PHONOLOGICAL SYLLABIFICATION IN DANISH ONCE MORE: A PROPOS
MOLBÆK'S PAPER

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Abstract: This paper contains an evaluation of Molbæk Hansen's
            critical discussion of my earlier syllabification prin-
            ciples of Danish phonology. A more recent version of
            the principles, which has been tested within the DANFON-
            project, is presented - although very sketchily - and
            Molbæk Hansen's counter-examples to the earlier prin-
            ciples are evaluated with respect to the DANFON-version.
            Particular attention is paid to the manifestation of
            short /a/, synchronically as well as diachronically.

1. Introduction[2]

   Peter Molbæk Hansen's recent paper (1979) contains an inter-
esting discussion of my principles of phonological syllabification
in Danish published earlier (see below), and a most challenging
set of apparent and real counter-examples to them. The editors
of ARIPUC have been so kind as to allot me in this volume the
space necessary for a reaction to some of Molbæk's criticism. I
shall try to clarify (in section 2) my position on some issues
where I am not sure I agree with Molbæk's interpretation, and, in
particular, I shall present (in section 3) an outline of the phono-
logical syllabification principles which have in fact been used in
the DANFON-project, which is a computer testing of a generative
phonology of Danish, conducted by Kjeld Kristensen and myself (see

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Basbøll and Kristensen 1975), and evaluate Molbæk's counter-examples with respect to these latter principles. (Particular attention is paid to the manifestation of short /a/ as [a] or [ɑ].)
It is hoped that this evaluation will clarify to what extent the shortcomings of the earlier principles are due to the tentative nature of their formulation and/or to the inherent failure of my whole strategy of syllabification. It is shown that the DANFON syllabification principles are observationally more adequate than those of the earlier version, but that certain classes of counter-examples nevertheless seem to remain. Lastly (in section 4) I discuss Molbæk's suggestions in favour of a unit larger than the syllable but smaller than the word, and an alternative account is sketched. (I should like to add that section 2 contains very little that is new, but that I have considered it as a prerequisite for the remainder of the paper.)

2. General remarks on my syllabification principles

2.1 Preliminaries

My point of departure is the following hypothesis (see e.g. Basbøll 1978a): The function of boundaries, which are linearly ordered, is to delimit "domains" (like "syllable", "phonological word" and "stress group"). The primary function of those domains is to define the "universe of application" of phonological rules and phonotactic constraints; but they also occur as units in such rules (e.g. syllables in tone- or stress-rules). Boundaries should not occur properly included in the Structural Description of a phonological rule, i.e. they may occur at the very beginning or at the very end of the Structural Description, but not within it.

This framework considers the function of syllabic boundaries and phonologically relevant grammatical boundaries to be phono-logically alike, and thus the syllable should be a possible domain for phonological rules, just as it is for phonotactic constraints. This was also one of the main points of my treatment of the short vowels in Danish (Basbøll 1972), even though the whole junctural framework was only worked out later. The domains of the present model in fact represent a simple type of hierarchically structured phonological organization (cf. Basbøll (forthcoming) for a dis-

cussion of recent versions of metrical or hierarchical phonology which seem generally over-structured to me).

As already stated, it has been claimed (Basbøll 1972) that a number of important phonological processes in Danish have the syllable as their domain (such syllable-dependent rules are the adjustment of short /o/ and /a/ in closed syllables and a whole range of consonant gradation-phenomena which are so characteristic of Danish (see Rischel (1970)), and which constitute a main reason why spoken Danish is so difficult to understand for other Scandinavians). It is then necessary, of course, to propose some principles of syllabification, since these are presupposed by such an account. In different papers (e.g. 1972 and 1974) I have discussed, in general terms, such principles (for instance that certain grammatical boundaries function as syllable boundaries too; that a stressed vowel attracts neighbouring consonants; that a full vowel attracts more consonants than a schwa; and that certain consonant clusters, like obstruent plus liquid in some languages, or /s/ plus certain consonants in others, function as single consonants with regard to syllabification). I proposed that such general principles (including the so-called "Hjelmslev's law", according to which a medial cluster should be split up into a possible final cluster plus a possible initial cluster) interact in different ways in different languages, and quite tentatively I suggested that the resultant principles of syllabification for Danish should be something like the following:

(1) The grammatical boundaries preceding pauses, words, stems and (primarily or secondarily) stressed native suffixes function as syllable boundaries too.

(2) Medial clusters are split up into a _possible_ word-final cluster plus a _possible_ word-initial cluster.

(3) Before syllables with full vowels, the syllable boundary goes as far to the left as permitted by the preceding principles, whereas before schwa-syllables it goes as far to the right as possible, with the exception that the syllable boundary goes between a sonorant consonant and a stop other than /g/.

