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Danish vowels: the psychological reality of a morphophonemic representation

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Abstract
The outcome is presented of some recent changes in the pronunciation of standard Danish vowels, changes which add to the already considerable inventory of surface vowel contrasts. A classical structuralist phonological account of the vowel inventory is no longer descriptively adequate. It definitely glosses over a lot of what is otherwise phonologically very regular and productive processes. It also creates an unreasonably large gulf between the phonological systems of the younger and the older generation, and I believe it violates speakers' own intuition about their language. A 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

There is hardly any of the numerous issues in the rather intricate Danish segment phonology whose solution does not depend upon choices made in other areas, and these are—for the present purpose—a priori decisions: long vowels are vowels with a prosodic feature, length; diphthongs are VC sequences; vowels with stød[1] are vowels with length; stød is a prosody which characterizes certain syllable structures under certain morpho-syntactic conditions. Convincing arguments can be brought to bear on each point, cf. Basbøll (1968, 1975, 1985) and Grønnum (1996, forthcoming).

Standard Danish distinguishes phonetically 16 vowel qualities in stressed syllables, cf. Fig. 1. All except [a œ ʌ] occur also with length and stød. In the speech of the generation born in the early part of the century, these vowel sounds can be derived by simple phonological rules from 10 phonemes: /i e ɛ a y ø œ u o ɔ/, which all occur short, with length, and with stød. The four tongue heights in the unrounded front series are a serious obstacle to any binary vowel feature system and have made Danish an often quoted example in discussions of binary versus scalar features, cf. Fischer-Jørgensen (1975, p. 220 ff - and her references), Ladefoged (1967), Lass (1984, p. 104 ff) and Rischel (1968). But worse is to come!

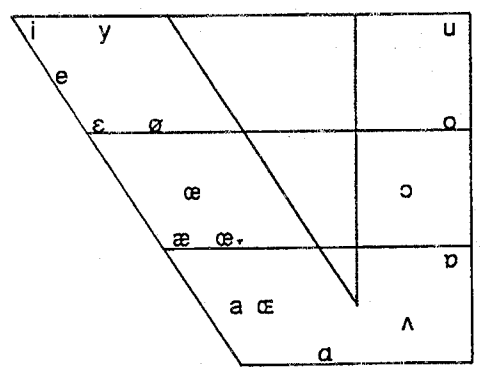

Figure 1 Danish vowels sounds in the Cardinal Vowel space - in modified IPA transcription

[1]Stød is a kind of creaky voice, cf., e.g., Fischer-Jørgensen (1989).

2. VOWEL CONTRASTS IN MODERN COPENHAGEN

Space does not permit a discussion of the whole system; the short unrounded front vowels will illustrate the forces at work. Grønnum (1996) presents the full material and a more extensive discussion. I also ditch the special problems introduced by r-colouring, which is given in-depth treatment by Basbøll (1996).

Table I Unrounded front vowels as pronounced early in the century in a representative set of monosyllabic words, cf. the text

di	lid	bið	bi-ʔð	li-ʔɣ	li-ʔv	iʁ	si-ʔʌ
de	led	beð	be-ʔð	ne-ʔɣ	le-ʔv	pʰeʁ	se-ʔʌ
mɛ	lɛd	mɛð	vɛ-ʔð	lɛ-ʔɣ	hɛ-ʔv	bæʁ	sɛ-ʔʌ
			bæ-ʔð	læ-ʔɣ	læ-ʔv		
va	lad	bað	baðʔ				
	ˈlab	lag		laj ʔ	tʰaw ʔ	ˈvaʁ	sa-ʔ
they	suffered	bite	bite!	corpse	life	verdigris	sieve
it	little	flowerbed	bit (vb)	sheaf	live!	(propr.)	sees
with	light (adj)	with	moisten!	lay (adj)	raise!	berry	strange
			bathe!	layer	low		
what	loaded	bath	asked				
	patch lacquer			game	was quiet	was	czar

Table II The words in Table I pronounced by young speakers

di	lid	bið	biðʔ	li-ʔ	liwʔ	iʌ	siʌʔ
de	led	beð	beðʔ	ne-ʔ	lewʔ	pʰeʌ	seʌʔ
mɛ	lɛd	mɛð	vɛðʔ	lɛjʔ	hɛwʔ		
			bæðʔ	læjʔ	læwʔ	bæʌ	sæʌʔ
va	lad	bað	baðʔ				
va	lab	lag		laj ʔ	tˢaw ʔ		sa-ʔ

