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 principles 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 principles 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

Peter Molbæk Hansen's recent paper (1979) contains an interesting 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 phonological 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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2) Most of the contents of the paper were presented—a rather condensed form—at the 4th International Conference of Nordic and General Linguistics, Oslo, June 23-27, 1980. I am indebted to John Dienhart for stylistic suggestions, and to Peter Molbæk Hansen for many valuable comments on the manuscript.
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 [a].) 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 phonologically 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-
discussion 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 difficulty 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 restrictions 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 particular on a level at which consonant gradation has already applied (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 principles 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" 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 glottometics, "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 no 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 only 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 descriptive devices to account for 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 ein Esel (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, 1)

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$me/ to /salm$e/ - 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, æ], [d, ɔ], [g, y], 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).

1) These manifestation principles may be stated informally like this: /o/ \(\rightarrow\) [ɔ] in a closed syllable; /a/ \(\rightarrow\) [+grave] (i.e. [æ]) before a tautosyllabic grave consonant; /d, g/ \(\rightarrow\) [d, y] 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 syllab-
(4) Certain grammatical boundaries are syllable boundaries too (unchanged, see (1) above): e.g. mad$os, dum$hed (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. bad$e, no$ta, 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$e, arg$re.

(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. hy$dra, Ni$gra.

(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$sma, øks$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. C$C, C$CC, CC$CC: e.g. sal$me, æn$dre, fæng$slæ, tun$dra, al$fa.

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

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.
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 possibly 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 recognizing 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 syllabification 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 alternative 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 arguments 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 complications, 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 underlying /a, o/ are pronounced as if the following consonant closes the preceding syllable, although it is followed by a full vowel. Incidentally, as Molbæk remarks, I in fact mentioned the vacillating pronunciation [a/a] 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

1) Gummi and Gunna are Molbæk's only examples with /o/; the relation between short [o], [ɔ] and [Â] 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 [Â]) essentially like the one I have proposed since (1972), but without any reference to my work.
they have the syllable-dependent \([a/\alpha]\)-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 \([\alpha]\) 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 \([\alpha]\) (or \([\alpha]\)) 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 \([\alpha]\)-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 \([\alpha]\) or something intermediate between \([\alpha]\) and \([\alpha]\)) 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 obligatory [a] (viz. Hammurabi and akkurat\(^1\)) have unstressed /a/, whereas both examples with vacillation [a]/[a] have unstressed /a/.

Brink and Lund (1975, p. 73) give the rules that [a] is more frequent in stressed than in unstressed position, and that [a] 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 intuitively evident, a schwa-syllable is considered to be minimally prominent, 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 (traditionally in terms of Structural Description and Structural Change, but other (alternative or additional) structurings are certainly possible\(^3\)), (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 considered to be synchronically basic is due to arguments of formal

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1) Molbæk (1979, p. 110) gives the pronunciation [aku'va:d], 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) Domain of application: 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). Most of Molbæk's counter-examples with stressed /a/ (like gamma 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 kappa, Bacchus, etc.), this analysis meets with difficulties. And forms like papir, fakultet - pronounced with [a] - 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 [a], 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 [a] seem to be more recent than those with [a],

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 [pa'pi'æ] "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 [a]-pronunciation, of course, is an old phenomenon in the sense that it is attested long before the [a]-pronunciation (viz. before the fronting of [a] started), but that my claim concerns something else, namely that the [a]-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) Mode of application: 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 [a] 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, [a]-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 [a]-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

\(^1\) 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 double ("grave") consonants in the orthography favour [a]-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.

VI. Cases like Harry, paritet, terracotta, Karoline, in which /r/ is realised as a glide before an unstressed full vowel. The conclusion suggests itself that the realisation of /r/ is not always syllable-dependent (cf. Basbøll 1972, p. 196).

VII. Cases like Canada, Paludan, 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 derivation, 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 phonetic syllable as the preceding (stressed) vowel, the description seems unsatisfactory.

The cases mentioned under VII, some of those under V, and possibly those under VI, suggest to me that in certain cases, a consonant occurring between a fully stressed short vowel and a weakly stressed short full vowel, may seem to close the preceding syllable (cf. Basbøll 1974, p. 88), see further below.  

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,

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 -ing, -ig, and certain -isk) 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 consonant (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 [agva'vid/akva'vid] are due to different foot-formation: akva-vit vs. a-kva-vit, and similarly [syglo'two'n/syklo'tno'n]: 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

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 ε ø a æ/". This set must be erroneous anyhow, as shown by words like Ammon ([amɔn], also cf. madding [maðæn]), 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-vocally. 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 following (constructed) examples (where all vowels are short):

(1) /áda/, pronounced [áða] (e.g. in (sn)adde)
(2) /ágə/, pronounced [áγa] (e.g. spelled Agga)
(3) /agá/, pronounced [agá] (e.g. in (prop)aga(na))

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

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

This seems rather straightforward (presupposed that the manifestation 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/-manifestation to the right. In agreement with my strategy as applied to French (cf. Basboll 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, naturally, would obtain in closed but not in open syllables. The consonant manifestation would be "initial", so to speak, due to the following full vowel. This proposal could be rendered in syllabic notation somewhat like this:¹

(1) $ád$a$, pronounced [áða]
(2) $á$ga$, pronounced [ágá]
(3) $a$ga$, pronounced [agá]

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 location of the syllable boundary, only some variable rules not reach-
This is, of course, a type of ambisyllabic 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 agent, papir [\(\text{'g\text{'en't}, \text{p\text{'i\text{p}}'}\)] (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 [\(\text{a\text{kva'}vit}\)], which is not mentioned by Molbæk Hansen (1979, p. 118): a-kva-vit. But now consider forms like kappa, Bacchus which have obligatory [\(\text{a}\)], 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,

\[\text{agation is deliberately vague regarding a sequence of equally prominent full vowels, which is exactly the case where most [a/a] vacillation occurs, but where the manifestation of the consonant is "initial" as a rule, e.g. in words like Agamemnon, fakultet, and so on. (The principles of syllabification just stated only apply within word boundaries, of course, in the usual fashion.)}\]

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. Balsbøll (forthcoming)).
an optional rule of de-aspiration must be postulated to apply
within the foot. Within Molbæk's analysis, the optional lack of
aspiration of /k/ in Bacchus and akvavit 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
akvavit may be accounted for as follows: [akva'vit]: a$kva$vit;
[agva'vit]: ak$va$vit; [akva'vit]: a$ka$vit. Notice that the pro-
nunciation [agva'vit] 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. 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.
$akva$vit$ (pronounced [akva'vit, akva'vit], respectively),
and to account for the pronunciation [agva'vit] 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 kappa and
Bacchus.

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 [agva'vit] 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
[agva'vit]. Investigations of such matters would be welcome.

3) Whether the normal pronunciation of apotek: [abo'te:k] can be
accounted for in this way, or whether it has an underlying /b/,
must be left entirely open here. The normal pronunciation of
chokolade: [fogo'lo:lde:], in addition to [[ogo'lza:de]], 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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COMMENT ON BASBøLL’S PHONOLICAL SYLLABIFICATION AS APPLIED TO DANISH

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Abstract: Basbøll’s principles for syllabifying phonological strings in Danish are discussed. Certain counterexamples to the predictions of these principles are presented, and it is argued that certain structural properties of Danish words cannot be adequately accounted for by Basbøll’s syllabification strategy in its present form.

1. Introduction

In an important paper, Basbøll (1972) launched the idea that the inclusion of a syllable concept in a (generative) phonology of Standard Danish (henceforth SD) would explain (or at least connect in a natural way) quite a few seemingly disparate facts of the surface or near-surface phonological structure of SD. Basbøll’s main finding was that a unique set of syllabification principles would supply the sufficient conditions for a simple account of the distribution of allophones of certain phonemes (or, within a generative phonological framework, the surface phonological behaviour of certain phonological segments). Of the distributional statements permitted by the introduction of syllabification, the most important were the following: Short /a/ is pronounced [a] before homosyllabic non-coronal consonants, otherwise it is [æ]. Short /ø/ is pronounced [o] in open syllables and [ɔ] in closed syllables.