2.2 Molbæk's critique and "Hjelmslev's law"

Quite recently, Peter Molbæk Hansen (1979) has critically examined the above principles and their empirical consequences in an interesting paper. He agrees with my principles concerning grammatical boundaries, which I shall therefore not consider any further here. But then he points rightly to the following diffi- culty with regard to my principle (2) applying "Hjelmslev's law": I consider this principle to mean that split up medial clusters should not be in conflict with any general phonotactic restric- tions of final, respectively initial, consonant clusters. I have stated these restrictions myself, however, on a phonological level which is more concrete (closer to phonetics, if you like), than the phonological rules which presuppose syllabification, in par- ticular on a level at which consonant gradation has already ap- plied (Basbøll 1973a). I should like to emphasize (and Molbæk has not claimed otherwise) that there is nothing circular in such a procedure, of course: the restrictions can be defined, in a non- circular fashion, to apply at a more abstract level; but the prin- ciples will then be less general, and what is worse, they will lose their otherwise convincing phonetic motivation (which lies in the sonority hierarchy).

Of course, Molbæk's criticism of my use of "Hjelmslev's law"[1] also applies to other approaches to phonological syllabification which make crucial use of the notions "possible initial cluster" and "possible final cluster", e.g. Anderson and Jones (1974). I should like to make clear (cf. Molbæk 1979, p. 96) that Kahn's strategy (e.g. 1976, p. 22) treats "permissible initial/final cluster" as an important theoretical primitive, or at least as a notion that is crucially presupposed by the syllabification within his framework. This is one of the facts about Kahn which make me feel somewhat uneasy about Molbæk's classification of him within

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1) I should add that I entirely agree when Molbæk points to the
    important distinction between strong and weak syllables with
respect to phonotactics (1979, p. 98). Although I have criticized
Haugen's (1956) definition of the syllable and other definitions
in Fischer-Jørgensen (1952) using just this argument (1974, p. 94-
95), I must admit that my early treatment of these matters (1972,
p. 194) is in fact objectionable in exactly the way Molbæk says
(ibid.).

"natural generative phonology", a trend which (in Molbæk's words) should have syllable boundaries inserted "according to phonetically and typologically based hypotheses of natural syllabification of sequences of segments, leaving relatively little room for language specific deviations" (ibid.). I also feel that Molbæk's characterization of my own use of syllable boundaries as reminiscent of e.g. their use within glossematics, "in that relatively large freedom is allowed in connection with the placement of syllable boundaries" (ibid.), can easily be misunderstood by others, so I want to make the following point clear: One basic idea of my procedure is that syllable boundaries are inserted by rule; there is thus <u>no</u> freedom once the rules have been settled. This procedure differs markedly from that of Hjelmslev (1951), who not only provided no rules, but even located the syllable boundaries in places which were crucially different in words of exactly the same phonological structure, just to account for the distinction in manifestation (cf. Basbøll 1971, p. 207-211).

In fact, I have stated explicitly (e.g. 1974, p. 83) that this Hjelmslevian principle (for lack of a better term) might well be dispensable in the final analysis, if we presuppose a certain elaboration of the third (and last) principle. In the DANFON-project we have operated with a set of syllabification rules in Danish which <u>only</u> depend on grammatical boundaries and on the sequence of segments. This set of rules has been used since 1975 with only minor modifications as far as syllabification principles are concerned. The system has given rise to very few ill-formed constructions where the placement of the syllable boundary is a cause of the failure, and it may thus be taken to represent at least some degree of observational adequacy. It must be emphasized, however, that the project has, for various reasons, not yet been concluded, and that there has been no really systematic testing of the syllabification rules in particular (cf. note 2, p. 269). The syllabification rules in DANFON have never been published, so Molbæk can of course not be blamed for not having considered them. I shall, however, briefly present their contents here (as of late 1975), in section 3.1 below, so that they can be used in the evaluation of Molbæk Hansen's counter-examples to my proposals (they remain, of course, counter-examples to the older and published proposals).

2.3 Phonological syllable boundaries as descriptive devices

Before we turn to the specific rules with their examples and possible counter-examples, two remarks of a preliminary nature may be in order. First and most important, the phonological syllable boundaries, as I have used them, are <u>descriptive devices</u> to account for[1] a number of phonological phenomena. They are subject to certain general restrictions on any type of syllable, e.g. that they conform to some sort of sonority hierarchy, and that a stressed syllable should be a possible word (disregarding prosody, e.g. the stød); but they are not claimed to have any phonetically or psychologically demonstrable existence at all.

Phonetic syllable boundaries should be phonetically demonstrable, on the other hand, e.g. in terms of duration of initial vs. final allophones. I suggested (1974, p. 72) that the universally unmarked way to syllabify a given sound chain is the phonetic (as opposed to phonological, viz. as concrete vs. abstract) syllabification, which also depends, of course, on language-specific (abstract-)phonological factors. Quite naturally, phonological syllable boundaries most often coincide with phonetic syllable boundaries, e.g. in the German example <u>ein Esel</u> (cf. Basbøll 1974, p. 74), where I consider the prevocalic glottal attacks to be manifestations of both phonetic and phonological syllable boundaries. That the different types of syllable boundaries within my framework coincide, is the unmarked (or natural) case. I think the apparent disagreement between Molbæk (1979, p. 95) and myself on this issue is purely terminological.

