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PHONOLOGICAL REPRESENTATION AND LENITION PROCESSES

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Tamás Szende:
Phonological Representation and Lenition Processes

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PREFACE

This study focuses on low-level 'distortion' operations (in particular, lenition processes) that turn phonological representations of word forms into flexible, context-adequate components of colloquial Hungarian speech and whose regular recurrence makes everyday speech natural. A successful exploration of these processes hinges on the following two conditions. (i) A theoretical prerequisite is the definition of phonological representation as an abstract--general (phonological) object; (ii) a practical antecedent condition is a reliable and authentic data base, i.e. a recorded corpus of utterances with its methodologically consistent analysis. In order for the present study to meet the first condition, it is necessary to include a critical overview of the relevant current theoretical frameworks proposed to date (or more exactly, prior to 1987). This is presented in Chapter One. Furthermore, we have to raise and solve a number of specific problems with respect to the general form of an authentic phonological representation. Given the particular concerns of this book, phonological representation will be considered at the level where it emerges from the lexicon and the morpho(phono)logy, ready to undergo implementation rules, i.e. at the level of word forms. This problem is discussed in Chapter Two.

To comply with the second condition, a set of rather severe constraints had to be imposed on the material of investigation. (i) It had to be chosen such that it fully reflects the attributes of natural speech, i.e. it had to be produced (i/a) in a familiar speech situation, (i/b) by speakers who were completely normal (non-deviant) with respect to their abilities for speech communication, (i/c) under circumstances in which the speakers were not disturbed in any way by the analytic devices to be employed but (i/d) in a form suitable for high-quality acoustic analyses. (ii) The special objectives of the investigation restricted the choice of procedure as well: (ii/a) articulatory-physiological methods of investigation had to be discarded since they would necessarily have interfered with the natural processes of speech production; (ii/b) to explore the micro-events of articulation, at least in an indirect manner, some sufficiently high-resolution methods of acoustic analysis had to be employed. (iii) Given that the set of individual instances of lenition processes involved a mixture of random and predictable cases, with

a variety of intermediate versions, familiar methods of statistical analysis have yielded the conclusion that it is not the dimension of statistical distribution that the essence of the phenomena involved can be accounted for.

In order to meet all the above criteria, I tried to find subjects whose speech would reliably exhibit the tendencies that are occasionally mentioned in the literature as new developments in colloquial Hungarian (shortening of high front vowels, elision of word internal open syllables containing exclusively voiced consonants, and so on). On the other hand, the subjects had to be sufficiently speech-conscious so that such tendencies are but mildly characteristic of their speech, i.e. to an extent that does not violate a somewhat loosely interpreted normativity. Therefore, I selected four young students of a teacher training college, aged between 21--23. The group was then complemented with a 43-year-old engineer, primarily in order to check if the difference in subjects' ages correlates with the frequency of application of lenition processes. (No such correlation was found.) The group of three female and two male subjects were asked to carry on a spontaneous conversation about set topics, in the autumn of 1986, in the silent room of the phonetics laboratory of the Linguistics Institute of the Hungarian Academy of Sciences. The recorded material ran into approximately 45,000 syllables. The relevant portion of this material was then subdivided into 2,055 samples, each containing 1 to 20 lenition cases, and covering, in principle, all instances of lenition in the material, for further analysis. A carefully selected subset of these samples was made available by analog/digital conversion for the PDP 11 computer of the Phonetics Department that produced high-resolution (100 Hz/s) oscillograms of them. The analysis then proceeded in the traditional manner, with the exception of one particular aspect. That exception concerned the problem of how to delimit 'transient phases' from 'pure phases': our specific objectives required that we establish the central element of each transient phase by the criterion of shape constancy, i.e. by locating all cases in which the curves exhibit identical parameters through at least three oscillation periods. In identifying types of distortions, especially those concerning syllable structure, I sometimes relied on what Tarnóczy calls "the finest analytic device": my own ear. At various points and for various reasons, additional investigations were also called for. To facilitate the interpretation of some cases of sequence size truncation or de-

letion, the word or phrase in question was recorded, on a separate occasion, among laboratory circumstances, in a lento rendering by the same speaker, in order for the typological identity of the given instance of distortion to be clarified by comparison.