In the old generation [æ] occurred only with length, [a] occurred short in open syllables and before coronals, and short [ɑ] occurred before labials and dorsals, cf. Table I. Postvocalic [ʁ] had weakened to [ʌ] after long vowels already in the 19th century, and this semivowel fused with [ɑ:] and [ɒ:], cf. [sa-ʔ sɒ-ʔ] *zar, sår* 'czar, wound (sb)'. But it had remained, unvoiced, after short vowels into the earliest part of this century, cf. [iʁ vaʁ] *ir, var* 'verdigris, was'. However, [ʁ] soon became voiced and vocalic after short vowels as well; and as [ʌ] it fused with preceding [ɑ] and [ɒ]. In non-final position length resulted from this fusion, as in [pʰɑ:g̊ sd̥ɒ:g̊] from former [pʰaʁg̊ sd̥ɒʁg̊] *park, stork* 'park, stork', but not in word final position, cf. [va vɒ] *var, vor* 'was, our'. - [ɣ] was fronted to [j] after front vowels, a [j] which

is now deleted after non-low vowels, as in [li-ʔ ne-ʔ] *lig, neg* 'corpse, sheaf'. - /v/ was [w] after short vowels, cf. [tˢɒw tʰɑwʔ] *tov, tav* 'rope, was quiet'; it was [v] after long vowels in formal style, cf. [li-ʔv] *liv* 'life', but [w] in less formal style. [w] is now the norm, also after long vowels. - Monosyllables with length—and thus also stød—ending in what is now [ð j w ʌ̂], have lost the length and—consequently--stød is transferred to the succeeding consonant, as in [b̥eðʔ læjʔ lewʔ seʌ̂ʔ] *bed, lag, lev!, ser* 'bit (vb), layer, live!, sees'. - The result of these changes are shown in Table II, with words shuffled over in the columns to clarify the resulting emerging vowel quality contrasts.

An orthodox structuralist must raise all six vowel sounds in Table II to phonological status, be he American or European, cf. Bloomfield (1933), Trubetzkoy (1939). The obvious—and only possible—candidates for a reduction would be [æ a ɑ]. But no: [a ɑ] occur in identical surroundings—due to loss of final [ʁ̥], cf. [va vɑ] *hva', var* 'what, was'; so do [æ ɑ] and [æ a], respectively—due to fronting of [ɣ] and loss of length in monosyllables ending in [ð j w ʌ̂], cf. [læjʔ lɑjʔ b̥æðʔ b̥aðʔ] *lag, leg; bad!, bad (sb)* 'layer, game; bathe!, bath. The words sound different, which would be the Bloomfieldian criterion for setting up their vowels as distinct phonemes, and they mean different things, the Trubetzkoyan criterion. However,

(1) long vowels surface in forms inflected with /ə/, cf. [b̥iðʔ 'b̥iːð̥][1] *bid!/bide* 'bite (imp., inf.)', [kʰl̥ɛjʔ 'kʰl̥ɛːj] *klæg/klæge* 'pasty (sg., pl.)', [sl̥ewʔ 'sl̥eːw̥] *slev/sleve* 'ladle (sg., pl.)', [væʌ̂ʔ 'væːʌ] *vær!/være* 'be (imp., inf.)';
(2) consonantal [ʁ] appears after stems ending in [ɑ] and [ɒ] when derived with a stressed vowel suffix, cf. ['nɛɡ̊tˢɑ nɛɡ̊tˢɑ'ʁiːʔn ʁaɡ̊tˢɒ ʁaɡ̊tˢɒ'ʁɑːʔd̥] *nektar/ nektarin, rektor/rektorat* 'nectar/nectarine, rector/rectorship'.

Therefore there are **formal** grounds for the assignment of length underlyingly in monosyllables ending in [ðʔ jʔ wʔ ʌ̂ʔ], and underlying /r/ in words ending in [ɑ] and [ɒ]. If such alternations can be shown to be productive processes we may perhaps also grant these underlying forms a kind of psychological reality.

3. A PHONOLOGICAL EXPERIMENT

3.1 Material and speakers

Departing from existing imperative/infinitive and singular/plural paradigms, like *spil!/ spille, hus/huse* 'play (imp., inf.), house (sg., pl.)', presented to them in writing as well as orally, subjects were invited—in individually recorded oral sessions—to inflect 40 monosyllables with short vowels ending in [ðʔ jʔ wʔ ʌ̂ʔ], cf. examples in Table III. These were mixed with 16 nonsense controls whose structure should prohibit length alternation in inflection. - Likewise, departing from paradigms like ['ɕɛlo ɕɛ'lisd̥ ad̥'leːʔd̥ ad̥le't̥ˢiɡ̊] *cello/cellist, atlet/atletik* 'violoncello, cellist; athlete, athletics', they were invited to suggest names for instrumentalists, activities, products etc. I.e. they derived 5 orally presented nonsense nouns ending in [ɑ], and 5 ending in [ɒ].

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[1] /ə/ assimilates to the preceding sonorant consonant.

5 controls ended in [ə o iˀ d̥] and were not supposed to bring out any [ʁ] in inflection. See examples in Table IV. Subjects were 21 linguistics students, a younger group of nine speakers—between 19 and 24 years of age, and an older group of twelve—between 26 and 35. For details of the procedure, see Grønnum (1996).