Secondly, it follows from this conception of phonological syllabification that such boundaries may be partly indeterminate. For example, when the only distinction that matters phonologically is one between open and closed syllables, then it will, of course,

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1) Of course, such an account in no way qualifies as an explanation - which must ipso facto involve (well-known) explanantia external to the explicandum in order to avoid circularity - but is an instance of a scientific generalization (hopefully a linguistically significant one). The latter point presupposes, naturally, that several different phonological phenomena are captured under one description, which is the case here. Notice that within this conception of reality, there is no reason to prefer /sal$mə/ to /salm$ə/ - or the other way round - except for what Molbæk Hansen calls "economy of formulation" (1979, p. 100).

be quite empty to insist on one unique inter-segmental boundary in all cases when its placement cannot be tested phonetically or psychologically, and when different placement of the syllable boundary has no phonological consequences.

What is essential in an evaluation of my proposed principles of phonological syllabification in Danish is, in my opinion, the following: Can a set of (preferably not too unnatural) syllabification rules be given from which one can derive - from grammatical boundaries and the sequences of segments, with or without the inclusion of prosodic information - in a non-circular manner, the correct output forms as far as syllable-dependent phenomena like short vowel adjustment and consonant gradation are concerned? Or, more specifically: can the correct allophones [o, ɔ], [a, ɑ], [d, ð], [g, ɣ], and so on be predicted from underlying forms with invariant /o, a, d, g/ etc., by means of automatically inserted syllable boundaries and some simple syllable-dependent rules?[1] The tentative answer delivered by the DANFON-project is in the affirmative, but it should be borne in mind that so far only rather limited sets of data have been tested.

3. Molbæk's counter-examples and the DANFON syllabification principles

3.1 The net effect of the DANFON syllabification principles

The syllabification principles of DANFON are approximately as follows ($ indicates a syllable boundary). These principles (4-10) replace 1-3 above (2.1). Remember that this is only an informal statement of the net effect of the syllabification rules taken together.[2] (5) through (10) only apply if no syllable boundary has been placed in accordance with (4).

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1) These manifestation principles may be stated informally like this: /o/ → [ɔ] in a closed syllable; /a/ → [+grave] (i.e. [ɑ]) before a tautosyllabic grave consonant; /d,g/ → [ð,ɣ] in the final part of the syllable (the last rule is somewhat simplified).

2) It should be emphasized that the rules (4) through (10) below cannot be determined from the program of the DANFON-project, but that I have considered their over-all effect to be a reasonable approximation to the over-all effect of the DANFON syllabi-

(4) Certain grammatical boundaries are syllable boundaries too (unchanged, see (1) above): e.g. mados, dumhed (the examples are rendered in the orthographic form, except for $).

(5) A single intervocalic consonant belongs with the preceding vowel if the following vowel is schwa, otherwise with the following vowel (unchanged): e.g. bade, nota, O$da.

(6) $ goes immediately to the right of /g/ preceded by a voiced consonant if the vowel of the following syllable is schwa (that /g/ is the weakest plosive is in agreement with the hierarchies discussed e.g. in Foley 1977): e.g. alg$e, ærg$re.[1]

(7) $ goes immediately to the left of a plosive followed by a voiced continuant followed by a full vowel (exception: /tl/ (and possibly /dl/ too) is hetero-syllabic): e.g. hydra, Nigra.

(8) /s/ plus a plosive function as a plosive (different from /g/, see point (6) above), cf. (7): e.g. bi$skop, ek$stra.

(9) $ goes between a two consonant group and a nasal: e.g. ast$ma, øks$ne.

(10) Otherwise the syllabification of a medial consonant cluster is the unmarked one, namely as equal as possible, but with a preference to the left in the case of an odd number of consonants, informally speaking, viz. CC, CCC, CC$CC: e.g. sal$me, æn$dre, fæng$sle, tundra, alfa.

Notice that the principles do not appear completely ad hoc: the clusters plosive plus liquid (or glides, etc.) and /s/ plus plosive are well attested as close-knit units in several other languages, and so is the hetero-syllabicity of /tl/ (and possibly

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2) (cont.) fication principles. It is clear that a reliable evaluation of those rules can only be given after a more definitive report on the DANFON-rules has been presented. Unfortunately, Kjeld Kristensen and I have not been able to work on the DANFON-project for the purposes of the present paper. I should also like to mention that a late DANFON-rule optionally deaspirates /p t k/ before schwa. The variables entering into such an optional rule are not encoded within the DANFON-project (it is the other way round: such variable rules should be investigated departing from the output of the DANFON-project, see Basbøll and Kristensen 1975).

1) Molbæk Hansen (1979, p. 101) apparently finds it in some way objectionable that I have treated otherwise similar clusters containing /g/ and /k/ according to different criteria. I fail to see why, given the unique behaviour of /g/ (as opposed to the other plosives) in this respect.

/dl/ too). There is also a high degree of similarity between the principles accounting for groups of one, two, three and four inter-vocalic consonants. Finally, the significance of the distinction between full vowels and schwa should come as no surprise either.