1) My phonetic transcription of Danish word-forms is in agreement with Basbøll (1969), except that I use [p t k] for [ph k ph] and [b d g] for [v g ɹ]. [a] denotes a low vowel half-way between cardinal vowels 4 ([æ]) and 5 ([ɔ]).
/p t k d g r/ are pronounced [p t k d g e] in syllable initial position and [b d g ʒ g̊] in syllable final position, except that /ɡ/ is dropped after homosyllabic sonorant consonants, and /ʃ/ is dropped after homosyllabic nasals. (For further details, see Basbøll (1972, p. 137 ff., and 1974, p. 40 ff.).)

In Basbøll (1973c and 1974), this idea is further developed, and some principles for syllabifying phonological strings (at a certain level, cf. below) in SD are given (in the 1974 paper) in connection with a more general discussion of the role of syllables and syllabification within the framework of generative phonology.

The present paper is mainly inspired by Basbøll's work. In section 2 we shall discuss the principles of syllabification given in Basbøll (1974) and Basbøll's use of "phonological" syllables and syllabification from a general point of view.

In section 3 we shall develop our main theme, viz. an evaluation of the observational adequacy of Basbøll's principles.

2. Basbøll's principles of syllabification

As mentioned above, several surface-phonological phenomena can be accounted for in a rather simple way if syllable boundaries (marking the domain, i.e. the syllable, of the relevant rules) are inserted in phonological strings according to a judiciously selected set of syllabification principles. The advantage of referring to syllables and syllabification in the description of the so-called consonant gradation in SD - i.e. roughly the alternations p-b, t-d, k-g, d-ʒ, g-ʃ, and n-s - and certain others, cf. Basbøll (1974, p. 42-43) and Eichholz (1970) - is described by Basbøll in the following way: "Now it is very interesting that all these alternations can be subsumed under a single principle, viz. the well-known one of consonant weakening in syllable final position" (1974, p. 43). On p. 44 he goes on to state that "... it is clear that the value of the above mentioned principle depends on whether there can be given explicit (and not unnatural) principles of the location of syllable boundaries that can account for all of the above mentioned phenomena [consonant gradation and the behaviour of short /æ/ and /ə/; PMH] without giving rise to complications elsewhere in the phonology. This will be attempted ... below."

In this section, Basbøll's principles of syllabification, as formulated in his 1974 paper, will be evaluated both from the point of view of their explicitness and from the point of view of their naturalness.

In section 2.1 we shall discuss whether Basbøll's principles of syllabification are sufficiently explicit for their predictions to be compared with phonological data in SD, i.e. whether or not ambiguities may arise when they are actually applied to phonological strings; this discussion thus concerns neither the naturalness nor the motivation of Basbøll's principles. These matters will be discussed in section 2.2.

In the remainder of this paper the symbol $ designates a syllable boundary.

2.1 Are Basbøll's principles sufficiently explicit?

After discussing several factors (grammatical boundaries, initial and final segment combinations in grammatical units of different size, stress, surrounding vowels, sequence of consonants) which may interact in different ways in different languages to determine the location of syllable boundaries, Basbøll sets up a hierarchy of three principles "which seem, by and large, to account for the phonological syllabification in Danish" (1974, p. 82). These principles may be paraphrased as follows (but the reader should check this paraphrase against Basbøll's own formulations on p. 84-91):

(i) Let $'s coincide with grammatical boundaries before words, before stems, before stressed native suffixes, and before zero. If, by the application of this principle, any two consecutive syllabic segments have a $ between them, the string is syllabified; otherwise, proceed to (ii).

(ii) In all cases of two consecutive syllabic segments having no $ between them, mark off all the places where a $ can
occur without giving rise to a syllable-initial or a syllable-final cluster which is impermissible word-initially or word-finally, respectively; if there is only one such place, a $ is inserted at that place. If, by the application of this principle, any two consecutive +syllabic segments have a $ between them, the string is syllabified; otherwise, proceed to (iii).

(iii) In all cases of two consecutive +syllabic segments having no $ between them, insert a $ at the rightmost place marked off by principle (ii) if the second of the two +syllabic segments is shwa and in the leftmost place marked off by principle (ii) if the second of the two +syllabic segments is a "full" vowel, i.e. any vowel other than shwa, cf. below.

According to Basbøll, the application of these principles at the level of representation which is input to (the first of) the rules that have the syllable as their domain (or refer to a $ in their structural description) will supply the $'s needed by these rules with one important exception, viz. when a consonant cluster which contains a stop other than /g/ preceded by either a (underlyingly) voiced continuant or a nasal, occurs before shwa. In that case the syllable boundary goes before the stop" (p. 90).

It should be noted that stressed native suffixes comprise both suffixes with main stress and suffixes with reduced main stress (secondary stress) as e.g. -inde and -dom, cp. skuespillerinde ("actress") [s'nœstel'ens] and barndom ("childhood") [bœn dom']. It should also be noted that the unstressed native suffixes -ig ([i]), -(n)ing ([n]e], and certain occurrences of -isk ([i:s]) have shwa at the level at which syllabification takes place.

The following examples may illustrate the function of these principles: mados ("smell of cooking") and godhed ("goodness") are syllabified /mad$os/ and /god$hed/ (principle (i)); angre ("regret") is syllabified /æŋ$œa/ (principle (ii), cf. however, below); bade ("bathe") and fæg (a personal name) are syllabified /ba$dog/ and /i$æ$e/ (principle (iii)); verden ("world") and varten ("the landlord") are syllabified /ve$\$d$an/ and /ve$\$tan/ (the exception to principle (iii)).

Now, let us try to determine the meaning of the expression "principles of syllabification". Since they have the effect of changing phonological strings at a certain point in a generative phonological derivation, Basbøll's "principles" of syllabification must apparently be interpreted as informal descriptions of (the function of) a set of phonological rules which apply at a certain point in the generative phonological derivation, namely just before the (first of the) rules which have the syllable as their domain or which mention a $ in their structural description, (cf. Basbøll, 1974, p. 84). In other words, if the derivational machinery is to work, the principles must be spelled out as phonological rules with the combined effect of inserting $'s (hopefully) at the places where they are needed in order to take care of the above-mentioned processes (consonant gradation and vowel adjustment).

Taking for granted that principles (i)-(iii) can be translated (some way or other) to phonological rules, I find them explicit to the extent that the entities they refer to are well-defined. From that point of view principles (i) and (iii) are impeccable: the grammatical boundaries mentioned in (i) and the full vowels and shwa referred to in (iii) are reasonably identifiable at the level at which syllabification takes place, cf. Basbøll's careful descriptions (1974, p. 84-86 and p. 88-89).

The reference in principle (ii) to structurally possible word-initial and -final clusters seems also unambiguous in view of Basbøll's reference (1974, p. 87) to his own work on Danish consonant combinations (Basbøll, 1973a) for a phonotactic description allowing one to distinguish between structurally motivated and accidental gaps in the corpus of consonant combinations. But the phonotactic description given in Basbøll (1973a) concerns a level which presupposes that the $-dependent rules have already applied, cf. e.g. the existence on that level of segments like /\omicron\ysa/, and cf. Basbøll's explicit statement that "The terms "pre-" and "post-vocally" refer to the position in the syllable (the syllable division being in accordance with Basbøll (1972))." (Basbøll, 1973a, p. 110, footnote 2). The reference to Basbøll (1972) in this quotation is not of much help either, since the principles for syllable division given in that paper (p. 194) are "intra-level" principles, i.e. they state where the
I conclude that the clusters permitted word-initially and word-finally on the phonemic level (= the level which is input to syllabification) are such as would produce—through the application of syllabification and syllable final weakening—word-initial and word-final clusters permitted on the level described in Basbøll (1973a).

This means that Basbøll's principle (ii) in a way "looks ahead", i.e. its correct application is conditioned by the possible outcome of tentative applications of principle (ii) and (iii) and other later rules. This is neither circular nor meaningless as long as principle (ii) is only given as an informal description of the function of a phonological rule (or of a set of phonological rules), but as suggested above, such rules must probably be formulated in terms of the segments found at the level at which they apply, since the application of a generative phonological rule can only depend on its own structural description which, as far as I know, is an "intra-level" concept. This means either that the phonological rules corresponding to principle (ii) must refer (in their structural description) to possible word-initial and -final segments on that level or that the rules must refer directly to the segments found at that level, as Basbøll actually suggests (1974, p. 79); cf. also the formulations of $\text{-}insertion$ rules in other generative phonological works, e.g. Hooper (1972) and Vennemann (1972).

