioned alternation into consideration in the determination of the phonological representation of individual forms. Cf. Bloomfield (1933). – A more flexible American structuralist would allow partial overlapping in the manifestation of phonemes, i.e. the same sound in different surroundings may belong to different phonemes, cf. Bloch (1941). But it is doubtful whether he would allow one short sound to represent a sequence of two phonemes, even if it would give a more general distribution to some of the elements in the inventory.

A Praguan structuralist would have somewhat different points of departure, cf. Trubetzkoy (1939). He would put emphasis on meaning and contrast, on phoneme system simplicity and symmetry, and only secondarily on distributional symmetry. Partial overlapping of phoneme manifestations in different surroundings would certainly be allowed, and he could interpret one sound as a sequence of two phonemes, granted that a variant pronunciation with a sequence of two sounds exists. Morphonology is established as a separ-

ate discipline, between phonology and morphology. But morphonemes are not common base forms from which the various alternating phonemes are derived by rule. Rather a morphoneme is a set, a listing, of the phonemes which alternate in a morpheme in its various morphological contexts. On the whole, morphological arguments are rarely brought to bear on phonological issues in Prague phonology, and then mainly in connection with neutralization, cf. Martinet (1937).

#### 4.1 Unrounded front vowels

On the above assumptions, any Bloomfieldian or Praguian structuralist would be forced to raise all six unrounded front vowels in Table I to phonological status, be he American or European. The obvious – and only possible – candidates for a reduction would be [æ a ɑ]. But no:

(i) [a] and [ɑ] occur in identical surroundings: [va va], as do [æ] and [ɑ]: [læɪ? lɑɪ?], [læu? tɑu?].

(ii) The words sound different, which would be the Bloomfieldian criterion for setting up the vowels as distinct phonemes, and they mean different things, the Trubetzkoyan criterion. And so, in fact, does the third couplet [bæð? bað?], which latter – having different meanings – is a real innovation: A student of mine distinguishes these words, [bæð?] being imperative of *bade* 'bathe', [bað?] past tense of *bede* 'pray'. Now, this [æ]/[ɑ] contrast proper before [ð?] could be idiosyncratic, but the following would hold generally: Imperative of verbs like *bade*, *hade*, *vade* 'bathe', *hate*, *wade* end in [-æð?]; the past tense of irregular verbs like *bede*, *gide*, *sidde* 'pray', *feel like*, *sit* can likewise end in [-æð?], but also have a (stylistic) variant [-að?], creating at least a potential contrast to the imperatives. And besides, there would still be the structural types [bað] versus [bæð?] to account for, and no plausible phonetic rule to describe the further distribution of [æ] and [ɑ] in Table I either.

Basbøll (1988b, p. 492) reaches a similar conclusion: »six clearly different and commutable vowels in the range between [i] and [ɑ]« at the utterance phonological level. He establishes the three *a*-contrasts on the basis of the vowels in the unstressed first names in 'Ane Hansen, Anne Hansen, Arne Hansen' [ænə 'han?sən], [anə 'han?sən], [ɑnə 'han?sən], where [æ a ɑ] derive from stressed [æ: a ɑ:]. What the material in Table I demonstrates is that counting six vowels in the [i ɑ] range no longer only results merely from the application of utterance phonological rules (vowel shortening due to stress reduction), but they must be reckoned to belong to the level of single word forms.

On distributional grounds, i.e. to achieve distributional symmetry in the occurrence of /a/ and /r/, respectively, one might be tempted to a bi-phonemic interpretation of word-final [ɑ] as /a/+/r/, but I do not think this option is really open without stretching structuralist principles too far. Although, inter alia, Trager and Smith (1957) proposed a bi-phonemic interpretation of long (and in some dialects diphthongized) English vowels, no American structuralist, to my knowledge, ever considered a bi-phonemic interpretation of short monophthongal vowel sounds. A Praguian structuralist would perhaps be less quick to dismiss word-final [ɑ] as /ar/. He would note that in distinct speech there are actually only three stressed occurrences: [va pa ka] *var, par, kar* 'was, pair, vessel'. Those apart, and when no /r/ precedes (which always yields [ɑ]), [a] and [ɑ] are in complementary distribution: [a] in open syllables and before homosyllabic coronals, [ɑ] elsewhere, i.e. before labials and dorsals. Thus, phonologizing the [a/ɑ] difference will obscure what is otherwise to an overwhelming degree a relation of bound variation. It would also, as noted, disrupt the generality of vowel + /r/ combinations, because /a a/ could not occur before /r/. But since variant pronunciations of [ɑ] word finally as [ɑŋ] really no longer occur, which would have been Trubetzkoy's condition to consider a bi-phonemic interpretation (1939, p. 57 ff), and since – furthermore – in this particular position the complete assimilation of [ʁ] to the preceding pharyngeal vowel does **not** entail a lengthening of that vowel, and since – failing all else – the arguments that come from morphological alternations cannot be brought to bear, even a Praguian structuralist will have to admit 6 short front unrounded vowel phonemes. Scuttling [ɑ] across to the back vowels is a possibility, but only serves to increase the number of phonemes there from 5 to 6, cf. below. The phonological status of /a/ was also suggested by Basbøll (1968), though on somewhat different grounds.

#### 4.2 Back vowels and rounded front vowels

On similar reasoning, a structuralist analysis would come out with 5 back vowels, /u o ɔ ɒ ʌ/. They all occur in word final position, 4 of them occur before [ðʔ]. But [ɒ] calls for a comment: It has limited occurrence (word final position and before [ɹ]), so does it really have independent status? The answer is yes. [tɒɹ] *tov* 'rope' as \*/tɒrv/ is infelicitous because the word ought then to have stød (cf. section 5 below). [tɒɹ] cannot be /tɒv/ either, under a strict structuralist interpretation, because [ɔ] and [ɒ] actually contrast, cf. [tɔɹʔ? tɒɹʔ] *tog, torv* 'train, square'. Identifying the vowel in [tɒɹ] phonologically with

[Λ], is another possibility, and in itself entirely defensible since variant pronunciations as [taʊ] exist with at least a minority of the young speech community. But [sɒʊ?] must then follow suit, which is unfortunate, because just as there are young speakers with [taʊ], there are individuals – though their number is probably in rapid decline – who distinguish [sɒʊ? saʊ?] *sorg, sov* ‘sorrow, slept’. Finally, the absence of any [ɒg] pronunciations presumably empties the above speculations of any real merit.

Under a strict bi-uniqueness principle, we end up with 4 rounded front vowels (/y ø œ ɘ/), because [fœɾʌ?] *før* ‘before’ (Table IA) must be /œ/ and therefore also [gʁœɾnʔd ʁœɾʊ?] *grynt, røv!* ‘grunt (n.), rob!’ (Table IB), but then [gʁœnʔd ʁœʊ?] *grønt, røv* ‘green (neuter), arse’ must have /œ/. If partial overlapping is permitted, 3 rounded front vowels suffice, /y ø œ/. But no less than 3, although the number of occurrences of [y] + nasal is restricted,<sup>7</sup> and Basbøll (1972) actually reckoned only two short round front vowels, /y ø/, with a lowering rule before nasals.

I emphasize that I have, on purpose, applied structuralist principles rigidly above, but I do not think that I have distorted them. A somewhat less biased account, which puts more emphasis on distributional facts, is Basbøll (1968).

### 5. Is stød distinctive or not?

The generalized occurrence of short vowel sounds before [ðʔ ɪʔ ʊʔ ʌʔ], where the older generation had long vowels with stød, has consequences for our statements about the distinctiveness or non-distinctiveness of stød. Table II contains a survey of the relevant syllable and word structure types in monomorphemic words. Note that one requirement must always be met for a syllable to receive the stød accent, namely the phonetic condition for its occurrence: a certain minimum stretch of voiced segment material, which in Standard Danish translates into either a long vowel or a short vowel succeeded by a voiced consonant.

It was true of the older generation that when words in column III had stød they ended predominantly in [m n l ɪ ʊ], i.e. there were few monosyllables

7. High vowels, thus also /y/, were lowered before nasals, but since then a couple of new lexical items with [y] have appeared, like *brynje, hymne* ‘coat of mail, hymn’ and there are also morphologically shortened vowels to be reckoned, like *Fynbo* ‘native of Funen’.



Table II

Stød in monomorphemic native Danish words.

monosyllables					disyllables	
I	II	III	IV	V	VI	VII
VC <sub>l</sub> -voil (short vowel + a phonetically unvoiced consonant)	V# (short vowel in open syllable)	VC <sub>l</sub> +voil (short vowel + one phonetically voiced consonant)	VC <sub>l</sub> +voilC (short vowel + a phonetically voiced consonant + one more consonant)	V:C <sub>0</sub> (long vowel, with or without succeeding consonant)	-V(:)C <sub>0</sub> ə (short or long stressed vowel, word final schwa)	-V(:)C <sub>0</sub> əC <sub>l</sub> +sonl (short or long stressed vowel, schwa in the 2nd syllable followed by a sonorant consonant)
[kad] <i>kat</i> 'cat'	[ja] <i>ja</i> 'yes'	[tal] <i>tal</i> 'number' or [halʔ] <i>hal</i> 'hall'	[halʔs] <i>hals</i> 'neck'	[seʔ] <i>se</i> 'see'  [viʔs] <i>vis</i> 'wise'	[hu:lə] <i>hule</i> 'cave'  [ɛŋgə] <i>enke</i> 'widow'	[gaməl] <i>gammel</i> 'old' [vamʔəl] <i>vammel</i> 'sickly'.
never stød; the phonetic condition is absent	never stød; the phonetic condition is absent but these words acquire long vowels and stød in in- flected forms	stød is unpredictable from the surface phonological form in this type	always stød	always stød	never stød	stød is unpredictable from the surface phonological form in this type

with short vowel + [ðʔ ʌʔ].<sup>8</sup> And monosyllables ending in [iʔ uʔ] were restricted to vowel sounds which did not also occur long before [i u], thus: [ɑuʔ ʌuʔ œuʔ aiʔ ɛiʔ]. In other words, there was hardly ever any direct, immediate contrast between stød syllables with long versus short vowel and postvocalic [ð i u ʌ]. Accordingly, monosyllables with long vowel + [ð i u ʌ] could have their vowels shortened, and the stød consequently shifted to the consonant, with no great loss of distinction, hardly any lexical consequences. The final consonant also underwent weakening to semivowel/approximant manifestation, which resulted in a merger of [ɣ] (i.e. /g/) and [ɰ] (i.e. /v/) after back vowels (in [u]), and [ɣ] and [i] (i.e. /j/) after front vowels and /l/ (in [i]), possibly via a stage where former [ɣ] was still unrounded and thus distinguished from [u]. Recall that postvocalic /v/ was optionally pronounced [u] after long vowels, but it was compulsory after short vowels, so – at least in the case of /v/ – consonant weakening is the precondition for vowel shortening.

Below are some illustrations of the development:

<i>sød</i> 'sweet'	/sø:ð/	[søʔð]			>	[søðʔ]
<i>lag</i> 'layer'	/la:ɣ/	[læʔɣ]	>	[læʔ <sub>ɪ</sub> ]	>	[læ <sub>ɪ</sub> ʔ]
<i>låg</i> 'lid'	/lɔ:ɣ/	[lɔʔɣ]	>	[lɔʔ <sub>ʊ</sub> ]	>	[lɔ <sub>ʊ</sub> ʔ]
<i>liv</i> 'life'	/li:v/	[liʔv]	>	[liʔ <sub>ʊ</sub> ]	>	[li <sub>ʊ</sub> ʔ]
<i>lov!</i> 'promise!'	/lɔ:v/	[lɔʔv]	>	[lɔʔ <sub>ʊ</sub> ]	>	[lɔ <sub>ʊ</sub> ʔ]
<i>ser</i> 'sees'	/se:r/	[seʔʌ]			>	[seʌʔ]

This shortening was originally a stylistic variant, characteristic of less distinct, informal speech styles, aptly termed 'stylistic shortening', but it has been completely generalized to-day and must appropriately be characterized as a historical development (albeit recent), in so far as the young generation will admit to recognize forms with long vowels but they do not produce them themselves, not even in distinct, formal speech.