3.2 Molbæk's counter-examples to the earlier syllabification principles, evaluated with respect to the DANFON-version

Molbæk Hansen (1979) classifies his examples (which are all problematic with respect to my tentative rules corresponding to (1) - (3) in section 2.1 above) into seven groups which will be exemplified below:

I. Cases like manøvrere, aula, which are correct according to the DANFON-rules.

II. Cases like Sigrid, Børglum, prognose, of which the names Børglum, Sigrid, Sigvald, and Sigvard, where /g/ is not pronounced as a plosive, are the only exceptions to the DANFON-rules. The latter two examples can be correctly generated by restricting principle (7) to apply only to plosive-liquid-sequences (and pos-sibly plosive-glide sequences as well), not to all clusters of a plosive followed by a voiced continuant (cf. Muta cum Liquida as a category in other languages); or the last three of them by re-cognizing a strong word-internal grammatical boundary between Sig- and -rid, -vard, -vald (cf. Ingrid, Edvard, Thorvald, and other names mentioned by Molbæk Hansen). The latter alternative is of the hocus-pocus-type (see below), and would be even more so if a strong word-internal boundary was postulated also in a case like Børglum (between Børg- and -lum).

III. Examples like adjudant, advokat, Gudrun (with /d/ pronounced [ð]) are counter-examples to both sets of my proposed syllabifica-tion principles. According to the first alternative just mentioned (under II), the cluster /dv/ (and possibly /dj/ too, cf. above) will be split up, correctly; and according to the second alterna-tive there, Gudrun will be accounted for by means of a grammatical boundary (cf. Gudmund and other such names). Notice, however, that this account in terms of boundaries is only to be considered a lexical shorthand device, so to speak, since this boundary is of course semantically quite unpredictable in such proper names.

IV. Cases like pingvin, jonglør, Ingrid, which when pronounced
without [g] are exceptional also with regard to the DANFON-rules.
These forms would be correctly generated if the velar nasal were
taken as one underlying segment. One can find independent argu-
ments in favour of this ("concrete-phonological") solution, but
the adoption of it would, admittedly, diminish the number of cases
accounted for by my syllabification rules a little. I shall not
pursue this issue any further here, and the forms must at present
be considered exceptions, although only marginal ones. Another
problem with /g/-words is a name like Hauge, which was formerly
correctly generated with a pronounced stop, but which is mal-
generated by the DANFON-rules. These may be changed without com-
plications, as far as I can see, so that /g/ follows the unmarked
C$C-pattern between /j, v/ and schwa (such forms are only rare
names and the like, where one is on uncertain ground anyhow).

The preceding groups of problematic cases seem to me to be
rather marginal when related to the DANFON-rules, which also by
and large agree with the result of Molbæk Hansen's useful overview
of certain $V_1C_1C_2V_2$-sequences. Some cases in the remaining three
groups appear to be less marginal, however.

V. Cases like gamma, Abba, Bacchus, gummi, Gunna, in which under-
lying /a, o/ are pronounced as if the following consonant closes
the preceding syllable, although it is followed by a full vowel.[1]
Incidentally, as Molbæk remarks, I in fact mentioned the vacil-
lating pronunciation [a/ɑ] in words like papir, akademiker (1974,
p. 67), where the /p/ or /k/ which follows /a/ is aspirated and
thus clearly syllable-initial. I suggested that this might be
the symptom of a phonological change in progress whereby the rule
assimilating an /a/ to a following grave consonant enlarges its
domain (it is, for instance, my impression that older people,
"socially higher" people and people from Jutland use the [a]-
pronunciations in such words more than other people, provided that

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1) Gummi and Gunna are Molbæk's only examples with /o/; the rela-
   tion between short [o], [ɔ] and [ʌ] is extremely complex when
viewed in its entirety, and I shall not discuss these examples
further here, but only refer to Brink and Lund (1975, p. 180-183).
These authors recognize that phenomenological syllable boundaries
("oplevede stavelsesgrænser") play a role for the distribution of
[o]: [ɔ] (their [å]) essentially like the one I have proposed
since (1972), but without any reference to my work.

they have the syllable-dependent [a/ɑ]-alternation in other words).

When we consider this possibility of a phonological change in progress (the question of the nature of the change will be taken up below), it seems to me that there are a couple of important observations to be made with regard to the examples presented by Molbæk Hansen (1979, p. 109) and other similar examples:

(1) The preceding consonant: Most of Molbæk's problematic examples, i.e. those with obligatory or optional [ɑ] before a grave consonant followed by a full vowel, have a grave consonant before them, and there is only one example (the place name Malacca) which is preceded by an acute consonant.[1] The examples of vacillating pronunciation adduced by Brink and Lund (1975, p. 71-73) seem to agree well with my analysis.[2] (Since /a/ adjacent to /r/ is always pronounced [ɑ] (or [ɑ]) in the varieties of Standard Danish considered here, examples with /ar/ or /ra/ have been disregarded, of course, in the present context.) I conclude that the [ɑ]-pronunciation is favoured by a preceding grave consonant and impeded by a preceding acute consonant.[3]

As to other examples of a preceding consonant influencing vowel quality, consider r-colouring in Danish as well as many instances of vowel nasalization (where the influence of a preceding nasal consonant is clearly inferior to that of a following tautosyllabic one, but nevertheless not quite negligible.