If the rules corresponding to principle (ii) are formulated in terms of the segments found at the level at which syllabification takes place (and this seems to be technically necessary, cf. above) they will, for instance, have to prohibit the potential syllabification /$\text{hau}g\text{a}$/ of the name Hauge [ˈhaʊɣa], since otherwise the output would be *[ˈhauɣa]], whereas they will have to allow the potential syllabification /$\text{alg}\text{a}$/ of alg [ˈalɡa], since otherwise the output would be *[ˈalɡa]]. These examples illustrate an important property of the whole strategy: Basbøll has decided that (most of) the phonotactic restrictions valid for consonants should be stated by reference to the phonological syllable and that they should refer to the segments occurring at a level at which "syllable final" weakening has already applied (this is one of his main claims in Basbøll (1973a)).
It is his task, therefore, to supply a syllabification which makes this possible, and this means that the insertion of $'s at a (slightly) higher level is functionally determined rather than structurally motivated from the point of view of the higher level.

In the following, I shall assume that the above-mentioned interpretation of principle (ii) is in accordance with Basbøll's intentions (otherwise one would need a reference to a phonotactic description valid for the phonemic (= pre-syllabificational) level). If this is correct it may be concluded that Basbøll's principles of syllabification are sufficiently explicit in the sense that their application to phonological strings do not give rise to ambiguities. In the next section we shall evaluate these principles from a more general point of view.

2.2 Basbøll's use of syllable boundaries

Basbøll's use of syllables and of syllable boundaries is of interest not only from the point of view of the generative phonological framework in which it was launched. Since it can also be seen as an interesting attempt to account for the distribution of surface phonological segments (see Basbøll, 1973c), it may be compared with other ways of dealing with the syllable in structuralistic and pre-structuralistic as well as in generative phonology and descendants of the latter trend, e.g. natural generative phonology. Since, however, this is not the place for a general discussion of the syllable, I shall confine myself to a few theoretical remarks concerning Basbøll's concept of the role of syllable boundaries.

It may be expedient to consider first Basbøll's motivation for referring to his syllables as "phonological" rather than "phonetic". The following quotation gives us the cue: "In some cases (e.g. Grùsse /grys:a/ the postulated syllable boundary may not coincide with the intuitively felt syllable boundary or with some experimentally established syllable boundary (or better: experimental data may seem to contradict the proposed syllable boundary). This may indicate that the syllable we are dealing with is a more abstract entity than the phonetic syllable, viz. a "phonological syllable". Nevertheless I dare use the term "syllable" since it is an entity which has, in Danish at least, exactly one phonological vowel and whose boundaries can be posited in accordance with some generally recognized principles for syllabification [roughly: principles (i) and (ii) above; PMH]" (1972, p. 193). This quotation and other passages of his clearly show that the "phonological" aspect of Basbøll's syllable lies in its being a descriptive device which need not be motivated by phonetic or typological "naturalness". In other words, Basbøll's phonological syllables (and, in particular, their boundaries) are primarily motivated by what they accomplish (together with the $-dependent rules), viz. by the fact that certain surface-near structural constraints may be economically stated by reference to them. Superficially, Basbøll's principles of syllabification and the later $-dependent rules may thus look like a rule conspiracy in Kisseberth's (1970) sense. The similarity is only apparent, however; postulating a set of rules which have the combined effect of rescuing some (real) surface constraint which is statable in terms of segments in their relation to each other and to independently motivated grammatical boundaries is very different from postulating a set of rules (like Basbøll's) whose application merely permits the description of some surface-near constraints by (direct or indirect) reference to "phonological" syllable boundaries which have, of course, no physico-phonetic (segmental) existence at all, but may, at best, in some cases (e.g. probably not in a word like bade ('bathe') ['ba:da]) correspond to psycho-phonetic syllable boundaries.

Incidentally, I find Basbøll's three-way distinction between "phonological", "phonetic", and "psychological" syllables and syllable boundaries (1974, p. 72-73) somewhat dubious. If "the fact that in German, word-initial vowels have a glottal attack, e.g. ein Esel ['ai in ?e: z I ] " is an example of "phonetic syllabification" (p. 74), then the terminology is at best confusing. In my view (and in my terminology), the interpretation of glottal stops in German as manifesting syllable boundaries is no less phonological than the interpretation of a Danish word like gade ('street') ['ga:d$a] as /ga:d$a/, but the former interpretation is obviously more concrete in the sense that the relation between perceptual data (which are conditioned by both physical and psychological factors) and interpretation is more direct.
In order to illustrate the theoretical status of Basbøll's "phonological" syllable it may be fruitful to compare it with two main trends in the use of syllables and syllabification by various phonologists: one of these is characteristic of glossematic theory and may be characterized as follows: once the number of syllable peaks is established at a certain level of representation, then boundaries may be inserted between them at places where the phonologist can use them to provide an economical description of the distribution of segments. In many cases, this gives the phonologist a high degree of freedom to distribute syllable boundaries (with the obvious restriction, though, that only one syllable boundary may be posited between two consecutive syllabic peaks). As is well known, this freedom is typically used (where possible) to insert syllable boundaries at places where they will split up intervocalic consonants or consonant clusters in a possible word-final + a possible word-initial consonant or consonant cluster, the need for making special statements about possible medial clusters thus being eliminated (cf. Basbøll's principle (i)). In cases where - at a certain level of abstraction - this can be done in several ways, the syllable boundaries are (whenever possible) inserted at such places as to make the manifestations of consonants on lower levels stable in terms of the position in the syllable (cf. Basbøll's principle (iii)). Within structuralistic schools this relatively free use of syllable boundaries often amounts to the postulation of phonemic syllable boundaries which may permit a reduction of the inventory of phonemes, cf. e.g. Hjelmslev's (1938) treatment of [z] and [s] in German as allophones of the same phone.

The other main trend is characteristic of natural generative phonology (Hooper, 1976; Kahn, 1976) and differs crucially from the first in that its syllables are inserted in phonological strings according to phonetically and typologically based hypotheses of natural syllabification of sequences of segments, leaving relatively little room for language specific deviations.

Basbøll's use of syllable boundaries is in important respects a compromise between these two conceptions: it resembles the former in that its motivation is primarily descriptive economy and in that relatively large freedom is allowed in connection with the placement of syllable boundaries, but it resembles the latter in that these syllable boundaries are nevertheless inserted by explicit principles which are translatable to phonological rules proper.

From the point of view of the latter trend, Basbøll's principles may be criticized on the grounds that some of his "phonological" syllables are definitely located at unnatural (or at least unexpected) places. This is true, in particular, of the syllable boundaries between, e.g. of certain other languages, which may be criticized on the following grounds: the placing of syllables as allomorphes of a word-final cluster + a possible word-initial cluster is well
motivated in languages in which any vowel may occur in any syllable. In Danish, however, there are certain restrictions in the inventory of vowels found in certain syllable positions, the most important restriction being that shwa does not occur in a word-initial syllable, and this means that principle (ii) becomes somewhat arbitrary: the idea underlying this principle would appear to be that the word should be regarded as composed of an integral number of syllables which are all potential words or minimal utterances. As is well known, such an analysis is not possible in all languages, either because any location of the syllable boundary would lead to a syllable-final or -initial cluster which is structurally excluded word-finally or -initially, as in Finnish, or because certain vowels (notably shwa) do not occur word-initially or word-finally. In Danish and German, shwa does not occur as the first segment of a word (in Danish shwa is even impossible as the vowel of the first syllable of a word). This does not mean that principle (ii) is completely arbitrary, of course; but the application of this principle to a language like Danish seems to be based upon the somewhat questionable assumption that the consonantism of a word is more relevant to potential divisions than its vocalism. Since e.g. the sequences [emne], [æ], and [ε] are all structurally excluded as word-initial segment combinations in Danish, neither of the syllabifications /bæ:jæ/ and /ba:dæ/ of the word bæde ('bath') ['ba:jæ' (which are both permissible as far as principle (ii) is concerned) are a priori more motivated from the point of view of Danish word structure than the syllabification /bæ:mm/ of the word emne ('subject') ['emne' (which is excluded by principle (ii))]. I do not deny the descriptive advantages of principle (ii) in its combination with certain parts of principle (iii); but the appeal to the conception of syllables as possible words implicit in principle (ii) is not straight-forward in a language like Danish, and if the structure of words must be used as a criterion for excluding certain locations of syllable boundaries, then the reason for considering consonants more important than vowels should be stated explicitly. As mentioned above, these remarks are not meant as a criticism of the descriptive value of principle (ii), and I only mention this problem because the tacit acceptance of principle (ii) is likely to conceal what I consider an important structural property of Danish words, viz. that they cannot always be regarded as composed of syllables which are potential words. Basbøll's (1972, p. 194): "Syllables always begin with a "full statement..." or with a possible word-initial consonant or consonant vowel" or with a possible word-initial consonant or consonant cluster..." must be a lapse, since it is incompatible with his statement later on the same page that "one intervocalic consonant belongs to the syllable of the preceding vowel if the following vowel is /a/...", but it may nevertheless reflect the above-mentioned neglect of the importance of vocalism in principle (ii).