The typology of lenition processes made it clear that the investigation should not stop short with a classification of surface facts but go on until a common underlying explanatory principle is found in the light of which all the individual types of lenition turn out to be instantiations of that principle. The common denominator was defined in terms of the principle of 'global programming', described at the end of Chapter Two. An abridged presentation of the typology itself constitutes Chapter Three.

The study concentrates primarily on the segmental phenomena of present-day colloquial Hungarian. Yet, it turned out during the initial elaboration of the strategy of analysis that almost all lenition phenomena involve clear reference to other components of the system of devices of speech -- and that those points of contact should not be artificially separated from the issues discussed here. The main conclusions in that respect are summarized in Chapter Four.

Having characterized the purpose and structure of this study, I have to mention a few points concerning the way of presentation. This book was written in a period of the history of linguistics in which the novelty value and prime effectiveness of generative phonology had largely subsided. The major frameworks that have been proposed to replace it are discussed here with an eye on whether and to what extent they are able to account for a linguistic object of everyday use that a three-year-old child is perfectly able to handle: the word form. However, for lack of space, some intriguing matters of detail are not treated in sufficient depth. The claims concerning these are put forward in the form of lemmata and subsequently taken for granted. Similarly, documentation is only given where absolutely necessary and the number and graphic presentation of examples is restricted to a minimum.

Finally, I would like to acknowledge the help I received from a number of people in preparing this book. First of all, I want to thank my subjects for participating, as well as Péter Nikléczy and Gábor Olaszy for their help in preparing the recorded material and the visual displays. I am indebted to the Phonetics Institute of the University of Hamburg where I spent three

months in 1987 amidst undisturbed pleasures of scholarly contemplation and to the Institute for General Linguistics at the University of Vienna where I had the occasion in November 1990 to update my theoretical overview.

I owe many thanks to the first three critics of an earlier version of this study, Iván Fónagy, András O. Vértes, and Péter Ács, for their numerous helpful suggestions concering possible ways of improvement. But the person I am the most indebted to is Péter Siptár for his devoted efforts to produce the present English version. He went far beyond the usual tasks of a translator and the two of us have spent many a happy hour in passionate discussion, trying to unite forces, despite obvious differences in scholarly attitude, to achieve the common goal: the completion of this book to the best of our joint knowledge.

1. THEORETICAL APPROACHES TO WORD-LEVEL PHONOLOGICAL REPRESENTATION IN POST-SPE FRAMEWORKS

The analysis of distortion processes that speech units regularly undergo relies on the basic assumption that such processes can be accounted for, both phonetically and phonologically, in terms of a relation between a pattern (A) and a realized form (B). Strictly with respect to the present investigations, that relation is unidirectional, A ⟶ B, where A is 'underlying' and B is 'actual'. (Note that in an epistemological perspective A -- as 'actualized' -- can assume the position of B, and B can likewise function as A, constituting the category of 'underlying'.) In the material of these investigations, i.e. in our recorded corpus, B is invariably given, even if it can be interpreted in a variety of ways in certain cases. On the other hand, A -- as an abstract individual entity -- is of indirect access, and -- as a category -- it is largely theory-dependent. In a relation like A ⟶ B, however, both are to be fixed since B cannot be related to a non-definite A.

The possible contents of B are represented in the variation of segments between boundary markers, in independent word-size units, even if such variation is the manifestation of some higher-level system (e.g. that of primary stress over the voiced portion of a syllable). Some other types of variation (like that of the speaker's pitch register) will not be taken to belong to the notional realm of distortion. In accordance with the foregoing considerations, the following initial lemmata will be given and regarded as a priori valid.