A very small handful of contrasts are neutralized by this process. It affects perhaps a total of a dozen word pairs where, e.g., [ʒæðʔ] may be imperative of

8. Some 25 in all, most of them imperatives, cf. section 8.3.1 and Appendix III.

either *redde* 'save' or *rede* 'comb (vb.)'; [ku<sub>Δ</sub>?] may likewise be imperative of either *kurre* 'coo' or *kure* 'glide'; and [nøð?ɲ] is either *nødden* 'the nut' or *nøden* 'the distress'.

In contradistinction, there were and are plenty of contrasts in monosyllables between long (i.e. stød-) vowels and short vowels when the final consonant is a nasal or lateral: [ki<sup>ʔ</sup>m kim<sup>ʔ</sup>] *kim* – *Kim* 'germ – (proper name)'; [pɛ<sup>ʔ</sup>n pen<sup>ʔ</sup>] *pæn* – *pen* 'nice – pen'; [fø<sup>ʔ</sup>n føn<sup>ʔ</sup>] *føn* – *fynd* 'Foehn – pith'; [ve<sup>ʔ</sup>n ven<sup>ʔ</sup>] *Hven* – *vind* '(place name) – wind'; [hɛ<sup>ʔ</sup>l hel<sup>ʔ</sup>] *hæl* – *held* 'heel – luck'; [hu<sup>ʔ</sup>l hul<sup>ʔ</sup>] *hul* – *huld* 'hollow – fair', etc.

To recapitulate: shortening of long vowels before [ð ʊ ɪ ʌ] – with stød shift to the consonant as an inescapable consequence – has drastically increased the number of words with stød within group III in Table II, and has thereby considerably increased the number of surface contrasts between stød and non-stød in monosyllables with short vowel, cf. also the eight rightmost columns in Table IA and IB. It appears reasonable now perhaps, in a structuralist framework, to raise the stød/non-stød difference to undisputed phonological status in monosyllables with short vowel and one succeeding voiced consonant.<sup>9</sup> In other monomorphemic words it is still largely predictable, as it is in morpho-syntactically complex structures. See further Basbøll (1985).

## 6. Via the older generation to a present-day morphophonemic account

Although, of course, phoneme inventories change over time (items appear, disappear, merge, split), fifteen (fourteen) vowel phonemes is not a felicitous abstract representation. It is an uncomfortably large vowel system, and it creates a significant gulf between the phonological systems of the younger and the older generation, cf. below.

Such an analysis glosses over a lot of what is otherwise phonologically very regular and productive processes. Thus, phonologizing the [a ɑ] difference leaves unexplained their very nearly complementary distribution (cf. Table IA and section 6.1 below). If [i e ε æ a ɑ] are separate phonemes, then of course the non-high vowels after /r/ (cf. Table IB) are /æ a ɑ/, respectively, and we are at a loss to account for the absence of /e ε/ after /r/. Likewise for /ø œ/. There are similar unexplained gaps in the distribution of stød vowels and long vowels (cf. Table IC and ID): no [ɤe<sup>ʔ</sup> ɤε<sup>ʔ</sup> ɤø<sup>ʔ</sup> ɤœ<sup>ʔ</sup> ɤe: ɤε: ɤø: ɤœ:]. In other words, the phenomenon traditionally termed 'r-colouring', i.e. the lowering and retraction of non-high front vowels after /r/ is no longer a phono-

9. See footnote 5.

logical process, but fossilizes as a matter of representational restrictions. Finally, and conspicuously, there are no stød vowels before [ð ɪ ʊ ʌ] (cf. Table IC).

I believe the analysis violates speakers' own intuition about their language. And though structural descriptions do have a *raison d'être* per se, and though I do not subscribe to any (particular) generative framework, I am committed to the view that »... one cannot arrive at a plausible overall understanding of the nature of language, its structure and functions, without considering [among other things, NG] the psychological aspects.« (Linell 1979, p. 8).

Note, however, that I do not want to deny [æ], [a] and [ɑ] or [ɔ], [ɒ] and [ʌ] a cognitive status as sound images in the minds of Copenhagen Danish speakers and listeners, though perhaps [a] versus [ɑ] and [ɔ] vs [ɒ] are more firmly established than [æ] versus [a] and [ɒ] vs [ʌ]. The latter have merged in lower Copenhagen speech, in [æ] and [ɒ], respectively, and I suspect it to be a matter of perhaps another generation or two before this feature is generalized to all sociolects in Copenhagen, i.e. there will then be no [a] and [ʌ] vowel sounds. – The status of [a] and [ɑ] as independent productional units is attested by the following very neat self-repaired slip of the tongue from a radio news broadcast: [...tɒŋgas ..... tɒŋgasgʁanæʔdʌ ...] *tåregasgranater* 'tear gas grenades'. We are also generally quick to note when a wrong *a*-sound is being used (say, by foreigners), i.e. when the phonological rules are being violated. At the same time, our three different *a*-sounds are felt to be in some way the same, a feeling which may of course have orthographic causes (we have only one *a*-letter) but which may also reflect speakers' and listeners' tacit knowledge of phonological rules and morphological alternations, see further below.

### 6.1 The vowels 100 years ago

Speakers born around 1870 possessed the whole gamut of sounds depicted in Fig. 1 and Table I, but in another distribution, cf. Table III. They had not yet dropped consonantal unvoiced [ɣ] after **short** vowels in final position or before /p t k f s/, cf. Brink & Lund 1975, pp. 67 and 261 ff. And in monosyllables with stød, they had long vowels before /d g v r/ ([ð ɣ v/ʊ ʌ]). When no /r/ preceded – which triggered [ɑ], irrespective of the context to the right – their three *a*-sounds were in perfect complementary distribution: [æ] occurred long only, except that /ɛr/ yielded [æɣ] as in [bæɣ] *bær* 'berry'. [a] occurred short only – in complementary distribution with short [ɑ]: [a] in open syllables and before coronals, [ɑ] elsewhere. Or, more formalized, and in the order given:

Table III

The words in Table I as pronounced by the generation born around 1870, with some additions (starred) which have since disappeared from the paradigms, due to later developments.

A

di	lid	pinjə	bið	biʔð		*liʔγ		liʔv	iɿ	siʔ <sub>Δ</sub>
de	led	venʔ	beð	beʔð		neʔγ		leʔv	peɿ	seʔ <sub>Δ</sub>
mē	léd	vənʔ	mēð	vɛʔð		lɛʔγ		hɛʔv		sɛʔ <sub>Δ</sub>
				bæʔð		læʔγ		læʔv	bæɿ	
va	lad	vanʔ	bað	baðʔ	mai	laiʔ				
vaɿ	lag	vamʔs					haɯ	taʔv or tauʔ		
ɬɛʔvy	tysd	synəs	syð	gyʔð		*syʔγ		lyʔv	fyɿ	fyʔ <sub>Δ</sub>
milʔjə	øsd	pønʔd	sgøð	gøʔð		søʔγ		løʔb or løʔv		føʔ <sub>Δ</sub>
		sgœnʔ						mœʔv		fœʔ <sub>Δ</sub>
									hœɿ	
					tɕɛɿ	lɕɛɿʔ				
du	kusg	hunʔ	sguð	tuʔð				*duʔγ	sguɿ	uʔ <sub>Δ</sub>
jo				foʔð				joʔγ	soɿ	oʔ <sub>Δ</sub>
pɔ	kɔsd	ɔnʔ		bɔʔð				tɔʔγ		
vɔɿ								sɔʔγ or		
sɔ	kɔsd	ɔnʔ	sgɔð	sgɔðʔ			tau	sɔuʔ		

B

	bid	bin	bid	biʔð		*biʔɣ		diʔv		biʔʌ
				beʔð		beʔɣ		diʔv		beʔʌ
	vææg	æŋʔ	fæð	gææʔð			diʔv			
	æg	dæŋʔ				dæiʔ				
fæu	æg	æŋʔ	æð	gææʔð			æu	gææʔv		
	kæys	bæynjə	sbæyð	bæyʔð		*bæyʔɣ		kæyʔb		gæyʔʌ
	dæoes	gæoenʔd		ææʔð		ææʔɣ		ææʔv		ææʔʌ
		gæænʔd				ææʔʔ		ææʔʔ		
fæu	kæud		bæud	æuʔð				*æuʔɣ		æuʔʌ
				æoʔð				dæoʔɣ	bæoʔʌ	æoʔʌ
	ææsd	ææmʔ		æoʔð				kææʔɣ		
	kæab	ææmʔ	bææð				ææ	gææʔʔ		

C

si?	ki?l	vi?n	gi?	gi?s	gi?n
se?	ke?l	ve?n			
fe?	ke?l	pe?n	kfe?	kfe?s	gfe?n
hæ?	kæ?l	mæ?n			
ha?	ka?l	ba?n	ka?	ka?s	ka?n
sy?	ky?l	fy?n	ky?	ky?s	gy?n
sø?	kø?l	mø?n			
			fæ?	fæ?s	dæ?n
du?	su?s	tu?n	bu?	bu?s	*bu?n
to?	o?s	so?n	bo?	bo?s	bo?n
to?	o?s	ho?n	bo?	bo?s	bo?n
to?	o?s	to?n	sgbo?		

## D

mīl̥ə	mīnə	bīðə	vīr̥ə	līvə	svīʌʌ or svīʌ	p̥r̥iːsə	ɡm̥iːnə	kīðə	kīr̥ə	ɡm̥iːbə	kīr̥ʌ
mēl̥ə	mēnə	bēðə	vēr̥ə	lēr̥ə	mēʌ						
mēl̥ə	pēnə	vēðə	vēr̥ə	hēr̥ə	vēʌ or vēʌʌ	k̥r̥əsə	ɡm̥r̥nə	v̥r̥əðə	t̥r̥əʔə	ɡm̥r̥nə	p̥r̥əʔʌ
mæ̌l̥ə	mæ̌nə	bæ̌ðə	væ̌r̥ə	læ̌və				ɡm̥æ̌ðə			
kag̥bə	q̥nə			h̥ar̥ə		k̥arsə	k̥anə	*ɡm̥ar̥ðʌ	*b̥ar̥ə	ɡm̥ar̥nə	
syl̥ə	synə	syðə	sy̌r̥ə	ly̌və	fy̌ʌʌ or fy̌ʌ	k̥y̌bə	t̥m̥ynə	b̥m̥y̌ðə	k̥y̌r̥ə	k̥m̥y̌bə	k̥y̌r̥ʌ
sø̌l̥ə	f̥œ̌nə	sø̌ðə	sø̌r̥ə	l̥œ̌və or l̥ø̌bə	f̥œ̌ʌ						
	h̥œ̌nə				ɡœ̌ʌ	k̥œ̌bə	d̥k̥œ̌nə	b̥k̥œ̌ðə	k̥œ̌r̥ə	k̥œ̌nə	k̥œ̌ʌ
mū̌l̥ə	tunə	bū̌ðə		dǔr̥ə or dǔrvə	kǔʌʌ or kǔʌ	k̥ursə	*b̥k̥urnə	b̥ur̥ðə		*b̥ur̥r̥ə	*b̥ur̥ʌ
mō̌l̥ə	tonə	bō̌ðə		tǒvə	pǒʌʌ or pǒʌ	k̥osə	t̥m̥onə	k̥ǒðə		d̥k̥ǒr̥r̥ə	k̥ǒʌ
mō̌l̥ə	d̥onə	bō̌ðə		l̥ǒvə or l̥ǒr̥ə		f̥k̥osə	ɡm̥onə	k̥ǒðə		k̥k̥ǒr̥r̥ə	
ē̌l̥ə	enə			tǒvə or *b̥ǒr̥r̥ə	p̥iː						



a	> a	/r	[ʁab ʁa:sə]	<i>rap, race</i> 'quick, race'
			[va:a va:mə]	<i>var varme</i> 'heat, goods'
a[+long]	> æ:		[mæ:lə]	<i>male</i> 'paint (vb.)'
a	> a	/ __+cor	[kad]	<i>kat</i> 'cat'
		/ __•	[ja]	<i>ja</i> 'yes'
a	> a elsewhere		[ham hag vaŋ]	<i>ham, hak, var</i> 'him, tick, was'

[vaŋ paŋg], etc., are uncontroversially analyzed as /ar/, and since the sequence [aŋ] is in complementary distribution both with long [a:] and with [aʔ] (which are also mutually exclusive), the latter are analyzed as /ar/ or /ar/,<sup>10</sup> where /r/ is realised as a non-syllabic unrounded pharyngeal vocoid, which assimilates completely to the preceding [a], and surfaces as length of the vowel sound. Thus, the 6 front unrounded vowels reduce easily to 4 phonemes.