Ad (iii). This principle is, of course, crucial for Basbøll's whole strategy. However, in addition to being responsible for the major part of the observational inadequacies which will be exemplified in the next section, it gives rise to some minor problems which ought to be taken into account in the evaluation of Basbøll's syllabification. The postulation of principle (iii) was inspired, I think, by four important facts of Danish surface phonology:

1) the inventory of word-final consonants is identical to the inventory of single intervocalic consonants occurring before shwa; 2) the inventory of word-initial consonants is identical to the inventory of single intervocalic consonants occurring before a full vowel. 3) /a/- and /o/-adjustment invariably take place when the vowel of the following syllable is shwa and when the /a/ or the /o/ is the last vowel of a word. 4) consonants with phonetic std-basis, i.e. [m n j r ε y], may receive the std irrespective of whether they are followed by shwa or word boundary. Thus, by postulating that the syllabic boundary goes to the right of a single intervocalic consonant if it is followed by shwa and to the left if it is followed by a full vowel, the need for making special statements about single intervocalic consonants is eliminated. The descriptive advantage of this is obvious, and the principle of locating the syllabic boundary to the right of (at least some) consonants before shwa can be traced back at least to Ælmslev (1951) and has also been adhered to in many Danish dialect monographies (e.g. Juhl Nielsen (1968)). In most Jutlandic dialects, this sort of description is even more motivated than in SD because in these dialects the gradation series k-g-y and t-d-ø are paralleled by the labial series p-b-p.

Thus, the description of single intervocalic consonants before shwa as syllable final and also the description of single
inter-vocalic consonants before full vowels as syllable initial must be given credit for a certain elegance.

The situation is somewhat different when it comes to inter-vocalic consonant clusters. In the case of clusters before stress, it is clear that it is the behavior of only certain of these which has lead Basboll to locate the $ as far to the right as permitted by principle (ii) instead of locating it, say, to the right of the first inter-vocalic consonant (which would cover the case with single inter-vocalic consonant as well): by locating the $ as far to the right as possible it becomes possible to absorb the behavior of stems preceded by obstruents and /g/ preceded by sonorants to their position in the syllable in the same way as with single inter-vocalic stops and /r/. In all other cases, however, there is no descriptive motivation for preferring the rightmost location of the $ compatible with principle (ii) rather than the location one segment to the left of that position; as a matter of fact, the latter location would in most cases be preferable from the point of view of naturalness. Thus, the only motivation I can see for syllabifying a word like salme "hymn" /salma/ rather than /salma/ is economy of formulation: from a purely descriptive point of view, such a syllable boundary will do no harm within Basboll's framework, and it permits principle (ii) to be formulated in a simple way; but it has no function whatsoever, and it is such syllable boundaries and also the fact that clusters containing a sonorant + a stop other than /g/ must be exempt from principle (iii) which makes Basboll's whole strategy less convincing. Consider, e.g., the derivation of the words Haug (personal name), Frake ("seaweed"), and Malke ("milk" (vb.) (starting with the Level which in input to syllabification (the "phonetics" level); [i] is here derived from /\w/ is immaterial in the present context whether it should be derived from /w/ instead, cf. the discussion in section 3 below. The semicolons denote the potential locations of syllable boundaries marked off by principle (ii):

It is a good illustration of Basboll's strategy that the similar clusters /vg/ and /vk/ are divided in the same way but for different reasons, i.e., according to two different principles, whereas the equally similar clusters /lg/ and /lk/ are divided in different ways according to one principle, viz., principle (ii) its exception. Having chosen beforehand to absorb the pronunciation of /g/ to its position in the final part of the syllable, Basboll must claim that /g/ is final in Haug and Belke's syllabification rules accordingly.

The above-mentioned drawbacks may not be too serious, after all. At least their significance depends on one's conception of the function of syllabification and the factors determining syllabification. If their observational adequacy can be considered satisfactory, Basboll's principles of syllabification must be considered an interesting attempt to account for consonant gradation and vowel-adjustment.

In the next section we shall see, however, that certain surface phonological facts of SD are incompatible with Basboll's description.
3. Are Basbøll's principles successful?

Since we concluded above that Basbøll's principles of syllabification are sufficiently explicit to be empirically interpretable, we are now in a position to confront their effects with surface-phonological data from SD to see whether they are observationally adequate in the Chomskyan sense.

First, however, the following remarks should be made: It was natural for Basbøll to emphasize the impressive lot of data which are accounted for by his hypothesis (and which, of course, inspired him to formulate that hypothesis) and to leave it to others to search for data which are not. [Data of the first kind can be found in Basbøll (1972 and 1974).] The data to be presented below belong to the latter category. Such data have not, to my knowledge, been published before (at least not from the point of view of being counter-examples to Basbøll's findings), and I therefore consider them relevant to an evaluation of the empirical success of Basbøll's syllabification principles, e.g. they may give rise to questions like the following ones: are such data sufficiently marginal to be ignored? if not, can Basbøll's principles of syllabification be amended to cover these facts without becoming extremely ad hoc or without entailing more complications than they were invoked to remove?

The validity of many of the examples in this section depends on the following assumptions concerning Basbøll's descriptive framework (as outlined in Basbøll (1973a, 1973b, 1973c, and 1974):

1. Non-alternating as well as alternating occurrences of [γ δ θ] are derived from /g d r v/ (the alternation v-g raises special problems, though, cf. below). The correctness of this assumption - which is only crucial from a generative viewpoint for the validity of some of the types of counter-examples mentioned below - can be inferred from several passages in Basbøll's writings, cf. e.g. his examples of exceptions to principle (iii) (1974, p. 90) from which it can be seen that e.g. a word like aige (ˈæiɡə) contains a stop /g/ at the level which is input to syllabification ([γ] does not alternate in the morpheme in question). Anyway, since Basbøll's principles of syllabification are also meant to be part of a structuralistic description of Danish phonology, cf. in particular, Basbøll (1973c, p. 32), it cannot be decisive, at least in such a description, whether or not certain segments alternate. Since the phonemic level in such a description seems to be identical - as far as the inventory and arrangement of segments is concerned - to the level which in a generative phonology is input to the syllabification rules, I shall refer to such a level as the phonemic level except in certain cases where the generative aspect calls for special comment.

2. Possible word-initial and -final consonant clusters are those described in Basbøll (1973a) (note especially that /v/ and /vŋ/ are taken to be structurally possible word-initial clusters).

3. The "syllable final weakening processes" comprise the consonant gradation phenomena mentioned in Basbøll (1974, p. 42-43) and the manifestation of /v/ as [y] after short vowels, cf. Basbøll (1973c, p. 32) (on the relation between [v], [u], and [ŋ], however, cf. below). Note especially that homomorphic [ŋ] and [ŋŋ] are both taken to manifest /ŋg/, [ŋ] being the syllable final manifestation.

4. The manifestation of /g/ after homosyllabic vowels and non-nasal sonorants is [γ] in conservative standards, whereas it is [ŋ], [ŋ] or zero in younger standards (cf. also below).

5. The types of morpheme boundaries obligatorily coinciding with syllable boundaries are those mentioned in principle (i) above.

The correctness of these assumptions can be inferred from Basbøll's writings on Danish phonology (cf. the references above), and I only mention them explicitly, because they are crucial for many of my counter-examples. In some cases, however, some (parts) of these assumptions will be further discussed.