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1) The name Jakob is not a real counter-example, since the general manifestation of the first part of the /aj/-diphthong (as [ɑ] or something intermediate between [a] and [ɑ]) shows that synchronically, at least, /j/ functions differently from acute true consonants with respect to this rule. Diachronically, however, /j/ was on a par with the other acute non-syllabics when the change started, cf. Brink and Lund (1975, p. 67).

2) Brink and Lund do not consider this question, but it turns out that only a couple of the roughly thirty relevant examples which they give of the vacillating pronunciation have an acute consonant before the /a/ (the exact figures depend on how you count and would be insignificant anyhow).

3) Cf. the fact that none of the examples of vacillating pronunciation given by Molbæk Hansen have any consonant before the /a/ (words like akademi(ker) belong here too). This generalization does not hold when further material is adduced, however, but the order grave cons. - zero/h - acute cons. still seems to obtain.

(2) _Stress_: Only 2 out of Molbæk's 16 examples with obli-
gatory [α] (viz. _Hammurabi_ and _akkurat_[1]) have unstressed /a/, where-
as both examples with vacillation [a]/[α] have unstressed /a/.
Brink and Lund (1975, p. 73) give the rules that [α] is more fre-
quent in stressed than in unstressed position, and that [α] is
clearly more frequent in the first of several pretonic syllables
than in the only pretonic syllable. All this strongly suggests
the following principle: the more prominent the /a/-syllable with
respect to the following syllable, the more likely /a/ is to be
influenced by a following grave consonant. If, as seems intuitive-
ly evident, a schwa-syllable is considered to be minimally promi-
nent, the distinction between full vowels and schwa with respect
to syllabification appears to be just a special case of this
general tendency.[2]

Synchronically, the following three aspects of a phonological
rule can be distinguished: (a) the contents of the rule (tradition-
ally in terms of Structural Description and Structural Change, but
other (alternative or additional) structurings are certainly pos-
sible[3]), (b) its domain of application (like syllable, word, and
so on, see Basbøll 1978a), and (c) its mode of application (in
terms of obligatory vs. variable rules, cf. Labov 1970). These
three aspects of the rule of /a/-manifestation will be briefly
considered in turn.

(a) _Contents of the rule_: (1) above in this section seems
to agree very well with my statement (1974, p. 66) that the rule
is an _auditory assimilation rule_. That the acute vowel is con-
sidered to be synchronically basic is due to arguments of formal

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1) Molbæk (1979, p. 110) gives the pronunciation [αku'ʁɑːd], but
    in fact pronunciations with stress on the first syllable of
this word are also frequently heard, which makes the tendency even
clearer.

2) This by no means implies that the syllabification effect of the
    distinction between full vowels and schwa can be predicted from
the general tendency: The importance of this vowel distinction for
syllabification, as compared to e.g. different degrees of stress,
is an interesting fact about Danish which had to be discovered
(and its discovery was gradual: cf. Martinet (1937), Andersen
(1954), Rischel (1970) and Basbøll (1972)).

3) One could consider such questions as which segment is affected,
    which direction does the change take, and so on. The important
question of a typology of phonological rules also belongs here, at
least in part (see, e.g., Linell 1977 and Dressler 1980).

simplicity, but I think it is in accordance with the intuition of most present-day speakers of Standard Danish (cf. the fact that /a/ is manifested [a] before zero, i.e. in the neutral context). Diachronically, the grave vowel changed into an acute one in more and more contexts (see Brink and Lund (1975, p. 67-96)); this development has been explained by Davidsen-Nielsen and Ørum in terms of the acoustic-auditory feature 'gravity' (1978), and further discussed in such terms by Brink and Lund (1975, p. 81). I shall return briefly to the diachronic problems below.

(b) <u>Domain of application</u>: It still seems to me that syllable boundaries play a decisive role for the manifestation of short /a/, cf. the detailed discussion by Brink and Lund (1975, p. 71-73 and 730-734).[1] Most of Molbæk's counter-examples with stressed /a/ (like <u>gamma</u> and other examples with 'non-grading' consonants) may be reconcilable with a syllabic analysis, presupposing that the syllable boundary occurs to the right of the consonant. In cases where the consonant, obligatorily or optionally has its "initial" manifestation (like <u>kappa</u>, <u>Bacchus</u>, etc.), this analysis meets with difficulties. And forms like <u>papir</u>, <u>fakultet</u> - pronounced with [α] - where pretonic /a/ as a rule is followed by aspirated /p/ or /k/, apparently cannot be analysed in these terms at all. In some sense, the domain of the /a/-rule for such forms seems to be larger than it is for otherwise similar forms pronounced with [a], regardless of whether this is accounted for in terms of a difference in the location of the syllable boundary (so that it is intra-segmental in the forms pronounced with [α], see section 4 below), or in terms of a rule domain larger than the syllable. Now the important point is that pronunciations of these and similar words with [α] seem to be more recent than those with [a],[2] accord-

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1) As in the case of the auditory nature of the rule, Brink and Lund make no reference to my proposals concerning the relation between the /a/-manifestation rule and syllable boundaries.