Likewise, the rounded front vowels reduce unambiguously to 3, and so do the rounded back vowels if we accept overlapping manifestation of short /o/ in closed syllables with the quality of long /ɔ:/:

O[+long]	>	o:	[mo:lə]	<i>mole</i> 'pier'
o	>	o / __•	[foto]	<i>foto</i> 'photo'
	>	ɔ elsewhere	[kɔsd]	<i>kost</i> 'broom'
ɔ[+long]	>	ɔ:	[mɔ:lə]	<i>måle</i> 'measure (vb.)'
ɔ	>	ʌ	[kʌsd]	<i>kost</i> 'food'

[pɔŋ] is uncontroversially /ɔr/ and since [ɔ:] and [pɔʔ] are in complementary distribution with [pɔŋ], they are of course analyzed likewise as /ɔr/ or /ɔr/,<sup>11</sup> where /r/ is realised as a non-syllabic rounded pharyngeal vocoid, which assimilates completely to the preceding [ɔ] and surfaces as length of the vowel sound. Thus, the 5 back vowels reduce easily to 3 phonemes.

Under this analysis, there is no discrepancy between surface contrasts and phonological representation, and the shortcomings of a classical structuralist analysis are not apparent.

10. About /a/'s length, see section 8.3.2.

11. About /ɔ/'s length, see section 8.3.2.

There is a snag here, however: Apart from the numerous occurrences of an [o] in closed syllable in morphologically complex words, like *fodtøj*, *modspil* 'footwear, defence', where it derives from long /o:/, there are about a dozen words with short [o] in closed syllable – like *soldat*, *sort*, *skjorte*, *torden* 'soldier, black, shirt, thunder', most of them with /-or/ – which break up the neat complementary distribution of /o/'s variants. They are traditionally simply accepted as exceptions to the general rule. If such exceptions are not tolerated, we have to posit 4 short rounded back vowels, /u o ɔ ʌ/, with a bi-unique relation between phoneme and sound, and a further rule: /ɔ(:)r/ > [ɔ:]. But that way the phonological identity between numerous long /ɔ:/s and their morphologically shortened counterparts is lost, as in [sdɔʔl sdʌltʁɔʔð] *stål* – *ståltråd* 'steel – wire' which must then have /ɔ:/ vs. /ʌ/, rather than /ɔ:/ vs. /ɔ/.

## 6.2 The older generation's phonemes may be the younger generation's morphophonemes

It is easy to see that the modern surface phonological forms, the contrasts between [æ]/[a] and [æ]/[ɑ], respectively, as well as the three-way distinction between [o ɔ ʌ], have arisen due to the shortening of long stød-vowels before [ð ɹ ʌ] in monosyllables; and that the word-final [a]/[ɑ] and [ɔ]/[ʌ] contrasts arose due to the weakening of the postvocalic consonantal *r*-sound to a vocoid and its ensuing complete assimilation to preceding [ɑ] or [ɔ] without the compensatory lengthening word-finally which is found in other positions, cf. [pa vɔ pa:g sdɔ:g] from former [paɣ vɔɣ paɣg sdɔɣg] *par*, *vor*, *park*, *stork* 'pair, our, park, stork'.

However, long vowels surface in inflected or derived forms with [ə], cf. [flæðʔ flæ:ðə (>flæ:ð)] *flad* – *flade* 'flat (sg. – pl.)'; [kleiʔ klei:ə (>klei)] *klæg* – *klæge* 'sticky (sg. – pl.)'; [læʊʔ læ:ʊə (>læ:u)] *lav!* – *lave* 'do (imper. – inf.)'; [væʌʔ væ:ʌ] *vær* – *være* 'be (imper. – inf.)'; [bɔðʔ bɔ:ðə (>bɔ:ð)] *båd* – *både* 'boat (sg. – pl.)'; [sdoʌʔ sdo:ʌ] *stor* – *store* 'big (sg. – pl.)'. It is therefore not unjustified to assign long vowels also to the monosyllables underlyingly, though not across the board: there are a couple of handfuls of (mainly) imperatives in final [-ðʔ -ʌʔ] that have underlying short vowels, cf. section 5 above and 8.3.1 below, but – crucially – none with [æ].

Likewise, the psychological presence of an /r/ in word-final short stressed [ɑ ɔ] may have several sources, the most likely one, disregarding orthography, perhaps being the rhymes with unstressed [ha fɔ], from stressed [haʔ fɔʔ] *har* – *får* (present tense of [hæʔ fɔʔ] *have* – *få* 'have – get') which must end in an /r/ like any other present tense in non-modal verbs. But consonantal [ɹ]s

actually surface in derivations with stressed suffixes, like [nɛgta nɛgta'ʁi'n], [ʁagto ʁagto'ʁa'd] *nektar* – *nektarin*, *rektor* – *rektorat* 'nectar – nectarine, headmaster – headmastership'.

I suggest that abstract representations with long vowels and with /r/, respectively, in the structural types exposed here, have a psychological reality in the minds also of young Copenhagen Danish speakers. If so, the rules that generate the existing surface forms must be productive: speakers presented with fictive stems with short vowels plus [ð? ʊ? i? ʌ?] should produce long vowels in inflected forms with schwa, and likewise [ʁ] should surface in their pronunciation from fictive stems in final [a ɒ] before a stressed vowel suffix.

In the final section (9) I try and narrow down the nature of this abstract, morphophonemic representation.

## 7. The experiment

### 7.1 Material

#### 7.1.1 Final /r/

To test the psychological presence of an /r/ beneath [a ɒ] I created the paradigms presented below:

[ka'lif] <i>kalif</i> 'caliph'	[kali'fæ'd] <i>kalifat</i> 'caliphate'
[no'vi:sə] <i>novice</i> 'novice'	[novi'çæ'd] <i>noviciat</i> 'novitiate'
[do:mə]	?
[kalga]	?
[mɛgtɒ]	?
[jens] <i>Jens</i> (proper name)	[jɛn'si:nə] <i>Jensine</i> (proper name)
[ge:ʋʌ] <i>Georg</i> (proper name)	[geʋ'gi:nə] <i>Georgine</i> (proper name)
[so'næ:də] <i>sonate</i> 'sonata'	[sona'ti:nə] <i>sonatine</i> 'sonatina'
[bɛpɔ]	?
[viʌgʋ]	?
[baltə]	?
[çɛlo] <i>cello</i> 'violoncello'	[çɛ'lisd] <i>cellist</i> 'cellist'
[vio'li'n] <i>violin</i> 'violin'	[viol'i'nisd] <i>violinist</i> 'violinist'
[tambə]	?
[bɛla]	?
[flɛgtɒ]	?

[melo'diʔ] <i>melodi</i> 'melody'	[melo'dig] <i>melodik</i> 'melodics'
[ad'leʔd] <i>atlet</i> 'athlete'	[adle'tig] <i>atletik</i> 'athletics'
[po'eʔd] <i>poet</i> 'poet'	[poe'tig] <i>poetik</i> 'poetics'
[pal'tiʔ]	ʔ
[fi'laʔ]	ʔ
[da'mɒʔ]	ʔ
[o'boʔ] <i>obo</i> 'oboé'	[obo'isd] <i>oboist</i> 'oboist'
[al'beʔd]	ʔ
[pan'taʔ]	ʔ
[al'bɒʔ]	ʔ

Note that word final [a ɒ] are either short and **unstressed** (in the three top-most boxes) or stressed and with stød (the two lower boxes). I have to assume that if [ʁ] surfaces in these derivations, then it would presumably also do so in word final short stressed forms. But since that type is rare (totalling three words *par*, *var*, *kar* 'pair, was, vessel' of which there are no derivations with stressed vowel suffix), I deemed it best to avoid the direct fictive analogy.

If unstressed [a ɒ] have mono-phonemic status, if they are single autonomous vowels, then they should be dropped before the derivational suffixes, in analogy with [ə o] in *noviciat*, *sonatine*, *cellist*, to yield [kal'gæʔd mæg'tæʔd viʌ'gɪnə bal'tɪnə be'lɪsd fleg'tɪsd] whereas if they are conceived of as ending in a consonant, they should be treated on a par with *kalifat*, *Jensine*, *Georgine*, *violinist*, where the final consonant remains, and – according to the rules for consonant manifestation – adjusts its pronunciation to what becomes syllable initial position before the stressed suffix vowel, cf. *Georgine*, *sonatine*, *atletik*, *poetik*. This would yield [kalga'ʁaʔd mægʁɒ'ʁaʔd viʌgʁɒ'ʁɪnə baltɒ'ʁɪnə bɛlɒ'ʁɪsd flegʁɒ'ʁɪsd]. Note also the couple of parallels with [ʁ] in the derivative, mentioned in 6.2 above, that actually exist in the language.

It is a whole lot more difficult to find adequate derivational models, i.e. examples with a stressed final open syllable which will take a stressed vowel suffix, and *melodi* – *melodik*, *obo* – *oboist* were actually the only two pairs I could come up with. *Obo* is not really fitting either, given that it does not suffer deletion before /-isd/. So if [pantɒ'ʁɪsd albɒ'ʁɪsd] will be evidence of an underlying /r/, paralleling [saʔ sɒ'ʁɪnə] *tsar*, *tsarina* 'Tsar, Tsarina', the unambiguous proof of single vowel status, in the shape of [pan'tɪsd al'bɪsd] is hardly to be expected, cf. *oboist*.

[domə bɛpɒ tambə pal'tiʔ al'beʔd] were included for derivation as controls: under no circumstance should an [ʁ] intrude before the derivational suffixes.

## 7.1.2 Vowel length

Verb stems ending in a consonant add schwa in the infinitive and, as a consequence, loose stød. The regular plural formation of monosyllables ending in one consonant is with either /ə/ or /ər/ (= [ʌ]) or zero suffix, cf. Hansen (1967, pp. 89 ff.). If the suffix is /ə/ the word is guaranteed to lose any stød it may have in the singular, as in [huʔs hu:sə] *hus* – *huse* ‘house – houses’ and [dʁaŋʔ dʁaŋə] *dreng* – *dreng* ‘boy – boys’; whereas /ər/ may preserve and even insert stød, cf. [halʔ halʔʌ] *hal* – *haller* ‘hall (sg. – pl.)’ and [øʌ øʌʔʌ] *øl* – *øller* ‘beer (sg. – pl.)’, though loss of stød also occurs, cf. [sønʔ sønʌ] *synd* – *synder* ‘sin (sg. – pl.)’.