L(i): There exists a type of linguistic signs that necessarily covers the notion of 'word'.

L(ii): The phonological representation of a word (form) is describable.

L(iii): There are phonological regularities and rule types that characterize the level of words and no other linguistic level.

L(iv): Lenition processes affect (and can be documented on) word-type phonological objects, where 'word-type' is meant notionally and in terms of size as well.

L(v): For a phonological delimitation of the notion of 'word', the following points are sufficient:

L(v/a): a word is semantically distinguishable;

L(v/b): at the same time, it is morphologically distinguishable;
L(v/c): realized in itself, it can fill in a superordinate linguistic unit in communication;
L(v/d): it is the minimal member of the set of linguistic units referred to in L(v/c);
L(v/e): phonologically, a word is a sequence that simultaneously satisfies conditions L(v/a-d).

Given that the recognition of an entity referred to here as A ('underlying form') is quite necessary for the purposes of the present study, but it is theory-dependent and not directly accessible, we must present a critical survey of previous attempts that have been concerned with the character of that entity. The relevant literature is neither unbounded nor impossible to survey in its totality. Still, the purview of the present chapter will be restricted, not independently of my own restrictions, in the following ways. (i) The issue will merely be considered in its phonetic/phonological aspect. (ii) Only post-SPE frameworks (i.e. ones that have been proposed since Chomsky and Halle's 1968 monograph, 'The Sound Pattern of English') will be discussed; and of those, only ones that (ii/a) meet the standards of a theory of phonology (or at least claim to do so), (ii/b) cover the notion at hand (assume its existence, directly or indirectly), and (ii/c) were available to me prior to 1987. (iii) The frameworks to be discussed will only be characterized in terms of specific and crucial theoretical claims. My survey will be highly critical in spirit; but my criticism will not involve matters that are outside the immediate concerns of the present study. -- Let me mention a few of those discarded but crucial points. In the theories discussed, (i) no specific low-level next-to-phonetic phonological representation is generally assumed as such. (ii) Phonological representations are generally conceived of as isolated sequences of segments or as sequences of units grouped into syllables. (iii) Variability and processes are generally defined on adjacent segments, except for vowel harmony.

1.1. The indication of a problem: the possible multivalued nature of a phonemic unit and alternation

One of the central issues in the phonology of segmental units, as well as the most important background problem of the present study, is this. What constitutes the set of elements appearing between boundary markers? Or more specifically, (i) what kinds of (and exactly what) units make up an abstract (segmental phonological) object that is an independently realizable linguistic sign (one that can be identified in itself, irrespective of its environment) in speech? (ii) In what network of relations is this phonological object associated with articulatory--acoustic--perceptual facts of speech? The relevance of these questions for lenition processes is as follows.

The term 'lenition' refers to a relation in the first place, expressing as it is a comparison of the given state of speech production and a possible other state, one that is 'not lenited'. In order to be able to explore and discuss their differences, first we have to define their common basis, with respect to which distortionless and lenited realizations occupy diverse levels of a hierarchy of correspondences. The former qualifies as primary, and the latter as derived. If the minimal independently realized unit of any linguistic (= non-metalinguistic) natural spoken text is the word form (as projected into a higher-level lingustic sign), the common abstract pattern that underlies distortionless and lenited realizations will be the phonological representation of a word form; that is, a sequence of phonemic elements flanked by a pair of word boundary markers. (Phonological representation in this sense obviously does not entirely cover the portions of text appearing in the recorded samples. But this restriction of phonological categories and devices implies that the characteristics of lenition processes affecting the object at hand can be explored within the chosen phonological framework, but not otherwise.)