2) When Molbæk (1979, p. 110) expresses his scepticism as to whether the pronunciation [pα'piŋ'] "is a new phenomenon (to the extent that it occurs)", it should be said, first, that it occurs without any doubt (cf. Brink and Lund (1975, p. 72-73)), and, second, that the [α]-pronunciation, of course, is an old phenomenon in the sense that it is attested long before the [a]-pronunciation (viz. before the fronting of [α] started), but that my claim concerns something else, namely that the [α]-pronunciation has reappeared (at least as a possibility) after an interval of "pure" [a]-pronunciation, presupposed, of course, that the sociolinguistic variables are kept constant (this, however, I cannot prove).

ing to my impression (unfortunately, this question has never been investigated, and no conclusions can be drawn from the material presented by Brink and Lund (ibid.)). If this is so, the /a/-assimilation rule seems to be in the process of enlarging its domain in one of the senses just hinted at: either so that the syllable boundary seems to be located intra-segmentally in more and more cases like those just mentioned, or so that the blocking effect of syllable boundaries with respect to this rule seems to be diminishing.

(c) <u>Mode of application</u>: It follows from what has already been said that the rule is variable in the sociolinguistic sense of Labov (1970), both with respect to different speakers (classified according to sociological, geographical and chronological criteria) and with respect to phonology (cf. (1) and (2) above in this section). Within the syllable, the rule is obligatory (for those speakers of Standard Danish considered here), and it never applies across word boundaries; in between those two domains, it is variable (but cf. section 4 below).

What I conclude from all this, although quite tentatively, is the following diachronic picture: The original [α] gradually was replaced by [a] in more and more contexts, with the proviso that a following tautosyllabic grave consonant impeded the change.[1] Towards the end of this process, a rule accounting for alternations and vacillations of /a/ would synchronically treat [a] as basic (since /a/ is manifested as [a] in the neutral context, viz. before zero). This latter rule (which essentially assimilates an /a/, with respect to the feature "gravity", to a following tautosyllabic grave consonant) then is applied in more and more contexts, [α]-pronunciation being favoured by higher relative prominence of the syllable in question as compared to the following syllable, and favoured, respectively impeded, by a preceding grave, respectively acute, consonant. According to the present account, the expansion of [α]-pronunciations in such words would thus be a symptom of a (variable, in Labov's (1970) sense) enlargement of the domain of the rule of auditory /a/-assimilation in one of the two respects

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1) For certain speakers, the labials clearly were not impeding the change in the way velars were, cf. Brink and Lund (1975, p. 67 and 71).

just mentioned. All this needs further investigation, of course.
The same applies to the influence of spelling: it is the impression
of both Molbæk (personal communication) and myself that <u>double</u>
("grave") consonants in the orthography favour [α]-pronunciation
of a preceding short /a/. There are a number of methodological
difficulties in investigating the character of this influence,
however, and this issue will not be pursued any further here.
<u>VI</u>. Cases like <u>Harry</u>, <u>paritet</u>, <u>terracotta</u>, <u>Karoline</u>, in which /r/
is realised as a glide before an unstressed full vowel. The con-
clusion suggests itself that the realisation of /r/ is not always
syllable-dependent (cf. Basbøll 1972, p. 196).
<u>VII</u>. Cases like <u>Canada</u>, <u>Paludan</u>, which have stød on a sonorant
consonant followed by a weakly-stressed full vowel. Although there
is no descriptive problem in first assigning stød to syllable
peaks and then having the stød spelled out, late in the derivation,
on a consonant which phonologically, at earlier stages of the deri-
vation, belonged to the following syllable, Molbæk is certainly
right that this description is at odds with my basic conception
of stød as a syllabic prosody. Although I could still say that
the stød-consonant occurs in the same <u>phonetic</u> syllable as the pre-
ceding (stressed) vowel, the description seems unsatisfactory.

The cases mentioned under VII, some of those under V, and pos-
sibly those under VI, suggest to me that in certain cases, a con-
sonant occurring between a fully stressed short vowel and a weakly
stressed short full vowel, may seem to close the preceding syl-
lable (cf. Basbøll 1974, p. 88), see further below.[1]

4. Concluding remarks

Molbæk Hansen concludes with the suggestion (1979, p. 118)
that an additional hierarchical unit in between the syllable and
the word might be phonologically relevant. He gives it no name,

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1) In the syllabification rules given in (1973b, p. 25), I treat
    certain instances of short /e/ and /i/ (viz. the vowel of the
endings -<u>ing</u>, -<u>ig</u>, and certain -<u>isk</u>) on a par with schwa, cf.
the fact that Martinet operates with "i de très faible intensité"
as a phonological entity which conditions (just like schwa) a
neutralization of the aspiration correlation in the preceding con-
sonant (1937, § 3-5).