A number of potential Danish monosyllabic imperatives and nouns were constructed, with final [ðʔ uʔ iʔ ʌʔ] preceded by [i e ɛ æ ø u o ɔ]. There are holes in the pattern below, because sequences of high back vowels + [ʌ] tend to monophthongize, as does [iɪ]; and [i] occurs only after front vowels, cf. Tables I and III.

## Imperatives:

pliðʔ sdeðʔ gæðʔ kæðʔ	pluðʔ gloðʔ snoðʔ
tiʌʔ geʌʔ peʌʔ plæʌʔ	
fleiʔ smeʔiʔ sgæʔiʔ	
smiʌʔ kleʌʔ smæʌʔ	kluʌʔ sloʌʔ

## Nouns:

sniðʔ fleðʔ bleðʔ sgæðʔ	tʁuðʔ shoðʔ sgɔðʔ
kliʌʔ heʌʔ seʌʔ næʌʔ	doʌʔ
heiʔ fleʔiʔ pæʔiʔ	tøʔiʔ
fliʌʔ geʌʔ læʌʔ	huʌʔ gloʌʔ

If my assumption is correct, young Danes – upon hearing these words and asked to inflect them – should respond with forms with long vowel sounds, except perhaps before [ð] where long vowels may shorten, cf. section 3 above. Note also, that if they respond with long vowels before [ʌ] it does not necessarily prove that the vowel is long in the abstract representation, since short underlying vowels actually undergo (surface) lengthening before /r/, cf. section 3 above. But other types of monosyllables (long vowel stems or different final consonants) should undergo no change in vowel length when inflected.

To ensure that subjects are indeed sensitive to differences in structure, some equally fictive stems ending in a lateral or nasal with stød, plus a few long vowel stems were added to the paradigm above, namely

imperatives: pil? pyl? vul?<sup>12</sup> kol? gɔm? fɛn? kleŋ? te?b flæ?s  
 nouns: myl? kvem? fam? beŋ? fæ?l ty?s sgæ?s

### 7.1.3 Reservations

The only possible way to represent word-final [a ɒ a? ɒ?] orthographically in Danish is with a final *r*-letter, and there is no way that I could strike this knowledge from the minds of the subjects in the experiment. Nor should I, for that matter, because knowledge about spelling is a legitimate part of our linguistic competence. Thus, there is no way to mute an objection that if [ʁ]s surface in the derivation of the nonsense words in section 7.1.1, it is due to indirect influence from the orthography.

It is a more general problem in this kind of experiment that we cannot know which role existing derivational and inflectional paradigms actually play in subjects' performance, to what extent they respond in accordance with mere analogy or whether they are being more directly creative. This last schism might be resolved if we actually knew what analogy or analogical formation is, neuro-linguistically speaking. Perhaps analogical formation is not such an unimaginative, mechanical sort of imitation as is often implied by the term.

## 7.2 Design

### 7.2.1 Final /r/ – derivation

Stimuli and responses had to be oral to avoid the most direct influence from the orthography. On the other hand, subjects were not necessarily so sophisticated linguistically that I could ask them to »produce with suffix X the abstract noun corresponding to Y«; nor did I want in that manner to alight them to the exact phonetic/phonological shape of the suffix in this part of the experiment. As a compromise, subjects were given – for each block of derivations, cf. 7.1.1 – a sheet of paper with, e.g., the following information:

*En kalifs domæne eller hans regeringsperiode hedder et kalifat.*

*Den tilstand en novice indtræder i hedder et noviciat.*

*(The domain or the reign of a caliph is a caliphate. The probationary period of a novice or the state in which she enters is a novitiate.)*

12. According to two of my subjects, *vulle* exists, meaning to rock a child to sleep in your arms, but no one else seemed to be aware of this.

I would repeat the written information and continue (in translation):

«Then what do you think we should call the area which is managed by a [do:mə]?» [...]

«What is likewise the name of the area managed by a [kalga]?» [...]

«What should we call the probationary period of a [mægto]?» [...]

The words in the four succeeding blocks in 7.1.1 above were elicited in similar fashion.

Between the two experimental conditions subjects were asked to read aloud two brief passages I had composed for another purpose than the present one.

#### 7.2.2 Vowel length – inflection

The instructions about inflection of the verbs ran as follows:

*Her skal dannes infinitiv af imperativ af en række hidtil ukendte verber i dansk, à la 'spil! – spille; mas! – mase'*

*Jeg siger imperativen og du svarer med infinitiven.*

*(Now you are to form the infinitive from the imperative of a series of hitherto unknown verbs in Danish, a la ... I will say the imperative and you should respond with the infinitive.)*

Again, I would repeat the written information and then continue to read – in random order, one by one, waiting for the subject's response after each word – the imperatives in 7.1.2, with the controls interspersed.

Finally the nouns, again in writing:

*Nu gælder det at lave pluralis af singularis af en række nydannede ord, som alle er neutrum, à la*

*'et hus – to huse; et land – to lande'*

*Jeg siger ordet i singularis og du svarer med pluralis.*

*(Now it is about forming the plural from the singular of a series of newly created words, which are all in the neuter, a la ... I'll say the word in the singular and you will respond with the plural.)*

Subjects were told to use only the plural suffix /ə/. Plural /ər/ (= [ʌ]) may be the productive plural suffix, cf. Basbøll (1985), but since noun stems may retain their stød and short vowel in the plural with /ər/, cf. 7.1.2 above, I had to force another solution on the subjects. I then read the pseudo nouns from section 7.1.2 above, with the controls interspersed – one by one, in ping-pong with the subject – in random order.

Speakers were recorded individually, of course, on good quality equipment, but under informal conditions, i.e. in my office at the University.

I do not see alternatives to the test format (single word production). And of course it invites maximally distinct speech. But that is perhaps – for once – an advantage in the interpretation of the results.

### 7.3 Speakers

I had wanted ten speakers 20-25 years old, born and raised in the greater Copenhagen area in a middle class environment. The middle class requirement probably holds, but greed and curiosity got the better of me and I ended up with the following:

age	Copenhageners	non-Copenhageners
11	1 (♀)	
19-20	3 (2♀, 1♂)	
21-25	4 (♀)	2 (♀)
26-30	4 (1♀, 3♂)	3 (2♀, 1♂)
31-35	4 (♂)	1 (♀)
66	1 (♂)	

The total is 23, 17 Copenhageners and 6 non-Copenhageners, 8 females and 9 males in the first category, 5 females and 1 male in the latter category. In the 'most desired age group' (25 years and younger) there are 10 speakers, 7 female and 1 male Copenhageners, and 2 female non-Copenhageners. The very youngest (11 years) and oldest (66 years) speakers were included mainly because they were readily available, and they would perhaps exhibit the greatest individual differences, mark the extremes of the continua, so to speak, although they cannot of course really represent their respective generations. They are all, except the youngest and the oldest subject (a colleague), students of linguistics at the undergraduate or graduate levels.

## 8. Results

### 8.1 Final /r/

Table IV displays the number of derived word forms produced with a consonantal [ʁ] in the ten fictive stems [kalga mægtv viʎgv balta bela flægtv fi'laʔ da'mvʔ pan'taʔ al'bvʔ], by each of 23 speakers. They are organised according



**Table IV**

Number of occurrences of [ɤ] after unstressed [ɑ ɒ] or stressed [ɑ? ɒ?] before a stressed-vowel-suffix. 23 subjects, arranged here according to age, sex and linguistic experience (1st year students in linguistics or older students), cf. section 7.1.1.

age		Words produced with [ɤ] (of a possible 10 total) – stars denote non-Copenhagen speakers			
		female		male	
		1st year	older	1st year	older
No. 1	11	1			
No. 2	19			8	
No. 3	19	5			
No. 4	20	8			
No. 5	21	*6			
No. 6	22		2		
No. 7	22	0			
No. 8	22		9		
No. 9	24		*9		
No. 10	24	5			
No. 11	26				10
No. 12	26		*6		
No. 13	26				*8
No. 14	27				10
No. 15	28	*6			
No. 16	28	8			
No. 17	29			8	
No. 18	30				10
No. 19	32				8
No. 20	33				8
No. 21	34			9	
No. 22	35		*10		
No. 23	66				6
total		160			

to age, sex, geographical origin (Copenhagen or elsewhere [starred]), and linguistic training (1st year students versus more advanced), all of which might a priori be thought to influence the results. However, speakers are not evenly distributed within the various categories. Particularly, there is an overweight of linguistically trained males in the age group over 25 years, and an overweight of females under 25 years of age. Thus, the only statistical test possible is a series of  $\chi^2$ s on various sub-groups of speakers, which test the significance of the difference between the number of observed occurrences of [ʁ] in either category versus the expected distribution of [ʁ] responses, i.e. the distribution which would arise if the speakers of either group in a pair produced identical proportions of [ʁ]-responses. The outcome of these various tests are listed below:

speaker characteristics	number of [ʁ] productions in each group in percent of the total number possible (=10 per speaker)	$\chi^2$ s with $p$ if smaller than 0.05
Copenhagen vs. non-Copenhagen speakers;	68% vs. 75%	0.29
male vs. female speakers; (over 25 years)	86% vs. 75%	0.39
older vs. 1st year students; (25 years or younger)	67% vs. 47%	1.43
older vs. 1st year students; (over 25 years)	84% vs. 78%	0.18
over 25 years vs. younger; (females)	75% vs. 50%	3.07
over 25 years vs. younger; all speakers	82% vs. 53%	7.34 $p < 0.01$

Regional background, sex and linguistic training have no significant influence on responses. The only factor in the presence or not of an [ʁ], when words ending in [a(?) ɐ(?)] are derived with a stressed suffix beginning with

a vowel, is age, when the line between 'young' and 'old' is drawn – somewhat arbitrarily – at 25 years. If set much lower, there will not be 'young' speakers enough to allow a meaningful comparison with the 'old' group; and if set at 30 years, the difference disappears. The youngest (no. 1) and oldest (no. 23) subjects do not produce fewer or more [ɶ]'s than the rest of the 'young' and 'old' groups, respectively. That established, the results for individual words can be presented as in Table V.

**Table V**

Number of occurrences of [ɶ] after unstressed [ɑ ɒ] or stressed [ɑʔ ɒʔ] before a stressed-vowel-suffix. 23 subjects, arranged here according to age: 25 years and younger vs. older than 25.

	Speakers according to age		total (N = 23)
	25 years and younger (N = 10)	older than 25 years (N = 13)	
kalga	3	7	10
megtɒ	5	10	15
viʌgɒ	4	10	14
balta	7	12	19
bela	5	10	15
flegtɒ	7	12	19
fi'laʔ	5	9	14
da'mɒʔ	7	11	18
pan'taʔ	6	13	19
al'boʔ	4	13	17
unstressed [ɑ ɒ] (N = 6)	31	61	92
stressed [ɑʔ ɒʔ] (N = 4)	22	46	68
percentage [ɶ] responses in unstressed vowels	52%	78%	67%
percentage [ɶ] responses in stressed vowels	55%	88%	74%

With the younger group, the proportion of words which will come out with [ʁ] in derivation is nearly identical for unstressed and stressed vowels (52% and 55%, respectively). With the older speakers the difference between unstressed and stressed final vowel is somewhat larger (78% vs. 88%), but it is not statistically significant.