It should be noted that Basbøll's principles "should ... be taken as exemplifying the preceding discussion [of various grammatical and phonological criteria for syllabification; PMH] rather than explaining the location of every syllable boundary in Danish" (1974, p. 83). Thus, if e.g. some of my examples depend crucially on the restricted list of boundary types given in principle (i), this is not in itself fatal to Basbøll's general strategy: Basbøll's principles are tentative (as he himself remarks) and to a certain extent independent of his general use of syllabification.

In other words, some of the following types of examples do not per se seriously undermine Basbøll's syllabificational strategy,
but they are all problematic in some way or other if principles (i)-(iii) are interpreted rigoristically.

Many of the examples in this section are foreign words and proper names. However, I do not think that this can be used as an argument against their validity as counter-examples to the predictions of Basboll's principles: most of the material used by Basboll himself to illustrate the dependence of his syllabification upon the distinction between "full" vowels and shwa consists of foreign words and proper names (like Amanda, Hulda, Gerda), and it is one of the main claims in Basboll (1972) that it is the presence of full vowels in posttonic syllables, not e.g. a deviant syllabification, which signals a foreign word structure, a view which I fully share.

The structural types which are problematic in connection with Basboll's principles of syllabification fall into several groups:

(2) Most words in which, according to assumptions (i) and (3) above, one of the phonemic clusters /vj/ or /v/ occurs between a (preceding) short vowel and a (following) full vowel which belongs neither to a stressed native suffix nor to one of the suffixes -ing, -ig, and -isk. Since a $ before any of the clusters in question would yield a structurally possible word-initial cluster, and since they are followed by a full vowel (not derivable from shwa), the application of principles (ii) and (iii) will place the $ before these clusters; they will accordingly be treated as syllable-initial, and the syllable-final weakening rules will not apply to them, but in the following words the intervocalic clusters are pronounced with a "weak" first member, i.e. the pronounced clusters are [v̪j̪ u̠ v̠]: Sovjet ("Soviet"), aura ("aura"), aurikel ("auricula"), aurora ("aurora"), Laura, Laurids, Europa, manœuvre ("manoeuvre" (vb.)), Furiipides, Povla, Paulus, Aulin (name of a firm), Aula ("aul", "hall"), paulun ("tent", "pavilion"), prosvjet ("bootee"), Pauline.

To be sure, the validity of these words as clear counter-examples to Basboll's predictions is disputable: they would be more detrimental to Basboll's syllabification if their [u̠] were

1) But note that Sovjet and manœuvre may also be pronounced with [vi] and [v̠], respectively, i.e. in some words [v] and [u̠] are in a kind of free variation.

in alternation with [v], but this is not the case in the words above, and I am not sure that examples of alternations between [v] and the [u̠] of homo-morphic [u̠]-, [u̠]-, and [u̠]-clusters can be found. The significance of the above examples of [u̠]-clusters thus hinges upon two assumptions: a) that they are derived from /vC/-clusters, and b) that [u̠] is the manifestation of /v/ in the final part of the syllable, cf. assumptions (1) and (3) above. Although this seems to be Basboll's position (1973b, p. 42), his suggestion (1973c, p. 76ff) that [v̠]-diphthongs before homo-morphic obstructions (e.g. in a word like sove ("sauce") [sau̠'s]) be derived from underlying /vu/ could probably easily be generalized to comprise all occurrences of non-alternating [u̠], and in that case the words above would not be counter-examples. I nevertheless think they are worth mentioning, since Basboll's principles of syllabification are clearly relevant to a structuralist interpretation of [v] and [u̠] as allophones (syllable initial and -final, respectively) of one phoneme (/v/). Even under this analysis, however, the intervocalic [u̠]- and [u̠]-clusters before full vowels might be considered marginal. They are listed here because /v/ and /v̠/ are considered possible word-initial clusters in Basboll (1973a), cf. also the (foreign) names Vladimir and Vietnam. (The pronunciation [sin'vi̠d̠] of Sovjet is, of course, in agreement with Basboll's predictions.)

In short, what the examples with intervocalic [u̠] (at least those with [u̠]) actually show is that if Basboll's machinery is to work, then either [u̠] cannot be derived from /v/ in such cases (phonemically speaking: [u̠] and [v] cannot be interpreted as allophones of the same phoneme) or the distribution of [v] and [u̠] cannot be accounted for by reference to their position in the syllable. Basboll's own suggestion that [u̠] be derived from /v/ (phonemically speaking: that [u̠] be the postvocalic allophone of /u/ (at least after short vowels; after long vowels the situation is more complex) would probably be a satisfactory solution of this problem. /v/ would then simply be defectively distributed (it would not occur after a homosyllabic short vowel), and there would be no discrepancy between the behaviour of the intervocalic consonant cluster in lîvřé ("livery") [l̠'v̠r̠e] and e.g. manœuvre ("manoeuvre" (vb.)) [m̠n̠'v̠r̠u̠] (these words would be understandingly and/or phonemically /l̠v̠r̠e/ and /m̠n̠'v̠r̠u̠/, respectively).
But of course, a rule which de-syllabifies postvocalic /u/ would have to be postulated.

(II) Some words in which the phonemic clusters /gr gl gn gv/ occur in environments like those mentioned under (I) above; although principles (ii) and (iii) will insert a $ before these clusters they are pronounced with a weak first member ([y] or, in younger standards, [j] or [i]) according to the specific context: Sigrid, Ægir, Ragna, kognitiv ("cognitive"), inkognito ("in-cognito"), magnet ("magnet"), Magnat ("magnate"), stagnerre ("stagnate"), stagnation ("stagnancy"), magnium ("magnesium"), magnesium ("magnesia"), magnatum ("big-"), sphagnum ("peat moss"), Magnum, Agnete, Pøgni, (Sigvald, Sigvard).

Most of these examples are clear counter-examples in those conservative standards in which postvocalic written g is pronounced [y] in the words above. (In some very conservative standards the pronunciation [ø] is possible for intervocalic written gn in these words, cf. e.g. Hansen 1956, p. 82.) In such standards, the words magnet, etc. are counter-examples of the type illustrated in (IV) below. In most younger standards, however, the words with intervocalic written gr, gl, gn, gv contain (non-alternating) [yc]- and [yc] Clusters, and if, in these standards, such words have underlying /yc/ and /yc/, then the words with [yc]- and [yc] Clusters are definitely not valid as counter-examples, since /yc/ and /yc/ are impossible word-initial clusters; furthermore, the remarks above (concerning non-alternating [yc]-Clusters) will, in these standards, apply to the words in which written gr and gl are pronounced [y] and [y].

If, however, these words contain underlying (phonemic) /yc/ Clusters (and within Basbøll's framework this seems inescapable in standards with surfacing [y]) they are incorrectly processed by Basbøll's rules, since the $ will be located before the /yc/, whereas words like agrar ("farmer") [æ'gwald] and agglomerende ("agglutinating") [æ'gglutineð] are in agreement with Basbøll's treatment. The pronunciation of the words prognose ("prognosis") and diagnose ("diagnosis") is of particular interest in this connection. These words may be pronounced [poo'gnose] and [di'agnose] respectively. Within Basbøll's framework, these pronunciations could be due to two different interpretations: 1) a "pre-stem" boundary may be felt by some speakers to occur before /g/ (this would be etymologically "correct"), or 2) the Basbøll's principles will locate the syllable boundary before /g/, albeit for different reasons. In standards with [y], however, the pronunciations [poo'gnose] and [di'agnose] are by no means rare. It is tempting to assume that the pronunciations with [g] in the latter ([y] standards reflect the bi-morphemic analysis whereas the pronunciations with [y] represent the mono-morphemic analysis which leaves the syllabification to be determined by purely segmental criteria. Anyway, the pronunciation with [y] can hardly be compatible with a morpheme boundary before this [y]. It should be mentioned that the pronunciations [poo'gnose] and [di'agnose] are also common.

The proper names Sigrid, Sigvald, and Sigvard are parenthesized because a morpheme boundary (of the "strong" kind mentioned in principle (i)) might be postulated to occur after Sig-, cf. names like Ingrid, Thorvald, and Edvard, but they are of interest because they are probably the only existing words with inter-vocalic [y] and [y] before full vowels, and it is not unlikely that such clusters could be freely introduced in Danish mono-morphemic words (this question concerns the descriptive (predic-tional) adequacy of Basbøll's principles); it seems inescapable that the other words are incompatible with Basbøll's analysis, at least if they are pronounced with [yc]-Clusters.