After the rise of the standard theory, the issue of how to define phonological representation remained open (or turned out to be controversial) in the various phonological frameworks. The relevant claims of generative phonology include the following key sentences that throw light upon (i) the negative attitude of the standard theory towards the existence of an autonomous phonemic level and (ii) its recognition of the necessity of rules (of a

grammatical nature) in the construction of lexical units: "[W]e propose that each item in the lexicon be represented as a two-dimensional matrix in which the columns stand for the successive units and the rows are labeled by the names of the individual phonetic features. We specifically allow the rules of the grammar to alter the matrix by deleting or adding columns (units), by changing the specifications assigned to particular rows (features) in particular columns, or by interchanging the positions of columns" (Chomsky and Halle 1968, 296). To illustrate, I present two examples of the concrete analytical procedure of generative phonology with respect to underlying representation, based on one of the immediate forerunners of SPE, Chomsky (1964). First, note that a methodological principle of generative phonology is that surface forms or phonetic representations are derived from underlying forms such that simplicity is a crucial requirement that derivations have to meet, hence paradigmatic correspondences are to be built into the description of forms. In practical terms, this amounts to the following. The words divinity and divine are obviously related since divinity derives morphologically from divine; if, however, we want to express this by /a͡i/ → /i/ as a (phonological) derivation, and if, furthermore, in vary/variety (a similarly related pair) we have to assume the opposite process, /i/ → /a͡i/, as the direction of morphological derivation suggests, then we are forced to state two rules that are the exact opposites of one another. This violates the requirement of simplicity. The difficulty appears to be resolved if we posit /i:/ in the common root that is realized by shortening as [i] in one of the cases and by diphthongization as [a͡i] in the other. If, however, we follow the same track of phonological interpretation to its logical extremes, we will be forced to hypothesize /ri:xt/ as the root of right/righteous. But here it is not only the case that the consonant before t will never surface (let alone surface as [x]); in fact, a velar fricative does not even exist in the surface sound system of English (for a general criticism of the SPE view in this respect, cf. Kiparsky 1968/1974, for a detailed critical analysis of the above examples see Sommerstein 1977, 211--2, Vennemann 1986, 5--7).

The first principled effort to resolve the problem by constraining abstractness in phonological theory has been made in the framework of Natural Generative Phonology.

1.2. Natural Generative Phonology

The way of determining the phonological representation of a surface sequence that had been advocated by the standard theory of generative phonology was subjected by proponents of Natural Generative Phonology to a type of criticism that had actually originated in the claims of the standard theory. Both frameworks accepted distinctive features as constituents below the abstract phoneme level and employed rewrite rules in derivations; but NGP severely constrained the abstractness of phonological representations and used rewrite rules to a more modest extent (cf. e.g. Hooper 1976 passim, esp.13).

To recapitulate, the standard theory had an ambiguous attitude towards the issue of phonological representation. (i) On the one hand, it subscribed to Postal's (1968) Naturalness Condition. Thus, the relation between phonological representations in the lexicon and phonetic properties of morphemes was not arbitrary, in the sense that the individual distinctive features involved in phonological representations of morphemes had their equivalents in the world of realia (with the feature [+voice] corresponding to vocal cord vibration, etc.). In describing morphemes as sequences of segments, that is: syntagmatically, SPE invariably sticked to this principle. (ii) On the other hand, generative phonology is known to have permitted extensive abstractness wherever word forms that were based on the same lexical item but exhibited morphophonological alternation in a paradigmatic sense were not quite obviously related by some immediate phonetic connection. Hooper (1976, 5--10) -- although she does not mention the apparently schizophrenic nature of the SPE treatment and concentrates on the problem of root alternation -- highlights the problem that was a debated issue even prior to 1968, in what was called the abstractness controversy. Her example is a Latin American Spanish verb, crecer 'grow', first discussed in this respect by Saporta (1965, 220--222). That stem, along with a number of others, exhibits morpheme final /sk/~/s/ alternation as between 1sg crezco ⟷ /kresko/ and 2sg creses ⟷ /kreses/. The phenomenon is not generally true of all /s/-final verb stems. For example, coser 'sew' does not exhibit /sk/ in any of its forms, cf. 1sg /koso/, hence -- according to Saporta -- we must assume that some verbs, like coser, have /s/ in the appropriate place whereas others, including creser, contain a different phonemic constituent, namely /θ/, that triggers a rule of k-in-