and does not refer to recent versions of hierarchical phonology, but he evidently has in mind some sort of foot, consisting of one salient syllable followed by zero, one or more subordinate syllables with a limited vowel repertoire.[1] The foot would be "internally consolidated by certain obligatory structural properties: /a/- and /o/-adjustment, the restricted occurrence of medial aspirated stops before sonorants,[2] the occurrence of at most one stød, and probably some more" (ibid.). He suggests that e.g. the pronunciations [ɑgva'vid/akva'vid] are due to different foot-formation: akva-vit vs. a-kva-vit, and similarly [sʏglo'tʁoːn/ sʏklo'tʁoːn]: cyklo-tron vs. cy-klo-tron,[3] but he of course realizes that this would mean the introduction of a new unpredictable structure. I find this structural addition empirically ill-supported by the type of examples he gives. Notice that only a very small and specific part of the consonant gradation-phenomena can be accounted for in terms of feet, that different placement of the syllable boundary in cases like this will have the same effect as different foot-structure, and that the stød-restrictions offer no real arguments for the foot, either (since weak syllables generally do not have stød).[4]

One of the more challenging consequences of Molbæk Hansen's competent discussion is that it brings into the open certain incongruencies (within my framework) between 1) the concept of the syllable which is decisive for the manifestation of /a, o/, and

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1) According to Molbæk (1979, p. 118), it should be "schwa or one of the full vowels /a o i y u/ but not /e ɛ ø æ ɔ/". This set must be erroneous anyhow, as shown by words like Ammon ([amʌn], also cf. madding [maðeŋ], unless this ending is posited with an underlying schwa), but I shall not go into that problem here.

2) This restriction is not quite as strict as Molbæk seems to think (1979, p. 113), e.g. cyklus has an aspirated /k/ in my normal pronunciation. (I disagree with some other pronunciations given by Molbæk, but this is not important here.)

3) If such different pronunciations are tonally distinct, an important independent argument for foot-structure might be established from such a distinction (this point was suggested by Jan Katlev at the conference).

4) It should be observed, however, that stød-words of the type Canada, mentioned under VII in section 3.2 above, are unproblematic within Molbæk's account, whereas they seem to presuppose that the syllable boundary does not occur before /n/ within my framework (which is quite acceptable to me).

2) that which defines the domain of consonant gradation inter-
vocalically. Since not the foot in Molbæk's sense, but something
like the syllable in my sense, is decisive for the manifestation
of a single intervocalic /d/ or /g/, one can in fact construct a
better case for the foot, or at least a better counter-case to my
analysis, than the one presented by Molbæk. Consider the follow-
ing (constructed) examples (where all vowels are short):

(1)   /ádə/, pronounced [áðə] (e.g. in (sn)adde)
(2)   /ága/, pronounced [ɑga] (e.g. spelled Agga)
(3)   /agá/, pronounced [agá] (e.g. in (prop)aga(nda))

Molbæk would ascribe the following dual structure to these exam-
ples, if I have understood him correctly:

(1)   syllables: $ád$ə$, foot: -ádə-
(2)   syllables: $á$ga$, foot: -ága-
(3)   syllables: $a$gá$, feet: -a-gá-

This seems rather straightforward (presupposed that the manifesta-
tion of /d,g/ is determined with the syllable as its domain, and
the manifestation of /a/ with the foot as its domain).

In my analysis, on the other hand, there would be trouble in
ascribing a syllabic structure to (2), since consonant gradation
would seem to presuppose $ to the left of /g/, and /a/-manifesta-
tion to the right. In agreement with my strategy as applied to
French (cf. Basbøll 1978b and section 2.3 above), I could define
the notions "open and closed syllable" so that /g/ closes the
preceding syllable in (2), due to the prominence relation of the
vowels. The rules of /a/- (and /o/-) manifestation thus, natural-
ly, would obtain in closed but not in open syllables. The con-
sonant manifestation would be "initial", so to speak, due to the
following full vowel. This proposal could be rendered in syl-
labic notation somewhat like this:[1]

(1) $ád$ə$, pronounced [áðə]
(2) $á$ga$, pronounced [ɑga]
(3) $a$gá$, pronounced [agá]

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1)   The principles of syllabification lying behind this notational
     proposal might be rendered something like this: In the case
of a single intervocalic consonant, $ occurs to the right of the
consonant if and only if the following vowel is schwa. Concerning
the difference between intra-consonantal and pre-consonantal loca-
tion of the syllable boundary, only some variable rules not reach-

This is, of course, a type of ambisyllabicity proposal (cf. Anderson and Jones (1974) and Kahn (1976)), which I should like to rephrase as follows: the intervocalic consonant at the same time closes the preceding syllable and begins the next one[1] (cf. the notion "close contact"). Viewed in this light, the difference between the treatment suggested here and Molbæk's account in terms of foot-structure, is perhaps not essential.[2] In addition to a possible (but by no means forcible) methodological reason for preferring my own account to Molbæk's (parsimony of levels), I want to briefly point out how the two sketchy proposals would account for a few complicated cases.