I can establish no other factors which trigger differences in [ʁ] occurrence. Thus, [a] and [ɒ] trigger similar proportions of [ʁ] responses. – Familiarity with the particular derivation and derivative suffix might influence subjects' performance, to the effect that more familiar (more frequent in their own language) derivative suffixes would be preceded by weaker morphological boundaries and lead to redrawing of the phonological syllable boundary to precede an underlying stem final /r/, and therefore induce a consonantal [ʁ], whereas less familiar suffixation would induce a stronger morphological boundary, no redrawing of syllable boundaries and thus no [ʁ]-consonant. I cannot know what is more and what is less familiar to the 23 speakers, but I suspect that deriving girls' names or diminutives and instrumentalists (blocks 2, 3 and 5 in 7.1.1 above) is a more familiar procedure than forming abstract nouns (blocks 1 and 4). However, the former group does not elicit more [ʁ] responses than does the latter.

Subjects exhibited a rather high degree of dispersion and some individuals were very imaginative in the derivations, i.e. they occasionally strayed rather far from the pattern which the models presented to them were intended to induce. Thus, e.g., [mɛgtɒ] provoked seven different answers, among them [mɛgtʁi'æʔd] and [mɛgtɒʁi'ɕæʔd]. Below are listed the three most frequent derivations of the ten test words and the 5 dummies. (Note that subjects occasionally suggested two responses, and the total for some words below may therefore exceed 23. Note also that vowel quality and consonant variation beyond the suffix boundary domain is ignored and, e.g., responses [kalgʌ'ʁʌd] and [kalga'ʁʌʔd] are pooled for the purpose – separated by a slash – and the information they contain about other issues in Danish phonology, like the domain for 'r-colouring', is ignored here.)

- |       |   |  |
|-------|---|--|
| domə  | → | do'mæʔd (11), domi'æʔd (7), domi'ɕæʔd (5)  |
| kalga | → | kalgʌ'ʁʌʔd/kalga'ʁʌʔd/kalkʌ'ʁʌʔd/kalka'ʁʌʔd (9),<br>kalgai'æʔd/kalkai'æʔd (4), kal'gæʔd/kal'kæʔd (4) |
| mɛgtɒ | → | mɛgtɒ'ʁʌʔd/mɛgtɒ'ʁʌʔd (13), mɛgtɒ'æʔd (3), mɛgtɒi'æʔd/<br>mɛgtɒi'æʔd (3)                             |
| bɛpɔ  | → | bɛ'pi:nə (16), bɛpɔ'i:nə (4), bɛ'bɪ:nə (3)   |
| viʌɡɒ | → | viʌɡɔ'ʁi:nə/viʌɡɒ'ʁi:nə/viʌɡə'ʁi:nə (14), viʌ'ɡi:nə (6),   |

	viʌɡp'i:nə (4)
balta	→ balta'xi:nə (18), bal'ti:nə (4), balta'si:nə (2)
tambə	→ tam'bisd (12), tam'pisd (4), tambe'isd (2)
bela	→ belə'xisd (15), be'lisd (5), belə'isd (3)
flegtə	→ flegtə'xisd/flegtə'xisd (19), flegtə'isd (2), fleg'tisd (2)
pal'tiʔ	→ pal'tig (21), paltə'tig (1), palti'tig (1)
fi'ldə	→ fila'xisg (14), fila'tig (4), fila'tig (2)
da'məʔ	→ damo'xisg/damə'xisg (18), damə'tig (3), damə'ig (1), damə'i'tig (1)
al'beʔd	→ albe'tisd (15), albe'isd (10)
pantəʔ	→ panta'xisd/panta'xisd (19), panta'isd (2), panta'isd (1)
al'bəʔ	→ albo'xisd/albə'xisd (17), albə'isd (7)

The five dummies (ending in [ə o iʔ d]) never appeared with [ɣ] in the derivation, so surfacing [ɣ]'s must have been lying in wait in stem final [a(ʔ) ɒ(ʔ)]. However, the picture is not unambiguous and uniform: There are only four speakers who invariably produce [ɣ] (nos. 11, 14, 18, and 22, cf. table IV), one speaker never does (no. 7) and two do so rarely (nos. 1 and 6). Furthermore, no test word with unstressed final vowel is exempt from vowel deletion, cf. [kal'gæʔd/kal'kæʔd mæg'tæʔd/megti'æʔd viʌ'gi:nə bal'ti:nə be'lisd fleg'tisd]. There are also responses which have no unambiguous interpretation, like [kalgai'æʔd megtoi'æʔd viʌɡp'gi:nə balta'si:nə flegtə'nisd fila'tig damə'tig] which are open to two interpretations, since an underlying /r/ would not be pronounced anyway: It is only optional before unstressed full vowels ([kalgai'æʔd megtoi'æʔd]), and in [viʌɡp'gi:nə] etc. it is syllable final and therefore ruled out.

A cautious conclusion is that on the whole, for these 23 speakers as an ensemble, it is not unjustified to analyze [a(ʔ) ɒ(ʔ)] as a sequence of vowel + /r/. But the concrete evidence for an underlying /r/ is not without exceptions. Granted that [ɣ]s surface more readily in speakers older than 25 years, we may perhaps predict a future where the psychological arguments weaken for a bi-phonemic interpretation of [a(ʔ) ɒ(ʔ)], in terms of morphophonemically conditioned phonological alternants. This experiment, or one like it, should evidently be run again in twenty years' time. Its implication for the interpretation of the data in Table I will be presented in section 8.3 below.

### 8.2 Vowel length

Two subjects, nos. 7 and 9, appeared uncertain about what constituted the stems in the fictive forms, or they introduced highly unorthodox suffixes, so their data were omitted. That leaves 21 speakers inflecting 19 verbs and 21 nouns. Some speakers had more than one suggestion for some words, in

**Table VI**

Number of inflected forms produced with a long vowel in 19 fictive infinitives and 21 fictive plurals by 21 subjects, arranged here according to age, sex and linguistic experience (1st year students in linguistics or older students), cf. section 7.1.2.

age		Words produced with a long vowel (of a possible 40 total) – stars denote non-Copenhagen speakers			
		female		male	
		1st year	older	1st year	older
No. 1	11	14			
No. 2	19			38	
No. 3	19	28			
No. 4	20	24			
No. 5	21	*31			
No. 6	22		25		
No. 8	22		31		
No. 10	24	19			
No. 11	26				18
No. 12	26		*24		
No. 13	26				*24
No. 14	27				30
No. 15	28	*16			
No. 16	28	20			
No. 17	29			33	
No. 18	30				37
No. 19	32				15
No. 20	33				17
No. 21	34			37	
No. 22	35		*38		
No. 23	66				37
total		556			

which case both are counted, and conversely there were a number of clear mistakes and aberrant responses which were omitted. I.e. totals do not amount to 21 for every word. Items which I could not classify unambiguously as having long or short vowels were noted as halflong.

### 8.2.1 Short vowel succeeded by [ðʔ uʔ iʔ ʌʔ]

The distribution of long, halflong, and short vowels in the inflected forms is as follows:

Verbs and nouns do not produce significantly different proportions of long,

	long vowel	halflong vowel	short vowel
infinitives	269 (67.8%)	24 (6.0%)	104 (26.2%)
plurals	287 (65.7%)	21 (4.8%)	129 (29.5%)

halflong and short vowel responses when inflected. The results from both are accordingly pooled and displayed in Table VI.

Again, a number of  $\chi^2$  tests on observed vs. expected number of responses in various pairs of groups of speakers were calculated. The results are tabulated below:

speaker characteristics	number of long vowel responses in each group in percent of the total number possible (= 40 per speaker)	$\chi^2$ (none with $p$ smaller than 0.05)
Copenhagen vs. non-Copenhagen speakers;	66% vs. 67%	0
male vs. female speakers;	72% vs. 61%	3.24
older vs. 1st year students;	67% vs. 65%	0.17
over 25 years vs. younger; females	61% vs. 61%	0
over 25 years vs. younger; all speakers	67% vs. 66%	0.02
over 30 years vs. younger; all speakers	72% vs. 64%	1.33

The occurrence or not of a long vowel in the inflected verbs and nouns seems independent of regional background, age, sex and linguistic training, so results can be pooled over all speakers. Furthermore, the data could be pooled over certain vowel-consonant combinations (cf. section 7.1.2), with no loss of information, as shown in Table VII.

**Table VII**

21 speakers' responses in the inflected form of 40 fictive verbs and nouns, grouped according to vowel duration and the relevant features of vowel and consonant type, cf. section 7.1.2. Small fat script indicates percentages.

	long vowel	half-long vowel	short vowel
i e ε æ + ð?	69 41	15 9	84 50
u o ɔ + ð?	81 64	5 4	41 32
all vowels + ð?	150 51	20 7	125 42
i e ε æ + ʊ?	124 74	6 4	37 22
ɔʊ?	10 48	4 19	7 33
all vowels + ʊ?	134 71	10 5	44 23
e ε æ ø + i?	129 92	2 1	10 7
i e u o + ʌ?	124 74	10 6	33 20
æʌ?	19 44	3 7	21 49
all vowels + ʌ?	143 68	13 6	54 26

Ideally, subjects should have responded with long vowels in each and every inflected form (bar the inevitable mistakes), but – firstly – there are opposing forces at work here, cf. section 3, and – secondly – such long vowel responses as there are cannot unambiguously certify to their phonologically long status either. I shall try and evaluate the data after a little more preliminary statistics.

[ð] produces significantly more short vowel responses (42%) than the other consonants ( $\delta \sim \text{ʊ} : \chi^2 = 20.57, p < 0.001$ ;  $\delta \sim \text{i} : \chi^2 = 69.16, p < 0.001$ ;  $\delta \sim \text{ʌ} : \chi^2 = 15.53, p < 0.01$ ).

[i] yields significantly fewer short vowel responses (7%) than the other consonants ( $\text{i} \sim \text{ʊ} : \chi^2 = 18.30, p < 0.01$ ;  $\text{i} \sim \text{ʌ} : \chi^2 = 27.89, p < 0.001$ ).

[ʊ] (23%) and [ʌ] (26%) are not distinguished ( $\chi^2 = 0.47$ ).

Furthermore, front vowels before [ð] yield more short vowels (50%) than do back vowels (32%) ( $\chi^2 = 15.69, p < 0.01$ ).



Front vowels before [ɥ] yield fewer short vowels (22%) than does [ɔ] (33%) ( $\chi^2 = 12.78$ ,  $p < 0.02$ ).

The non-low vowels before [ʌ] produce fewer short vowels (20%) than does [æ] (49%) ( $\chi^2 = 17.06$ ,  $p < 0.01$ ).

In the halflong category two types stand out: [ɔɥ?] with its rather high (19%) and [i] with its small (1%) proportion.

### 8.2.1.a [i]

The results are rather unambiguous: the inflected forms have long vowels (92% – bar the unavoidable chance exceptions) and unassimilated schwa, i.e. they end in [-iə]. Perhaps because sequences of front vowel + [i] normally – i.e. in less than maximally distinct and formal speech styles – suffer schwa assimilation and deletion of the semivowel, so the preceding vowel – if for no other reason – will be long as a result, as in [vi:i vei: vei: væ:i] *vige, vege, væge, vage* ‘give way, feeble (pl.), wick, vague (pl.)’. And when schwa is pronounced in formal speech style, the length is retained from the less distinct edition.

Postulating long vowels beneath the short vowels in monosyllables ending in [-i?] appears uncontroversial, and the simplicity of the behaviour of [-i?] throws the results below in relief.

### 8.2.1.b [ɥ]

Dissyllables in /-və/ have no vowel length contrast. Vowels used to be long in this context, cf. section 3, and to judge by responses here they still are, in the main (71%), but there were exceptions.