sertion (cf. Hooper 1976, 6):

$$\emptyset \rightarrow k \;/\; V\ \text{ð}\ \_\_\ + \begin{Bmatrix} o \\ a \end{Bmatrix}$$

before it undergoes a /ð/ → /s/ change that replaces its interdental place of articulation by alveolopalatal, or -- in the corresponding acoustic terms -- turns its [-strident] feature specification into [+strident]. The choice of /ð/ is supported by the external evidence that in some other dialects of Spanish, including Castilian, a phonemic distinction of /ð/ vs. /s/ actually occurs. However, the problem is as follows. First, Castilian /ð/ does not always condition k-insertion: there is at least one verb cocer 'cook' with a /ð/ that does not undergo that rule. Second, and more importantly, the competence of a Latin American Spanish speaker does not include any /ð/ at all. Therefore, another path must be found in determining the phonological representation of the verb stems at hand.

Given that this alternation involves the conjugation paradigm of a verb class, it appears to be expedient, in view of Kiparsky's (1968) Alternation Condition, to refer to the alternation /s/~/sk/ in the lexical representation of the verbs concerned. Thus, for crecer, we will have /kres-/.
[+K]
The phenomenon is then shifted from phonemics to the morphophonemic domain, where the diacritic [+K] is interpreted as an instruction to apply the rule

$$\emptyset \rightarrow k \;/\; V\ s\ \_\_\ \Big]_{\substack{\text{verb} \\ [+K]}}\ \begin{Bmatrix} o \\ a \end{Bmatrix}$$

(cf. Hooper 1976, 7). The alternation can also be accounted for with direct reference to conjugation class; the underlying form will then be /kresk-/ and the /k/ will be deleted before a front vowel, provided that the verb is not of the first conjugation. Thus, the underlying form will be

/kresk-/
[-1st conj.]

and the rule will be as follows:

$$k \rightarrow \emptyset \;/\; s\_\_\_ \Big]_{\text{verb}}^{[-1\text{st conj.}]} \quad \begin{bmatrix} V \\ -back \end{bmatrix}$$

The latter version is more realistic (less arbitrary) than the former since conjugation class membership is also relevant for a number of other morphemic and morphophonological rules in Spanish (cf. Hooper 1976, 8). It is true that reference to conjugation class is less ad hoc than the introduction of a general diacritic like [+K]; but it is less satisfactory than devices that are (more) directly related to the articulation program being used. Furthermore: by establishing phonological relationships between stem alternants, we unavoidably reach a point where we come up against unsurmountable difficulties. Spanish leche 'milk' ⟷ /leče/ cannot be phonologically described as /lakte/ (as done by Harris 1969, 169) on the basis that it is a regular development from Latin and that Spanish also includes lactar 'lactate', láctico 'lactic', etc. In fact, the competence of a Spanish speaker may not include a /č/--/kt/ correspondence at all. Nothing proves that a naive speaker is to make a phonological association between the two; notice that the original change -- Latin /kt/ ⟶⟶ Spanish /č/ -- used to be a productive rule in a certain period but is not that any more (cf. Hooper 1976, 10). In sum, the less we discard morphophonemic regularities as evidence for establishing phonological representations of word forms, the farther removed our underlying forms may turn out to be from surface representations. To quote a Hungarian example, if 3sgImp lássa 'he should see' is represented phonologically as a concatenation of the lexical form of its stem, /la:t-/, with the morphemic form of the modal suffix, /-j(-)/, and that of the personal suffix, /-(j)$\left\{\begin{matrix} a \\ e \end{matrix}\right\}$/, we get a net result like /la:t-j-a/ ⟷ /la:ʃ:a/. (The bidirectional double-headed arrow is meant to suggest mutual correspondence via a number of mediatory rules.) But given that 3sgInd látja 'he sees it' gives a form like /la:t-ja/ on the same basis, we almost end up with creating unjustified homomorphy in the description of lássa vs. látja.