(III) Some words with postvocalic /dj dr dv/ before a full vowel: Gudrun, Eidvin, Edvard, Kiddrian ("clumsy person") and some words of Latin origin with the Latin prefix ad-, e.g. adjuvant ("adjoiner"), adjektiv ("adjective"), advokat ("lawyer"). If these words are to be processed correctly by Basbøll's rules, a $ must be inserted after /d/ in order to generate the pronunciation [d] of this phome, and this must be taken care of by principle (i), since principles (ii) and (iii), if allowed to apply, would locate the $ before the /d/ (for the reasons mentioned above). This means that a transparent morpheme boundary (rigoristically: a morpheme boundary belonging to one of the categories mentioned in principle (i)) must be postulated to occur after /d/. As for the latter type (with ad-) one can, of course, claim that such a boundary exists, but the transparency of such a morpheme boundary to other than linguists or latinists
is highly questionable in cases where the "stem" does not occur in isolation (or in combination with other "prefixes") and/or the ad- is not interpretable (to the naive speaker) as a prefix, cf. that there are no such "stems" as *jektiv, *judant, *vent, *vokat. If such a morpheme boundary is nonetheless postulated in order to rescue Basboll's principles, then it will be difficult to explain why there is apparently no such boundary if the Latin stem begins with a vowel as in adoptere ('adopt') [adɔpbot], adept ('adept') [a'dept], adoptere ('adopt') [adɔpbot]. It is tempting to assume that the pronunciation of written d as [d] or [l] in such words is conditioned by purely phonological, i.e. non-grammatical, criteria.

The word adøkvat ('adequate') is particularly instructive in this connection. This word is pronounced [adə'kvat] by some people (primarily, I think, by people who are not aware of the fact that from a Latin point of view it is morphemically complex). However, those who use this word actively and frequently almost always pronounce it with [ə]. This may in some cases be due to a morphemic analysis, but it is highly significant that the pronunciation of the written d as [ə] in this word is often correlated with the pronunciation [a] of the following written a, i.e., [a'də'kvat] (at least there seems to be no opposition between [ə] and [a] in such a context). This pronunciation is quite regular if no morpheme boundary is felt to occur after /d/.

As for the words Gudrun, Edvin, Edvard, and klokdian, I would not claim that the postulation of a (transparent?) morpheme boundary after /d/ is entirely ad hoc, cf. words like Gudmund, Ervin, Sigurd, dumrian ('stupid person'), grimrian ('ugly person'); but the addition of such types of morpheme boundaries to the categories listed in principle (i) obviously makes Basboll's whole strategy considerably more complicated and less attractive, and like the words with intervocalic [ɵ] and [y], such words are of interest to the descriptive adequacy of Basboll's principles.

(IV) Words like jonglere ('juggle'), jongler ('juggler'), Ingrid, pingvin ('penguin'). At the level which is input to syllabification, these words must apparently contain the intervocalic clusters /ngl ngr ngv/ since the only source of [ə] within Basboll's framework seems to be an underlying nasal followed by /g/ or /k/, the post-nasal /g/ being deleted (via lenition to [y]) in the final part of the syllable. (It is possible that the nasal is at that level already specified as velar; anyway, the rule that velarizes a nasal before /k/ and /g/ seems to have a domain larger than the syllable, but it must at least apply before the syllable-final deletion of post-nasal /g/, and this means that /g/ must be present at the level at which syllabification takes place.) Since these words are normally pronounced [ŋɡviən], [ŋɡviən], [ŋɡviən], [ŋɡviən], the $ must be inserted after /g/, but principles (i) and (iii) will (for the reasons mentioned under (I) above) insert it before /g/, thus yielding [ŋɡviən], [ŋɡviən], [ŋɡviən], [ŋɡviən] as the final output. (Of these pronunciations at least [ŋɡviən] and [ŋɡviən] are hardly ever heard; the others are possible (according to ODS) but extremely rare, as far as I know.) To state the problem in nuce: it is difficult, within Basboll's framework, to account for the fact that a word like lingvist ('linguist') [lɪŋvɪst] has a pronounced [g] while a word like pingvin has not.

(V) In words like gamma (name of the Greek letter), Hammurabi, Kamma, mammon ('mammon'), mammut ('mammoth'), Abba (name of a popular Swedish song group), Pablo, kappa (name of the Greek letter), Afrika, (akkumulator) ('accumulator'), akkurat ('accurate'), Malacca, Bacchus, khaki ('khaki'), (akkvavit) ('aquavit'), Jakoh, Ajax, Naja, the first and/or stressed vowel is [a] in my speech and also in the speech of most other speakers of SD (I have interviewed a few speakers of Copenhagen Standard Danish with this in mind and asked my phonetician colleagues), and words like gummi ('rubber') and Gunna are invariably pronounced [ɡum] and [ɡuna], as far as I know. Within Basboll's framework these pronunciations would presuppose a $ after the (first) intervocalic consonant, but the principles of syllabification will place it before the (first) intervocalic consonant (for the reasons mentioned under (I) above). Although some words of this type vacillate between [a] and [a] (in my material, this seems to be true of the parenthesized words), I think there is sufficient evidence that the correlation in CVCV,VCV-structures between frontness (acuteness) of /a/ before an intervocalic non-coronal (grave) consonant (or before an intervocalic consonant cluster whose first member is non-coronal) and the presence in the following syllable of a full vowel is not so high as Basboll seems to presuppose. This
is particularly significant in cases where the intervocalic con-
some is an exclusively "syllable-initial allophone", i.e. [p] or [k], if akwa is pronounced [auwa'old] as seems to be the
normal case, then the domain of /a/-adjustment must be larger
than the syllable (but smaller than the word, cf. below). In-
cidentally, Basboll mentions this particular problem (1974, p.
67); he interprets such cases as a symptom of a phonological
change in progress, the /a/-adjustment rule being in the process
of enlarging its domain. This may be true (although I am some-
what sceptical about his claim that the pronunciation [pa'dip] is
a new phenomenon (to the extent that it occurs)), but the im-
portant thing is that if /a/- and /o/-adjustment (cf. the ex-
amples yam and yam above) do not have the syllable as their
domain, then two important arguments for Basboll's syllabifica-
tion are seriously weakened.

(Vx) Words like Harry, Lorry, karry ('curry'), sherry
('sherry'), barrie ('barrier'), terra-cotta, pariet ('parrot'); Karonga are hardly ever pronounced with the con-
sonantal, "syllable-initial" allophone [u] of /r/ as predicted by
Basboll's rules (which will treat the /r/ as syllable initial).
For disjunctural conditions on the pronunciation of etymological
/r/, see Brink and Lund (1975, p. 261f). One could, of course,
claim that the unstressed, posttonic [i] in sherry, pariet, etc.
is /er/ at the level of syllabification. cf. the above strategy is
used by Basboll to account for the unstressed suffixes -er,
-eler, and certain occurrences of -er (1974, p. 68), but still
the trouble with postonic [y], [o], and [a] make trouble.

(VY) The words Canada, Malaga, Paludan, Annum (annual
grant'; kogna ('brandy') are to my knowledge invariably pro-
nounced [kan'edə], [ma'læɡa], [pal'udan], [an'um], [kan'sa]j]. If,
for a moment, we ignore the stød, their segmental structure after
syllabification must be /kan'edə, ma'læɡa, pa'ludan, an'um, kan'sa]/, according to Basboll's principles, and this syllabifi-
cation raises serious problems for the stød, as far as I can see.