The particularly low proportion of long vowels (48%) and the correspondingly high proportion of halflong vowels (19%) in the case of [ɔɥ?] may be accidental, i.e. it may reflect the uncertain status of [ɥ] in general after back vowels: [ɥ] is normally completely assimilated to preceding [u o], so hyperdistinct [duɥ?] is [du?] *dug/duv!* ‘table-cloth/sway!’ – merging with the verb *du* ‘be adequate’; and the inflected form [du:ə] or [du:u] merges with *due* ‘dove’. *Snog* ‘grass snake’ is [sno?] rather than [snoɥ?] – merging with *sno* ‘twist (vb.)’, and the plural [sno:ə] or [sno:o] *snoge* rhymes with [ʁo:ə] or [ʁo:o] *roe* ‘beet’. This is why I had no [-uɥ? -oɥ?] in the stimulus material. In fact, assimilation of [ɥ] is possible even after [ɔ]: [kʁɔɥ?] > [kʁɔ?] *krog* ‘hook’. But I don’t think plural *kroge* can be [kʁɔ:ə] or [kʁɔ:ɔ]. I know it only as [kʁɔ:ɥə] or [kʁɔ:u]. Altogether, there are not more than about a half score words in the vocabulary ending in [-ɔɥ?] and [-ɔ:ɥə], respectively, and only four inflectional paradigms [-ɔɥ?] ~ [-ɔ:ɥə] or [-ɔ:u] come to mind, *lov!+e, vov!+e, kog!+e, krog+e*

'promise, dare, boil, hook' of which only *krog* is a noun. The notable scarcity of analogues to the fictive noun [dɔʊʔ] may account for its somewhat uncertain and aberrant behaviour.

Front vowels before [ʊʔ] produce 74% long vowel responses, which is significantly less than before [i] (92%). Schwa assimilation is perhaps not favoured by the recording conditions of this experiment, but if I had foreseen any short vowel responses at all to the [-ʊʔ] stimuli, I would have associated them with schwa assimilation, e.g. [ti:ʊə] (> [ti:ʊu]) > [tiʊu]. I would have deemed [tiʊə] an unlikely form. I was clearly wrong. Below is a list of the 44 short vowel responses to the 9 fictive [-ʊʔ] stems:

stem	inflected form	
tiʊʔ	tiʊə (3)	
geʊʔ	geʊə (5)	geʊu (1)
pɛʊʔ	pɛʊə (6)	
plæʊʔ	plæʊə (3)	
kliʊʔ	kliʊə (4)	kliʊu (2)
heʊʔ	heʊə (4)	heʊu (1)
sɛʊʔ	sɛʊə (5)	sɛʊu (2)
næʊʔ	næʊə (1)	
dɔʊʔ	dɔʊə (6)	dɔʊu (1)

Whether the 22% short vowel responses reflect a sociolectal reaction against short vowel lengthening in lower Copenhagen speech is impossible to say. Be that as it may, there are still sufficient long vowel responses that we may posit long vowels in the abstract representation in monosyllables with short vowels ending in [ʊʔ]. Nor do I think that short vowels will be generalized in any immediately foreseeable future.

### 8.2.1.c [ð]

Recall from section 3 that long vowels before [ð] in dissyllables tend to be shortened. That could account for the low proportion (51%) of long vowel responses in Table VII. And if the present data are indicative, this shortening is perhaps less pervasive in back vowels (64% are long) than in front vowels (41% are long). This is something to be investigated further. Thus, the high proportion of short vowels before [ð] may be the consequence of a general tendency towards vowel shortening in this context.

It is also conceivable that short vowel responses are modelled on the handful of existing verbs with short vowels in the infinitive, like [ʁæðʔ ʁæðə seðʔ

seðə] *red!* *redde*, *sid!* *sidde* ‘*save*, *sit* (*imper.* – *inf.*)’. But we have no analogous noun inflections, and the fictive noun stems were rendered with short vowels in the plural just as often as the infinitives. We have a few stødless monosyllabic nouns in [-ð], like *bad*, *bud* ‘*bath*, *messenger*’, but they have long vowel plurals: [bæ:ðə buðə], so they can hardly be made responsible either.

Did lower Copenhagen short vowel lengthening play a tacit role here, cf. section 3? Pushing speakers to emphasize their sociolect by producing more short vowels than otherwise? Or directly influencing them by producing more long vowels than otherwise? That is, again, impossible to say.

What are the implications for claims about the psychological reality of underlying long vowels in [-ðʔ] monosyllables? If – in a final stage of the shortening trend – long vowels never surface in dissyllables either, can they be granted psychological reality? Hardly.

For the time being, however, there are enough long vowel responses to conclude that monosyllables with short vowels ending in [-ðʔ] are /-V:d/ in the abstract representation of modern Copenhagen Danish.

### 8.2.1.d [ʌ]

Recall from section 3 that we have (had) vowel length distinctions in dissyllables before /r/, but they tend to be neutralized by the general vowel lengthening in this context. If the 21 speakers are representative, this lengthening is not yet compulsory, since 26% of the responses contained short vowels, with a significantly higher short vowel proportion in response to [smæʌʔ] (vb.) and [læʌʔ] (n.) (49%) than to the higher vowels (20%). If responses were direct reflections of the underlying structure of the existing vocabulary, there ought have been no short vowel responses at all to [-eʌʔ], since monosyllabic short vowels here only arose through ‘stylistic shortening’, but [kleʌʔ] (vb.) got 2 and [geʌʔ] (n.) got 5 (out of 21 possible) short vowel reactions. On the other hand the higher proportion of short vowel responses to [-æʌʔ] could be just such a reflection of the underlying form: in the parent generation there will be some who do *not* merge the quality of long and short /ε/ before /r/. They are [ε:] and [æ], respectively. And if the subjects were somehow aware of this and – correctly – perceived me as just such a conservative speaker, they would realize that the prompts [smæʌʔ læʌʔ] must have short vowel phonemes, because my /-εr/ has [ε]-quality, even when the vowel is shortened, and thus [smæʌʌ læʌʌ] are very appropriate responses. I can think of no other reason why [-æʌʔ] should distinguish itself.

Once more, I think it justified to conclude that long vowels have a psychological reality beneath the short vowels in monosyllables ending in [ʌʔ].

Table VIII

21 speakers' responses in the inflected form of 16 fictive verbs and nouns, dummies in the experiment, grouped according to vowel duration and the relevant features of vowel and consonant type, cf. section 7.1.2. Small fat script indicates percentages.

	long vowel	half-long vowel	short vowel
ilʔ	10 47	2 10	9 43
ylʔ + ulʔ + ɔlʔ	19 22	3 4	64 74
short vowel + nasal	8 6		118 94
yʔs	17 77		5 23
æʔl + æʔs + eʔb	82 98		2 2

### 8.2.2 Conclusion

Although the interpretation of the results is not rendered any easier by shortening and lengthening tendencies which operate independently of the 'stylistic shortening' of long stød vowels in monosyllables, I do not think it stretches the results too far to posit long vowels in the abstract representation of monosyllables with short vowels ending in [iʔ uʔ ɔʔ ʌʔ], if they have – or rather may have – a long vowel in the inflected form. The qualification is due to the fact that there are a handful of monosyllabic words (mainly imperatives) in final [ɔʔ] and [ʌʔ] which have short vowels also in the inflected form, like *spidde*, *sidde*, *svirre*, *kurre* 'impale, sit, whirl, coo' cf. section 3 above and 8.3.1 below. The implications for the vowel system is presented after the next section.

### 8.2.3 Other vowel-consonant combinations

Vowel length is uncontroversially distinctive before consonants other than [ɔ u i ʌ], i.e. /d v j r/, cf.

	[sbiʔl sbi:lə]	<i>spil!-spile</i> 'stretch (imper. – inf.)
vs.	[sbilʔ sbilə]	<i>spild!-spilde</i> 'waste (imper. – inf.)'
	[beʔn be:nə]	<i>ben!-bene</i> 'scram (imper. – inf.)'
vs.	[benʔ benə]	<i>bind!-binde</i> 'tie (imper. – inf.)'
	[vɛʔs vɛ:sə]	<i>hvæs!-hvæse</i> 'hiss (imper. – inf.)'
vs.	[vɛs vɛsə]	<i>hvæs!-hvæsse</i> 'whet (imper. – inf.)'
	[sgiʔb sgi:bə]	<i>skib!-skibe</i> 'ship (sg. – pl.)'
vs.	[sgib sgi:bə]	<i>skip!-skippe</i> 'skip (imper. – inf.)'.

The control dummies, cf. 7.1.2, were therefore not expected to suffer any change in vowel length due to inflection (bar the occasional mistakes – due to inattention on the part of the subjects – always to be expected in experiments of this kind). But some of them actually did, as appears from Table VIII.

Short vowels succeeded by a nasal consonant remain short (94%), and stød vowels remain long (98%), with the curious exception of the fictive noun [tyʔs] which was rendered as [tysə] in the plural by 5 speakers (23%), which is significantly more than the other three long vowel stems ( $\chi^2 = 11.70$ ,  $p < 0.001$ ). This is all the more surprising since [tysə] exists, but it is a verb *tysse* 'shush', not a noun. I have no explanation for this, and am tempted to put it down as accidental.

Not so with the behaviour of short vowels succeeded by /l/, however, which must have a systematic cause. The group as a whole rendered 27% 'wrong' long vowel responses, but the fictive verb /pilʔ/ did so significantly more often than the other three fictive stems (47% vs. 22%,  $\chi^2 = 5.57$ ,  $p < 0.02$ ). [pilə] is not a nonsense word, it exists, both as a verb and a noun: *pil* 'scurry/arrows'. A priori this could have repelled as well as attracted long vowel responses. The expected infinitive \*[pilə], though nonsense, rhymes with existing verbs, like [sbilə kilə vilə tɛilə] *spilde, kilde, ville, trille* 'waste, tickle, want, roll'. In other words, there is nothing phonological or semantic to prevent [pilʔ] from retaining its short vowel. Likewise, there are rhyming long as well as short vowel infinitives for each of the other three vowels: [hylə sgulə hɔlə] *hylde, skulle, hulle* 'praise, have to, perforate' vs. [hylə sgulə mɔ:lə] *hyle, skule, måle* 'scream, scowl, measure'.

It is impossible to know the reason for this aberrant behaviour of fictive short vowel + /lʔ/ stems. Is it an influence from *lower* Copenhagen? I will venture another guess: It is perhaps an indication that the status of /l/ in dissyllables is in the process of change, that its behaviour, from being analogous to the nasals, begins to resemble that of [ð] and [ʌ], in front of which vowel length differences tend to be neutralized, leading to short vowels before [ð] and long vowels before [ʌ], cf. section 3. Since we are getting long vowels where short vowels were expected, the resemblance is perhaps with [ʌ] (i.e. /r/) rather than [ð]. Hans Basbøll (personal communication) suggests that this perhaps establishes liquids as a virtual auditory category in this connection. If the data presented here are to be believed, the change is not equally widespread across all vowel qualities, but I cannot venture further than that from the four vowels in this material. – The results raise an inevitable question: are vowel length distinctions before /-lə/ acoustically stable (which no

one – to my knowledge – has doubted so far)? Or is there something about production data to presage the results in Table VIII? I shall have to leave the question open.

### 8.3 Implications for the vowel system

Recapitulate: there were two major problems with the data in Table I: (1) A superabundance of vowels, and some of them – [æ a ɔ ɒ ʌ] – with suspiciously skewed distributions. (2) The shaded cells in the [ðʔ ɪʔ ʊʔ ʌʔ] columns in IA and IB constrain the predictability of the stød from the segmental structure of the morpheme, cf. Table II.