Natural Generative Phonology, in particular, Vennemann (1971, 1974) introduces what is called the Strong Naturalness Condition to avoid 'overgeneralization' in cases like those mentioned above. This condition states that (i) the lexical representations of non-alternating portions of morphemes are

identical to their phonetic representations and (ii) the lexical representation of a root is identical to one of the radical allomorphs of the paradigm plus an (often empty) set of complementary rules (Vennemann 1974, 347); as Vennemann (ibid.) states, this is a stricter version of Postal's (1968) Naturalness Condition and Kiparsky's (1968) Alternation Condition. An obvious result of its application is that everything that is not directly justified by surface forms will be removed from phonological representations. For instance, to return to Latin American Spanish, no /θ/ will now be posited for creser. The insistence on exclusively surface-true (transparent) phonological representations entails that linguistic rules "are based directly on surface forms and ... relate one surface form to another, rather than relating underlying to surface form", in accordance with the True Generalization Condition (cf. Hooper, 1976, 13). All this suggests that proponents of Natural Generative Phonology will leave little room for speculation with respect to phonological representations. The main details are as follows. First of all, no phonetically predictable information will be included in the phonological representation. But if an alternation involves neutralization, the phonological representations will have to include non-neutralized values. For example, in American English the flapped realization of intervocalic /t/ and /d/ neutralizes the phonemic contrast in writing and riding; since, however, the two morphemes differ elsewhere in surface forms, as in write vs. ride, their phonological representations have to reflect their contrast in voicing (cf. Hooper 1976, 21). Given that morphological rules -- as opposed to phonological ones -- are not natural, that is, they may contradict articulatory constraints, they will result in phonetically unpredictable forms in phonological representations. The latter will therefore contain whatever these rules produce, e.g. for French bon/bonne 'good (masc./fem.)', bonne soeur 'a good sister' will include [bon] ◄⟶► /bon/. (In the medieval system of Hungarian verb stem alternation, one class of v-stem verbs -- with stem alternants in /s/, e.g. tesz 'do', vesz 'take', esz(ik) 'eat', etc. -- will be assigned a phonological representation based on a stem alternant that (i) has an actual surface allomorph corresponding to it, and (ii) can serve as a point of departure for the derivation of all further allomorphs. This alternant of e.g. iszik 'drink' will be iv-, cf. ivott 'he drank', ivó 'drinker', etc., from which isz- is derived by v-elision and the addition of a formative /s/.)

Other rule types that are (or may be) relevant for potential variation in phonological representation are the following in this framework: (i) Via-rules associate two (etymologically) related forms but leave the two phonological representations independent of one another. This type of relatedness obtains in Hungarian between esik 'fall' and ejt 'drop' or feslik 'come unstitched' and fejt 'unstitch' as lexical stem alternants. (ii) Sandhi rules are located in the rule hierarchy between phonological and morphophonological rules. Accordingly, the manner in which they determine phonological representations is of two types. (ii/a) Cases of exclusively phonetically motivated (natural) accommodation across morpheme boundary do not create morphophonemic alternation as the resulting forms will merely involve predictable modifications, just like in morpheme-internal cases. (For instance, in regional Hungarian Vasvár 'geographical name' with voicing assimilation on the /ʃ/, the phonological representation of Vas will not be affected since the rule concerned makes its voicing predictable.) (ii/b) Where a sandhi phenomenon involves an etymological difference between the two versions, we assume the existence of two independent alternants; for instance, the floating /z/ of the French plural definite article les as in les amies 'the friends' constitutes two alternants that are to be listed separately in the lexicon. (In Hungarian, obligatory morphophonemic sandhi can only be attested for a single pair of forms: the definite articles a/az 'the' that alternate according to the consonantal/vocalic onset of the subsequent word. The demonstrative pronouns eme/emez 'this' and ama/amaz 'that' exhibit a similar but optional alternation that depends on stylistic register.) (iii) Word-formation rules specify the order and type of morphological elements that constitute a word form; they operate on phonemically pre-defined units, therefore (subject to restrictions of their own) they can only increase the size of a phonological representation but are given its phonemic constituents ready-made, as determined by other rules and phonotactic constraints. (iv) Syllabification rules are another matter. They assign syllable boundaries to the appropriate places in a phonological string: e.g. in a sequence /hɑtɑlmɑʃok/, the placement of junctures defines morphemes by assigning syllable boundaries in different ways e.g. in hat alma sok 'six apples are too many' vs. hatalma sok 'he has excessive power' vs. hatalmas ok 'a compelling reason'.