Consider pronunciations like <u>agent</u>, <u>papir</u> [ɑˈgɛnˀt, pɑˈpiɒ̯ˀ] (cf. note 1, p. 279), which seem to presuppose that /a/-adjustment optionally may apply across foot-boundaries (but still within words only). This optionality across foot-boundaries at the same time accounts for the pronunciation [ɑkvaˈviˀt], which is not mentioned by Molbæk Hansen (1979, p. 118): <u>a-kva-vit</u>. But now consider forms like <u>kappa</u>, <u>Bacchus</u> which have obligatory [ɑ], but where the stop may be pronounced with or without aspiration. Those words would consist of just one foot, according to Molbæk's analysis; and in order to account for the optional lack of aspiration,

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1) (cont.) ing the level of complete predictability can be given, viz. that the syllable boundary most often occurs to the left of the consonant if the first vowel is less prominent than the second, and within the consonant if both vowels are full, and the first vowel is more prominent than the second. These variable rules should, of course, be made much more precise. The formulation is deliberately vague regarding a sequence of equally prominent full vowels, which is exactly the case where most [a/ɑ] vacillation occurs, but where the manifestation of the consonant is "initial" as a rule, e.g. in words like <u>Agamemnon</u>, <u>fakultet</u>, and so on. (The principles of syllabification just stated only apply within word boundaries, of course, in the usual fashion.)

1) It is by no means surprising that the initial manifestation of the consonant overrides the final one, so to speak, since initial is in many respects the stronger of these two positions.

2) Cf. Kiparsky's claim (forthcoming) that phonological phenomena which were earlier considered (in particular by Kahn (1976)) to be arguments for ambisyllabicity, can in general be accounted for as foot-bound phenomena. I do not subscribe to all of Kiparsky's claims concerning the foot, however (cf. Basbøll (forthcoming)).

an optional rule of de-aspiration must be postulated to apply
within the foot.[1] Within Molbæk's analysis, the optional lack of
aspiration of /k/ in <u>Bacchus</u> and <u>akvavit</u> is thus due to two unre-
lated structural properties, viz. the optional rule of de-aspira-
tion within the foot in the former case, and the structural ambi-
guity between a two-feet and a three-feet analysis combined with
"the restricted occurrence of medial aspirated stops before sono-
rants" (ibid.) within the foot, in the latter case. Whether this
structural complexity can be substantiated by any independent
evidence still remains to be shown.

Within my proposal, the three possible pronunciations of
<u>akvavit</u> may be accounted for as follows: [akvaˈvɪt]: a\$kva\$vit;
[ɑgvaˈvɪt]: ak\$va\$vit; [ɑkvaˈvɪt]: aǩva\$vit. Notice that the pro-
nunciation [agvaˈvɪt] is excluded within this notational system,
as desired. It is my impression, however, that the three pronun-
ciations given are very different with regard to distinctness:
the [g]-form is clearly less distinct than the two others.[2] In
view of this, I would prefer to limit the freedom of syllable
boundary location in cases like the one at hand to \$a\$kva\$vit\$
vs. \$aǩva\$vit\$ (pronounced [akvaˈvɪt, ɑkvaˈvɪt], respectively),
and to account for the pronunciation [ɑgvaˈvɪt] by means of an
optional rule of de-aspiration applying to ambisyllabic /p, t, k/
before weak syllables (it is no surprise that ambisyllabic stops
are more liable to de-aspiration than initial stops, cf. the fact
that syllable-final stops are unaspirated in Danish except before
pause; also cf. note 2, p. 280). This rule accounts at the same
time for the optional de-aspiration in words like <u>kappa</u> and
<u>Bacchus</u>.[3]

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1) Notice that /d, g/ are not optionally pronounced as continuants
   in this position, which shows that the often claimed parallel-
ism between /t, k/ and /d, g/ as instances of a common process of
"weakening" in certain positions ('consonant gradation') is not
complete.

2) I am not in a position to wholly exclude the possibility that
   even the pronunciation [agvaˈvɪt] can in fact be heard, as a
very indistinct form, but I very much doubt that it will ever be
encoded in serious communication, in contradistinction to
[ɑgvaˈvɪt]. Investigations of such matters would be welcome.

3) Whether the normal pronunciation of <u>apotek</u>: [ɑboˈteˑk] can be
   accounted for in this way, or whether it has an underlying /b/,
must be left entirely open here. The normal pronunciation of
<u>chokolade</u>: [ʃogoˈlæːðə], in addition to [ʃɔgoˈlæːðə], might be
interpreted as an instance of lexical restructuring (from /k/ to
/g/), but other interpretations are possible too. All this is
nothing but speculation, of course.

The sketchiness of this suggested proposal, just like Molbæk's on the importance of a unit like the foot, can hardly be overestimated. But it has at least become clear, I think, that Molbæk's detailed criticism of my own work on phonological syllabification as applied to Danish has been highly stimulating. I hope work in this area will be continued in the same spirit.

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