The data in Table ID and IC is manageable if we can interpret the stressed vowels in the shaded cells as vowel + /r/. Table IB is taken care of if the shaded vowels can be considered long in the abstract representation. Thus, we need to concentrate on Table IA only, which brings both final /r/ and underlying long vowels into play, and then we can generalize to the data in B-D.

#### 8.3.1 Vowel length

It simplifies matters to begin with length. As a first step [æ] and [œɾ] before [ʌ] are shuffled upwards and identified with /ɛ/ and /œ/, respectively, and [æ] in [kæðʔ] *red!* 'comb!' (Table IB) is identified with /e/. (This calls for a rule which lowers vowels below 'height 2' one degree before /r/,<sup>13</sup> and another one which lowers front vowels below 'height 1' two degrees after /r/.) Next, the vowels in the shaded cells in columns under [ðʔ ɪʔ ʊʔ ʌʔ] are identified with long vowels, with a minor reservation. In the starred cells a few true short vowels remain (27 in all), as indicated.<sup>14</sup> All except two are imperatives. There are very few ending in [ðʔ] (8 in all). Crucially, there are none at all in the [æ – ɔ] or [ɔ – ʌ] range. The words are listed in Appendix III. Under this analysis, the syllable types with unpredictable stød are – by and large – constrained to monosyllables with short vowels ending in a nasal, a lateral or a semivowel, cf. Group III in Table II.

Lastly, [pɔ] *på* 'on' calls for a comment. There are two other words like it: [mɔ fɔ] *må, få* 'may, get'. These forms are traditionally explained as being the

13. including [ɔ], cf. below.

14. I may have missed one or two words in my computerized search through some 65000 words in Molbæk Hansen's (1990) *Udtaleordbog*, of course, but the low counts are not wide of the mark.

unstressed variants of the full forms [pøʔ fɔʔ mɔʔ]. They are very frequently unstressed and so the reduced form may carry back over to stressed position. I do not think there is anything very hocus-pocus about assigning them long vowels in the abstract representation.

### 8.3.2 Final /r/

[a]: [va] is /var/ *var* 'was' which brings [a] and [ɑ] into complementary distribution. When no /r/ precedes, /a/ is [a] in open syllables and before coronals; in any other position it is [ɑ]. Inversely, an [ɑ] whose quality is not accounted for by a preceding /r/ and/or a succeeding labial or dorsal consonant, invokes a succeeding /r/. This takes care of every [ɑ]-sound in Table IA and IB.

If short [ɑ] can be bi-phonemic, then by inference [ɑʔ ɑ:] may also be dissolved into vowel + /r/, cf. the shaded cells in Table IC and ID. Word finally, as in [hɑʔ] *har* 'has', [ɑʔ] must be /ɑr/, i.e. it must contain a long vowel, to distinguish it from the short stødless vowel in [va] (/var/). When /r/ is not word final, I consider the preceding vowel to be short if another consonant follows, else it is long, in accordance with general morpheme structure rules in Danish, cf. section 2.2.2(ii) above. Thus the shaded words in Table IC and ID are /har karl barn karpə ərənə harvə/, with – predictably – stød in the three monosyllables and none in the dissyllables, cf. Table II.

[ɐ]: [vɐ] is /vər/ *vor* 'our'. But the vowel in [tɒɹ] *tov* 'rope' cannot very well be analyzed as a vowel + /r/ sequence, \*/tɒrv/, because – as noted also in section 4.2 – that should give the word stød, cf. Table II. We need to recognize one other source for [ɐ], namely succeeding /v/.<sup>15</sup> Now [ɐ] and [ʌ] are in complementary distribution. Furthermore, with word final [ɔ] out of the way, cf. above, the road is open to identify the remaining (non-shaded) [ɔ]s with short /o/. That calls for a rule of distribution: /o/ is [o] in open syllables and before /r/ (cf. section 6.1 above);<sup>16</sup> elsewhere it is [ɔ]. And then [ɐ ʌ] fall into place as manifestations of underlying short /ɔ/, whose manifestation is [ɐ] before /r, v/; elsewhere it is [ʌ]. Note that preceding /r/ does not affect the back vowels, and Table IB therefore needs no further comment.

On the same reasoning as above [ɐʔ ɐ:] are decomposed into a long or a short vowel + /r/, thus: /tɒr ɔrs tɒrn skrɒr/ (Table IC) and /ɔrlə ɔrnə tɒrvə ɔrə/ (Table ID).

15. Whether [sɒuʔ] is in fact /ʔsɒv/ or /sɒrv/ is a matter which need not concern us here.

16. See Appendix IV for a listing of these words and a commentary.

The rounded front vowels remain with three items, though there is only one context which exhibits a three-way contrast: succeeding nasal. The 'r-colouring' rules are as for the unrounded front vowels.

## 9. Summary and discussion

After some phonological preliminaries, I presented the vowel sound material of modern Copenhagen Danish. I argued that classical Bloomfieldian and Praguian structuralist analyses alike would raise just about each and every surface vowel contrast in this material to phonological status, yielding 14 or 15 short vowel phonemes, which is an uncommonly rich system. But there are other reasons than mere superabundance why this is not a satisfactory final descriptive solution, not in terms of a linguistic account of the facts, and perhaps not as speakers' internalized segmental building material either. (Whether the latter be Bloomfield's concrete 'minimum same[s] of vocal feature' or Trubetzkoy's abstract bundles of distinctive features.) It would obliterate a number of very regular phonological rules, some of which are undoubtedly productive (the pronunciation of short /a/, 'r-colouring' etc.); it would create an abyss between the phonological representations of the older and younger generations; and, finally, it would considerably constrain the predictability of the stød accent.

These drawbacks all disappear if we can assume that the relevant abstract representation of modern Danish vowels is morphophonemic, rather than surface phonemic. Now, 'morphophonemic' can have at least three orthodox (though not equally current) connotations. To an American structuralist it is the linguist's construct, a basic form from which he can derive all the surface phonemic forms of a given morpheme. It represents only the linguist's description of regularities observed in inflectional and derivational paradigms and is not to be confounded with the language users' actual linguistic competence. As such, as a mere descriptive statement, the conclusions I reached above about the presence, morphophonemically, of final /r/'s and long vowels in a large part of the word material in Table I, are hardly controversial, but not very interesting either.

To a Praguian structuralist the 'morphonemic' representation is not one common base form, but the morphoneme is 'complex idea', composed of those phonemes which alternate in a given position in morphologically related forms. Each of the alternating phonemes is equally present in the linguistic consciousness. A morphoneme is thus simply a set of phonemes, but the set as such has a kind of *Gestalt* character. This amounts to a claim about psychological reality, concerning representations (rather than rules, cf. below). It postulates a multi-



plicity of co-existing phonological forms of alternating morphemes. But abstract representations in terms of sets of distinct phonemes in the relevant locations does not solve the Danish vowel problem at hand. For one thing, it does not per se reduce the number of paradigmatically contrasting elements. Secondly, let us assume – for the sake of the argument – that provision can be made for a ‘zero phoneme’ among the members of a morphonemic set (even though I strongly doubt it would ever be sanctioned). That would enable us to take care of the few cases like *nektar* – *nektarin* ‘nectar – nectarine’: the final morphoneme of *nektar* would comprise /Ø/ and /r/) <sup>17</sup>. But no such road is open in forms like *var*, *par*, *kar* ‘was pair, vessel’ which do not alternate with stressed suffix forms at all. Furthermore, the rules that assign *stød* cannot apply at the morphonemic level of representation, where a vowel morphoneme may comprise long as well as short vowels. Since the *stød* rules are sensitive to vowel length, it follows that vowel length must be unambiguously determined before they can apply.

By far the strongest theoretical claim about the nature of morphophonemes is made in the classical generative approach, where the morphophonemic representation is the invariant base form from which the speaker, online so to say, derives every surface phonetic form. The morphophonemic representation *and* the ordered rules which lead to the phonetic representation are both claimed to have psychological reality, to be part of the speakers’ active competence. Here one does not have to agonize over the choice of level of representation: there is no autonomous phonemic level. There are only morphophonemes, phonological rules and the resulting phonetic output.

I suppose the abstract representation I have suggested for the modern Danish vowel data is exactly what generative phonology would also posit. But I hesitate to subscribe to the kind of psychological reality that goes with it. I do not think it can be taken for granted. I do not think it has yet been rendered sufficiently plausible that the morphophonemic representation is the only one a speaker can access, that it – together with a considerable number of intricately ordered phonological rules – is the direct basis for actual speech production.

I will settle for a somewhat weaker claim about the nature of the morphopho-

17. If the point is to get rid of /a/, the quality of [a] must be a product of its phonological environment. That a following /r/, (i.e. [ʀ]) should pharyngealize an /a/ is straightforward. It is very much less obvious why a zero phoneme, /Ø/, should have such an effect. The more so since /a/ in open syllables is [a]. Clearly, this zero phoneme is an awkward phantom, not to be taken seriously.

nemic representation of Danish vowels. I believe that the derivational and inflectional paradigms, upon which the experiment described in sections 7 and 8 were modeled, are part of the speakers' (tacit) knowledge about Danish. And that was in fact borne out by the results of experiment. But I do not thereby imply that the morphophonemic forms are necessarily identical to the lexical representations, the shape of the entries in the speaker's mental lexicon. I think it is a good and strong assumption where final /r/ is concerned, but I am less willing to commit myself to lexically long vowels in monosyllables ending in [ð̥ ɪ̥ ʉ̥ ʌ̥] in young Copenhagen speakers. They act – by and large – as if they know that the short vowels of monosyllabic [bið̥] etc. are related to long vowels in the inflected dissyllables. So a linguistic description along those lines is not unreasonable, it is not counter-intuitive, and it has the advantage of creating order and regularity in the surface contrast chaos. But I would be reluctant to give it status also as the representation which directly feeds speech production. That does not make it less adequate, less interesting, less useful or less cognitively plausible as a description, however.

Briefly then, the morphophonemic representation I have outlined is a common base form, somewhere in between the Bloomfieldian and Chomskyan concepts (if that is a possible position). It constitutes the linguist's point of departure for describing the regularities in the phonology. It is more than Bloomfield's base form in the sense that it is presumably part of speakers' active (though normally tacit) knowledge about their language – and in that sense it has psychological, cognitive reality. On the other hand, it has a less exclusive and privileged status than generative phonology's morphophoneme. It does not claim to be the only representation available to the speakers.

### Acknowledgements

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18. Danish vowels are treated at a much more concrete level of phonological representation, in Hans Basbøll's forthcoming paper "Ockham's Razor in Danish Phonology: Vowel Features and r-Colouring," in J. Durand & B. Laks (eds.) *Current Trends in Phonology*, CNRS Paris-X and University of Salford. University of Salford Publications, 1996. A copy of the manuscript only reached me after the completion of my own paper, so I have not been able to explore Basbøll's proposals in the present context.

Appendix I

Key to the translation of vowel symbols from the modified IPA I employ to Dania.

modified IPA	Dania	key word
i	i	<i>lidt</i> 'suffered (perf.)'
e	e	<i>lidt</i> 'little'
ɛ	æ	<i>let</i> 'light'
æ:	â	<i>bade</i> 'bathe'
a	ä	<i>dreng</i> 'boy'
a	ɑ	<i>ladt</i> 'loaded'
ɑ	α	<i>lak</i> 'lacquer'
y	y	<i>tyst</i> 'quiet'
ø	ø	<i>øst</i> 'east'
œ	ö	<i>skøn</i> 'evaluation'
œ	õ	<i>grynt</i> 'grunt (n.)'
œ	ɔ	<i>grønt</i> 'green (neuter)'
u	u	<i>kusk</i> 'coachman'
o	o	<i>foto</i> 'photo'
ɔ	â	<i>kost</i> 'broom'
ɒ:	â	<i>orne</i> 'boar'
Λ	ɔ	<i>kost</i> 'food'
ə	ə	<i>kaste</i> 'throw'
Λ	ɔ	<i>kaster</i> 'throws'

## Appendix II

Translation of the material in Tables I and III, column by column, section by section. Starred words appear in Table III only.