Table III Examples of nonsense imperatives and singular nouns to be rendered as infinitives and plurals, respectively

sb̥elˀ mæˀs *spil! mas!*	'sb̥el̩ 'mæːsə *spille, mase*
pʰl̥iðˀ sd̥eðˀ g̊ɛðˀ kʰæðˀ	?
pʰl̥uðˀ g̊loðˀ snɔðˀ	?

huˀs lanˀ *hus, land*	'huːsə 'lann̩ *huse, lande*
fl̥ɛjˀ pʰæjˀ tˢøjˀ	?

Table IV Examples of inflectional paradigms which invite a stem final /r/ to surface

'ɕɛlo *cello* 'violoncello'	ɕɛ'lisd̥ *cellist* 'cellist'
vio'liˀn *violin* 'violin'	violi'nisd̥ *violinist* 'violinist'
'tˢamb̥ə *(putative instrument)*	?
'b̥ɛlɑ *(putative instrument)*	?
'fl̥ɛg̊tˢɒ *(putative instrument)*	?
melo'd̥iˀ *melodi* 'melody'	melo'd̥ig̊ *melodik* 'melodics'
ad̥'leˀd̥ *atlet* 'athlete'	ad̥le'tˢig̊ *atletik* 'athletics'
po'eˀd̥ *poet* 'poet'	pʰoe'tˢig̊ *poetik* 'poetics'
pʰal'tˢiˀ *(putative phenomenon the study of which is ...)*	?
fi'lɑˀ *(putative student of ...)*	?
d̥a'mɒˀ *(professional who produces ...)*	?

3.2 Results

3.2.1 Length

The control items contained a surprise: items with short vowel and final [l] were rendered with long vowel in inflection in 34 of 128 instances (27%). This cannot be analogy to existing structural paradigms, but it could be indicative of a change in /l/'s status among the sonorants, from behaviour like the nasals to behaviour like /r/, cf. below, boosting a virtual liquid category.

The gross total of inflected test forms with length is 67%, against 5% indeterminate and 28% short vowels, but this covers up a considerable variation across final consonants, cf. Table V. This variation is likely a reflection of the fact that former length contrasts are lost in disyllables with postvocalic [ð], [ʌ͡] and partly also [w], cf. Grønnum (1996). By and large, though, if inflectional alternation is evidence of cognitive reality, it is not entirely unjustified to assign long vowels in the underlying form of monosyllables ending in [ðʔ jʔ wʔ ʌ͡ʔ]. But the issue needs to be revisited in another generation or two, when—presumably—durational patterns have stabilized in disyllables with intervocalic [ð ʌ͡ w].

3.2.2 Final /r/

The control words never came out with [ʁ] in the derived form, so surfacing [ʁ]s must have been lying in wait in stem final [ɑ] and ɒ]: The older group of subjects produced consonantal [ʁ] in 82% of the derivations, the younger group only 53%; with a grand mean of 70%. A cautious conclusion is that on the whole, for the 21 speakers as an ensemble, and Copenhagen speakers as a whole, it is not unjustified to analyze final [ɑ] and [ɒ] as /ar/ and /ɔr/. But granted that [ʁ] surfaces more readily in the older group of speakers than in the younger one, we may perhaps predict a future where the psychological arguments weaken for a bi-phonemic interpretation of [ɑ ɒ], in terms of morphophonemically conditioned phonological alternants.

Table V Long vowels in inflected nonsense verbs and nouns

final consonant	percentage long vowel
ð	51
w ʌ͡	71
j	92
total	67

Table VI [ʁ] *in derived stems ending in* [ɑ] *and* [ɒ]

young group	older group	total
53%	82%	70%

The abstract representation I propose for the modern Danish vowel data is what classical generative phonology would also posit. But I hesitate to subscribe to that kind of psychological reality. I do not think it is very 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 morphophonemic representation of Danish vowels. I believe that the derivational and inflectional paradigms, upon which the experiment described above were modeled, are part of the speakers' (tacit) knowledge about Danish. And that was in fact more or less borne out by the results of experiment. But I do not thereby imply that the morphophonemic forms are necessarily identical to the lexical representations, to 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—at least for a while yet, but I am less willing to commit myself across the board to lexically long vowels in monosyllables ending in [ðʔ i͡ʔ u͡ʔ ʌ͡ʔ] in young Copenhagen speakers. They act -

by and large - as if they know that the short vowel of monosyllabic [bɪðʔ] etc. is related to a long vowel in the inflected disyllable [b̥iːð̬] etc. So a linguistic description and representation 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 representation, however.

Briefly then, the morphophonemic representation I propose is a common base form, somewhere in between the Bloomfieldian and the 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 is 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.

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