Basboll considers the stød to be a syllable prosody which
is assigned to certain syllables by rule (1974, p. 461f), but it
is far from clear, where, in the generative phonological deri-
vation, the stød assignment rule is meant to apply; nor is it clear

how it applies. In Basboll (1974, p. 53) a stød assignment rule
(applicable to words of the type represented by the words above)
is formulated thus:

$$S \rightarrow [+\text{stød}] / - (SS) $$

Does the symbol S in this rule refer to a syllable complete with
peak and boundaries? Apparently not, for in his general dis-
ussion of syllabification Basboll states that "...where the syllable
functions as a unit in phonological rules (i.e. typically in rules
concerning prosodic features like stress, tone, and stød...,) sylla-
bification is not required for the correct application of the
rules: what is necessary is only that the number of syllables be
known; and this information can possibly be given with an identi-
fication of the syllabic peaks" (1974, p. 68). I take this and
other passages of Basboll's to mean that an abstract stød-prosody
is assigned (at a relatively early step in the derivation, at least
before syllabification) to certain syllabic peaks. The manifesta-
tion of the stød, as a glottalization of the first segment after
the syllabic peak if this segment is sonant (including the final
part of a (phonetically) long vowel), must, however, be taken care
of by a later rule which must be ordered after syllabification and
syllable final weakening, since, otherwise, words like Anger (a
personal name) ['æŋ'ə] and åder ('venom') ['a'də] could not be
realized with stød (before syllabification): the postvocalic segment
would be an obstruent ([g] or [d]) which cannot receive the (pho-
netic) stød). A word like Malaga thus has the segmental struc-
ture /ma'læɡa/ when it is input to the stød manifestation rule, and
this means that such a rule will have to disregard the in its
structural description (or, within Basboll's framework, its domain
must be larger than the phonological syllable), since the syllabic
initial /l/ is the stød segment. Although such an arrangement of
rules would generate the correct output, I sincerely doubt that
such consequences are, in accordance with Basboll's intentions:
it is hardly meaningful to claim that the stød is a property of
the syllable if it is first assigned to an entity (the syllabic
peak) which may be smaller than a syllable and then specified, by a later rule whose domain is larger than the syllable, as glottalization of a segment which in words like those above belongs to the following syllable. If the conception of the stød as a syllable prosody is not discarded, then it seems inescapable that words like those above must be listed as exceptions to principle (iii).

We shall now take an overall view of these counter-examples and try to evaluate their importance both from the point of view of Babøll's syllabificational strategy and from the point of view of Danish phonology in general.

Let us consider first the types (i) - (iv). These types have three things in common: a) they contain an intervocalic consonant cluster which on the phonemic level is a possible word-initial cluster (or better: the location of a $ before such clusters would give rise to a syllable initial cluster which is possible word-initially); b) there is no (transparent) morpheme boundary between their first member and the following full vowel (at least this holds true in the majority of cases); c) they are followed by a full vowel. What is at stake here is thus that part of principle (iii) which locates the $ in the leftmost position compatible with principle (ii), before a full vowel. From the point of view of Danish Phonology, the significant thing about this part of principle (iii) is that it amounts to postulating that a) in homomorphic VICIC2V2-structures where V1 is a short vowel, where V2 is a full vowel, and where C1C2 is one of the phonemic clusters /vj vr vl/ gj gr gl gn gv dj dr dv/, these clusters must be manifested as [(vj ve vl) gj ge gl gn gv dj dr dv], respectively, and b) in homomorphic V1ngC2V2-structures /nj ngr ngl ngv/ must be manifested as [ngj ngg ngl ngv], respectively. The above examples show that this does not hold true in all cases. It is obvious, however, that these structures are not of equal importance. As mentioned above, the examples with intervocalic [vj ve yj] before a full vowel need not per se be detrimental to Babøll's analysis, and I shall not discuss this type further here, since the analysis of labials poses special problems which are, at least in part, irrelevant to Babøll's principles of syllabification. They are therefore parenthesized above. Of the remaining clusters, some could perhaps be discarded as marginal or not even valid as counter-examples: the only examples I have found with "unexpected" manifestations of phonemic /gr/- and /dr/-clusters are Sigrid and Gudrun which might be analyzed as morphemically complex (quasi-compounds or the like) and the same may be said of /ng/ in Ingrid. The /Cr/-clusters are nevertheless of some interest, because they — like the remaining clusters — have some bearing on the question of possible contrasts between consonants in medial clusters before full vowels, and in the following discussion the relevant /Cr/-clusters will be discussed along with the remaining ones (including the /(n)gj/-clusters for which I have found no counter-examples. The only example with this cluster I can think of is the name Ingiáld which, to my knowledge, invariably pronounced ['eŋgai̯l] in accordance with Babøll's predictions). The behaviour of these (phonemic) clusters gives rise to the following questions: (1) in the homo-morphemic structures VICIC2V2 where V1 is a short full vowel, where C2 is one of the non-syllabic segments [u i a n v], and where V2 is a full vowel, is there in position C1 a contrast k-g or a contrast g-γ or perhaps a three-way distinction k-g-γ? (2) in the structure VICIC2V2 where V1 and V2 are specified as above and where C2 is one of the non-syllabic segments [i u v], is there a contrast t-d or a contrast d-s or perhaps a three-way distinction t-d-s?

My answers to these questions must be split up in the following way (and these answers must be considered tentative hypotheses rather than established truths):

A. The velars.

a) There is a contrast k-g before liquids followed by a full vowel, cp. mikroskop (microscope), lukrativ (lucrative), acryl (acrylic), cyklamen (cyclamen), cyclon (cyclone) [mikros'kopl̩ ˈlukrətiv ˈækryl ˈsiːkləmən ˈsiːklən] vs. agrar (farmer), hygrometer (hygrometer), agglutinender (agglutinating), Tekla, Hekla [a'gjorə ˈhigɹəmətəɾ əˈɡɡlutɪnəˌnɛlnəʊə ˈtekla ˈhekla]. The status of [γ] in this context is uncertain, cf. the names Sigrid and Berglum.

In di-syllabic trochaic mono-morphemic words, postvocalic [kt] seems to be excluded, cp. the words Hekla, Tekla, cyklus (cycle) (with [g]); it would be interesting to test whether naive speakers of the conservative variant of SD with surfacing [γ] would pronounce a fancy name like *Ragla as [ˈrægʃa] or [ˈrægʃa]. (My own variant of SD which has a distinct Jutlandic flavour) belongs
here, and I would not hesitate to pronounce this word as ['sayja]. It will be discussed below whether such trochaic di-syllabic words (or parts of words) can in any sense be considered phonological units of structural significance.

b) There is a contrast g-y before [n] + full vowel, cp. teknik ('technique'), strykvin ('strychnine'), teknikum ('technical school'), ignorant ('ignorant') [tg'niq, s'dyq'n'in, 'tgnikom, ign'oa'n'd] vs. magnet ('magnet'), magnat ('magnate'), magnium ('magnesium'), lagen, lagny [m'aq'ni, m'aq'ni, m'aq'niq, r'ayn, s'dyq'] [k] is excluded in this context. These structures are thus clearly at variance with Basboll's principles.

c) There is not much material on which to base a hypothesis concerning the behaviour of velars between a short vowel and [v] or [i] + a full vowel. It would seem plausible, though, to disregard the names Skovard, Sigvald and to postulate that there is only a contrast k-g in this context, but it is questionable whether [k] is possible in this context in trochaic words (personally, I would pronounce a fancy word like *mokva as ['mokva]).

B. The alveolars.

a) Before [s] there is a contrast t-d, cp. nitroglycerin ('nitroglycerine'), nitrat ('nitrate') ['nitrogl'y'sin, ni'tratd] vs. hydrogen ('hydrogen'), hydrat ('hydrate') ['h'ydrosge:n, h'ydatsa:d].

b) Before [i] the material is sparse. The names Katja and Nadja need not be distinguished (except of course through their initial consonants), but if they are, it is definitely as ['katja] vs. ['nadija]. Very few, if anybody, would pronounce the latter name ['nadija]. A few speakers of Copenhagen standard Danish whom I have interviewed with this in mind would tend to pronounce both names with ['adija] but could distinguish them (in the above mentioned manner) in careful speech. The words adjektiv and, in particular, adjunkt and a few more pose the problems discussed under (III) above.

c) Before [v] the situation is probably somewhat different. It is not unlikely that the contrast is d-d (cf. (II) above), and that [t] is excluded at least in trochaic words.

I conclude that the behaviour of at least the clusters /kn/ and perhaps also /kl/ is at variance with Basboll's principles (note, e.g., that cyklist ('bicycle rider') is normally pronounced ['syklis] (the pronunciation ['syklis] given in

ops is extremely rare, as far as I know); this would presuppose phonemic or underlying /sy'gli:s/, but the basic forms cykel, cyklen ('bicycle', 'to ride a bicycle') are pronounced ['sygel, 'sygel], presupposing underlying /sykel, syklen/). If Basboll's principles are to be amended to cover such facts as the manifestation of /gn gl/ they would probably have to be made sensitive to stress and to the sequences of intervocalic consonants per se.