## A

<i>de, det, (elliptical) med, (elliptical) hvad, var  lidt, lidt (adv.), let, ladt, lak  pinje, vind, vend!, vand, vams  bid (n.), bed (n.), (full form) med, bad (n.)  bid!, bed!, vød!, bad!, bad (vb.)  mig  *lig, neg, læg (adj.), lag, leg  hav  liv, lev!, hæv!, lav, tarv/tav  ir, Per; bær  sier, ser, sær</i>	<i>they, it, with, what, was  suffered (perf.), little, light, loaded, lacquer  pine, wind, turn!, water, bodywarmer  bite, flowerbed, with, bath  bite!, pray!, moisten!, bathe!, asked  me  *corpse, sheaf, lay, layer, game  ocean  life, live!, raise!, low, need/kept quiet  verdigris, (proper name), berry  strains, sees, peculiar</i>
<i>revy, miljø  tyst, øst  syn's, pynt, skøn  syd, skød (n.)  gyd!, gød!  tøj  *syg, søg!, løg  lyv!, løb!/løv, møv!  fyr (træ), hør  fyr!, før!, før (adv.)</i>	<i>review, environment  quiet, east  thinks, decoration, evaluation  south, lap  pour!, fertilize!  clothes  *sick, seek!, onion  lie!, run!/foliage, push through!  fir, linen  fire!, lead!, before</i>
<i>du, jo, på, vor, så (adv.)  kusk, kost, kost  hund, ond, ånd  skud, skod  tud, fod, båd, skod!  tov  *dug, jog, tog (n.), sorg/sov  skurk, sort  ur, ord</i>	<i>you, yes, on, our, then  coachman, broom, food  dog, mean (adj.), spirit  shot (n.), stump  spout, foot, boat, stub out!  rope  *table cloth, thrust (vb.), train, sorrow/slept  villain, black  watch, word</i>

## B

<i>fra</i> <i>ridt, vrik!, ræk!, rak</i> <i>trin, ring, dreng, rang</i> <i>vid (n.), fred, rad</i> <i>rid!, red!, græd/grad</i> <i>*rig, træg, drej!</i> <i>drev (n.), rav</i> <i>driv!, drev (vb.), grav</i> <i>rir, (langt) rær</i>	<i>from</i> <i>ride (n.), wriggle!, pass!, riff-raff</i> <i>step (n.), ring, boy, rank</i> <i>twist, peace, fellow</i> <i>ride!, save!, degree/wept</i> <i>*rich, sluggish, turn!</i> <i>pinion, amber</i> <i>drive!, drove, grave</i> <i>tacks (vb.), (lanky) fellow</i>
<i>kryds, drys</i> <i>brynje, grynt, grønt</i> <i>spryd</i> <i>bryd!, rød</i> <i>*ryg!, røg! røg</i> <i>(tygge) drøv</i> <i>kryb!, røv!, røv</i> <i>gryr, rør</i>	<i>cross, sprinkle</i> <i>coat of mail, grunt (n.), green (neuter)</i> <i>bowsprit</i> <i>break!, red</i> <i>*smoke, smoke-cure!, smoke (n.)</i> <i>(chew the) cud</i> <i>creep!, rob!, arse</i> <i>dawns (vb.), tube</i>
<i>fru</i> <i>krudt, rust, krop</i> <i>rum, rom</i> <i>brud, brod</i> <i>Rued/rod, råd</i> <i>rov</i> <i>*rug, drog (vb.), krog, grov</i> <i>bror</i> <i>Ruhr/ror (n.)</i>	<i>Mrs.</i> <i>gun powder, rust (n.), body</i> <i>room, rum</i> <i>breech, sting (n.)</i> <i>(proper name)/mess (n.), advice</i> <i>pillage</i> <i>*rye, drew, hook, coarse</i> <i>brother</i> <i>Ruhr/rudder</i>

## C

<i>si, se fæ, ha', har</i> <i>kil', kel, kæl', karl, Karl</i> <i>vin, Hven, pæn, man, barn</i>	<i>sieve, see, fool, have, has</i> <i>wedge!, moulding, caress!, farm hand, Karl</i> <i>wine, (place name), nice, mane, child</i>
<i>sy, sø</i> <i>kyl', køl</i> <i>Fyn, Møn</i>	<i>sew, lake</i> <i>throw!, keel</i> <i>(place name), (place name)</i>
<i>du, to, tå, tår</i> <i>sus, os, ås, Års</i> <i>tun, son!, hån, tårn</i>	<i>be adequate, two, toe, dollop</i> <i>rustling, smoke (n.), ridge, (place name)</i> <i>tunny, atone!, scorn, tower</i>
<i>ri/rig, kræ, Ra/rar</i> <i>gris, kreds/kræs, ras</i> <i>grin, gren, ran</i>	<i>tack (vb.)/rich, creature, Ra/kind</i> <i>pig, circle/delicacy, landslip</i> <i>laughter, branch, open theft</i>
<i>ry/ryg!, frø</i> <i>frys!, frøs</i> <i>gryn, drøn</i>	<i>reputation/smoke!, frog</i> <i>freeze!, froze</i> <i>grain, boom</i>
<i>ru/rug/ro, rå, skrår</i> <i>rus/ros, fråds</i> <i>*brun, tron!, grån!</i>	<i>rough/rye/calm (n.), coarse, chews tobacco</i> <i>intoxication/praise (n.), gluttony</i> <i>brown, throne!, turn grey!</i>

## D

<i>mile, mele, mæle, male, karpe</i> <i>mine, mene, pæne, mane, arne</i> <i>bide, bede, væde, bade</i> <i>vige, vege, væge, vage, varig</i> <i>(i) live, leve, hæve, lave, harve</i> <i>svirre/svire, mere, være/værre</i>	<i>dune, meal, utter, paint, carp</i> <i>mine, think, nice (pl.), admonish, hearth</i> <i>bite (vb.), pray, moisten, bathe</i> <i>give way, feeble (pl.), wick, vague (pl.), durable</i> <i>alive, live (vb.), raise, make, harrow</i> <i>whir/booze (vb.), more, be/worse</i>
<i>syle, søle</i> <i>syne, føne, høne</i> <i>syde, søde</i> <i>syge, søge</i> <i>lyve, løve/løbe</i> <i>fyrre (træer)/fyre, føre, gøre</i>	<i>awls, slush</i> <i>inspect, blow dry, hen</i> <i>seethe, sweet (pl.)</i> <i>sickness, seek</i> <i>lie (vb.), lion/run</i> <i>firs/fellows, lead, do</i>
<i>mule, mole, måle, årle</i> <i>Tune, tone, dåne, orne</i> <i>bude, bode, både</i> <i>duge/duve, Tove, love/låge, torve/*borge</i> <i>kurre/kure, porre/pore, åre</i>	<i>muzzle, pier, measure (vb.), early</i> <i>(place name), tone, swoon, boar</i> <i>messengers, do penance, boats</i> <i>table cloths/pitch (vb.), (proper name),</i> <i>promise/gate, market/*castles</i> <i>coo/slide, leek/pore, oar</i>
<i>prise, kredse/kræse, rase</i> <i>grine, grene, rane</i> <i>ride, vrede, græde, *grader</i> <i>rige, træge, *rage</i> <i>gribe, greve, grave</i> <i>riger, præger</i>	<i>praise (vb.), circles/give a treat, rage (vb.)</i> <i>laugh (vb.), branches (n.), steal</i> <i>ride, wrath, cry (vb.), *degrees</i> <i>kingdom, sluggish (pl.), *poke</i> <i>catch, count (n.), dig</i> <i>kingdoms, stamps (vb.)</i>
<i>rype, røbe</i> <i>tryne, drøne</i> <i>bryde, brøde</i> <i>ryge, røge</i> <i>krybe, røve</i> <i>ryger (n.), rører</i>	<i>grouse, reveal</i> <i>snout, boom (vb.)</i> <i>break, guilt</i> <i>smoke (vb.), smoke-cure (vb.)</i> <i>creep (vb.), rob</i> <i>smoker, touches (vb.)</i>
<i>ruse/rose, frådse</i> <i>*brune, trone, gråne</i> <i>rude/rode, råde</i> <i>*ruge, droge, kroge</i> <i>*truer, roer</i>	<i>fish trap/praise, gorge</i> <i>*brown (pl.), throne, turn grey</i> <i>pane/rummage, rule (vb.)</i> <i>*brood, drug, hooks (n.)</i> <i>*threatens, beet</i>

### Appendix III

25 imperatives and 2 nouns whose corresponding inflected forms (the infinitives, the definite, the plural) have short vowels before [ð] and [ʌ], respectively. Note that the majority of these verbs are highly unlikely ever to be uttered in the imperative.

[iðʔ]	spid, besid	<i>impale, own</i>
[eðʔ]	sid, hed	<i>sit, be called</i>
[ɛðʔ]	væd	<i>bet</i>
[æðʔ]	red	<i>save</i>
[yðʔ]	ryd	<i>clear</i>
[øðʔ]	nød (n.)	<i>nut</i>
[ʌðʔ]	lod, skod <sup>18</sup>	<i>solder, butt (a cigarette)</i>
[iʌʔ]	ir, dir, klir, pir, tir, stir, vir, svir	<i>become coated with verdigris, quiver, rattle, prod, tease, stare, shake, whirl</i>
[æʌʔ]	sner, spær	<i>snarl, block</i>
[yʌʔ]	fyr (n.)	<i>firtree</i>
[œʌʔ]	tør	<i>dry</i>
[uʌʔ]	kur, skur, mur, knur, snur, pur, sur	<i>coo, grate, grumble, growl, whirl, rout out, buzz</i>

### Appendix IV

The rule for /o/'s manifestation is traditionally stated as: /o/ is [o] in open syllables, [ɔ] in closed syllables. Exceptions are [a small number of] words like *sort, skjorte, torden*, cf. section 6.1. The point of this listing here is to demonstrate that [oʌ] is not a rare sequence at all, and the modification in section 8.3.2 which excepts /r/ from the closed syllable condition is well motivated by the data, although of course {syllable boundary and /r/} do not form a natural group at all.

The list includes items whose /o/ undoubtedly derives historically from a long vowel, but whose relation to long vowel forms I believe to have been severed, or whose short vowel forms have become established independently. Included are also a couple of words which are clearly derived. And there are

18. Included for the sake of completeness. These two words do not matter for the discussion since [ʌ] can never be long.



monosyllables in /-rC/ with stød, which could perhaps be analyzed as having long /o:/ – and therefore be irrelevant for statements about short /o/ – since there is no length *contrast* in this type. However, if we classify their vowels as short, these words will conform to the general restriction that long vowels do not occur before homomorphic clusters, cf. section 2.2.2. The list is not exhaustive, of course: some of the words below have derivations or form *composita*.

mor, bror, bor(-vand, etc.), flor(-mel, etc.), marmor, morsom	<i>mother, brother, boric</i> <i>whites, marble, funny</i>
fjorten, skjorte, kjortel, portner, porter, sort, bort, lort, port, gjort	<i>fourteen, shirt, coat, doorman, stout</i> <i>black, trimming, shit, gate, done</i>
torden, morder, Jordan, Ordrup, nordisk	<i>thunder, murderer, Jordan, (place</i> <i>name), nordic</i>
orm, dorn, horn, korn, torn	<i>worm, mandrel, horn, grain, thorn</i>

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