If the absence of aspirates in many of the above mentioned structures is not accidental, this ought somehow to be stated in a phonology of SD. Within Basboll's generative framework, such restrictions would probably have to be stated as morpheme structure conditions: a word like bekneb ('trouble') [be'knæb] shows that the absence of [k] in words like teknik and strykvin is not due to word structure conditions; but in trochaic structures, the absence of aspirates might be due to such word structure conditions. I have not discussed the labial stops in this connection because they do not participate in the gradation process, except in a few words, under specific phonological and stylistic conditions, cf. Basboll (1975), but it is highly significant that in di-syllabic trochaic words there is probably no contrast of aspiration in the context Vl(-long)_CV2 in labial stops either, irrespective of whether V2 is a full vowel or shwa, cf. that the name Pablo must be phonemically /'pablo/ within Basboll's framework (just as teknik, teknologi, cyklus must be /tEgnik, tEgno'lgi, 'sy'lus/).

The examples in (V) above show that the distinction between full vowels and shwa is not decisive for the behaviour of /a/ and /o/ in the preceding syllable, or rather: even though /a/- and /o/-adjustment before the relevant consonants invariably takes place when the vowel of the following syllable is shwa, it also takes place in many instances when the following vowel is a full vowel. It is probably significant that in most of these cases (e.g. in almost all the examples listed in (V) above), the full vowel is unstressed (see also Brink and Lund (1975, p. 73)). This is also characteristic of the full vowels before which /r/ is treated as "syllable-final", cf. (VI) above.

The words with stød in segments preceding a full vowel (cf. (VII) above) also seriously weaken Basboll's claim that the distinction between full vowels and shwa is a (directly) conditioning factor with regard to syllabification, at least if the stød is said to belong to the syllable.
The words pingvin and jonglør (vs. linguist), cf. IV above, give rise to a particular problem: within Basbøll's framework the only way to account for this distinction seems to be to accept /n/ as an underlying (phonemic) segment distinct from velar obstruent.

In this section I have only mentioned problems which are not mentioned by Basbøll. I have thus omitted the problems posed by words like ordne ('manage') [ordon] and tordne ('thunder' (vb.)) [tordan], but Basbøll's suggestion that they are underlyingly /ordan/ and /tordan/ (1972, p. 200) seems to me somewhat ad hoc; the late shwa-deletion required by such an analysis is not motivated by Danish word structure, cf. vordende ('prospective') [vordan]. In fact, I would find it much more meaningful to claim that the words orden ('order') and torden ('thunder (storm)') [tordan] from which the verbs ordne and tordne are derived have underlying /ordan/ and /tordan/ with phonologically motivated shwa insertion (no Danish word can end in [Vdn]), whereas the verbs do not need such a rule.

4. Concluding remarks

We may conclude that although Basbøll's attempt to account for consonant gradation and vowel adjustment by reference to "phonological syllables" is in many respects empirically successful, there are quite a few phenomena which cannot be adequately described within this framework unless his (admittedly tentative) principles of syllabification are considerably modified. Although many of the counter-examples mentioned above may be considered marginal in the sense that they are lexically sporadic, I think that most of them are phonologically significant, and at least they give rise to some interesting questions concerning Danish word structure.

As mentioned in section 1, the aim of this paper has been the modest one of pointing to some problematic consequences of Basbøll's principles of syllabification. This may seem somewhat unconstructive, but I have nevertheless refrained from discussing whether or not Basbøll's principles could or should be amended to cover the above-mentioned phenomena, because such a discussion would require theoretical considerations (concerning, among other things, the functional and structural status of the syllable) which could be only superficially dealt with within the scope set for this paper.

For the sake of clarity, I shall recapitulate what I consider to be the main results and perspectives of my investigation.

1) It is doubtful whether both vowel adjustment and consonant gradation can be satisfactorily accounted for by reference to phonological syllabification in Basbøll's sense, even if syllable boundaries are inserted quite arbitrarily, cf. the examples in (V) above.

2) In homo-morphemic strings with intervocalic clusters there is a contrast gn-yn irrespective of whether the following vowel is a full vowel or shwa (in younger standards, this need not be a problem for the observational adequacy of Basbøll's principles of syllabification, but it ought to be stated somehow in any phonology of SD that [kn] is systematically excluded in such positions).

3) In di-syllabic trochaic words, the occurrence of intervocalic clusters of the type aspirated stop + sonorant (probably apart from [I]) is probably heavily restricted in normal styles, irrespective of whether the following vowel is a full vowel or shwa. The status of [yv, yl, yv, ov, ol, ov] in this context is uncertain; most of these clusters may not be systematically excluded before full vowels; Basbøll's analysis presupposes that they are excluded in homo-morphemic strings.

These hypotheses ought to be tested; e.g. it would be interesting to present naïve speakers with written fancy words like *Ragla, *kidvas, *kagio, etc.

4) If the stød is considered a syllable prosody manifested as a glottalization of the first post-peak segment (including the last portion of a long vowel) of a syllable, the syllabification of Malaga, annuum, etc. must probably be /malasãga, anšusom/ etc. (unless the manifestation of the stød is considered to be independent of phonological syllable boundaries?)

1) In fact, the word raglanfrakke ('rağlan') is pronounced [raɣlan] (in younger standards: [raɣlan]).
5) It might be of some interest to investigate the possibilities of recognizing other phonologically significant units than segments and syllables. We have seen that di-syllabic trochaic words seem to have rules of their own, and it may be fruitful to consider the Danish word to be more hierarchically structured than usually assumed. What I have in mind is a unit larger than the syllable but smaller than the word. Any word consists of one or more such units, and any such unit consists of one salient syllable or of one such syllable followed by one or more subordinate syllables whose vowels may be shwa or one of the full vowels /a o i y u/ but not /e E ë ò ø u/. Such a unit would be internally consolidated by certain obligatory structural properties: /a/- and /o/-adjustment, the restricted occurrence of medial aspirated stops before sonorants, the occurrence of at most one stød, and probably some more. According to this conception, variable pronunciations of a word would in some instances be due to different hierarchizations: a-kva-vit [akvə'vid] or akva-vit [akvə'vid], cy-klo-tron [syklo'tron] or cyclo-tron [syklo'tron], etc.

I am fully aware that such a description would also have its costs; e.g. it would presuppose the hierarchization of each word, to be a phonemic property or at least a property not exclusively predictable from the sequence of segments. Nevertheless, this hierarchical treatment may be worth while exploring.

I think the data and hypotheses presented in this paper deserve consideration in future work on Danish phonology, irrespective of whether or not syllables or larger units are recognized as phonological units in their own right.

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WORD BOUNDARIES AND FO PATTERNS IN ADVANCED STANDARD COPENHAGEN DANISH

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Abstract: In a previous analysis word boundaries have been denied any influence upon the course of fundamental frequency in the stress groups of Advanced Standard Copenhagen Danish. A small experiment has been carried out, which supports this contention, but which also suggests that in more conservative standards, word boundaries do affect Fo patterns.

1. Introduction

In many languages linguistic stress and Fo (or pitch) are interrelated. This is true of e.g. Danish (Thorsen, 1978), Dutch ('t Hart and Cohen, 1973), English (Fry, 1958; Lieberman, 1960), and Swedish (Bruce, 1977). The nature of this relationship is language and dialect specific and so is probably also the weight which pitch has among other prosodic cues for the perception of stressed vs. unstressed syllables. Further, the domain, i.e. the specific combination of stressed and unstressed syllables, of Fo patterns may vary between languages. Thus, Esser (1978) hypothesizes that in German the word is the unit which governs Fo, whereas in English it is the foot (Halliday, 1967). Bruce (1977) implies that in Swedish the word does not seem to constitute the basis for fundamental frequency patterning, and the analysis reported in Thorsen (1978) renders support for a contention that in Advanced Standard Copenhagen (ASC) Danish, word boundaries are immaterial for the Fo patterning.

For a brief summary of the 1978 analysis, the reader is referred to Thorsen (1979 - this volume, p. 60-65). - The establishment of the stress group, i.e. a stressed syllable and all succeeding unstressed syllables, as a relevant unit for the description of ASC Danish is corroborated by Reinhold Petersen's investi-