Thus, the NGP procedure of determining phonological representations can

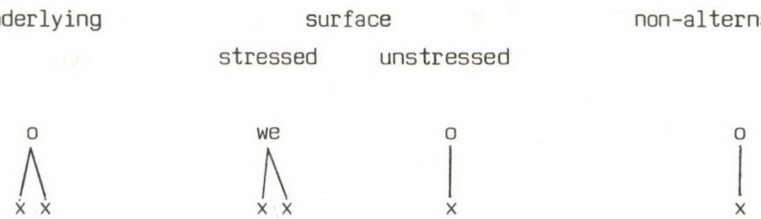
be briefly summarized as follows. The underlying form is, in general, simply the same as the surface representation. In the case of morphemes that exhibit some non-phonetic alternation as in /kres-/ vs. /kresk-/ ← creser, one of the alternants will be picked out as underlying and the rest will be derived from it by morphophonological rules. (In Hungarian this would roughly mean taking /lo:-/ and /lov(ɑ)-/ as stem alternants of ló 'horse', selecting /lov(ɑ)-/ as the primary alternant, and deriving /lo:(-)/ from it.) In doing so, we only specify (unpredictable) values of distinctive features that actually occur in surface realizations. In the case of an alternation governed by a via-rule we take both (all) alternants as independent lexical units, in a form that is identical with their surface representations, leaving unspecified (as everywhere) all feature values that are predictable (determined by phonetic rules), cf. Hooper (1976, 21).

Having elaborated on the roles of the various rule types, the question now arises as to what it is exactly that the phonological representation of a word form should represent. The views of the proponents and the adherents of NGP are rather divided on that issue. As long as we want to stick to the principle that realized forms should be our point of departure ("that underlying forms be identical to surface phonetic forms or be archisegmental representations of surface phonetic forms", Hooper 1976, 111), the first problem is which surface form to select from the numerous forms at our disposal. The endless variety of surface forms of Hungarian szóval 'so, well, that is' does not make a unique choice possible either in terms of the number of elements or in terms of their identity. As pointed out by Andersen (1973), Kučera (1973), Abaurre (1974), Rudes (1975), as well as, in a summary declaration, by Hooper (1976), the correct approach to this problem is as follows. The variability of pronunciations is not an unordered set of random phonetic facts but of ones that are mutually dependent. Their connections are established by rules that, frequently via several steps, link them up in a chain (from [so·vɑl] to [sɔ]). For instance, in the case of American English security ←→ {[sɔkyɾɪɾi]; ...; [skyɾɪɾi]}, the first version occurs in careful formal speech, and the last one, derived by ə-deletion and intervocalic t-flapping, in fast casual speech. Since the rules deriving the casual variant from the complete, higher-prestige form are mostly reductive (i.e. they remove some property of the articulatory pattern), the derivation cannot but

set out from the latter. Thus, to establish the phonological representation, "the most careful style of speech" (Hooper 1976, 112) is taken into consideration. But two pitfalls are still to be avoided. If we choose highly elaborated, suggestive or hypercorrect forms like [ˈso:vɑlᵊ] for szóval, we need a set of adaptive rules to derive the 'most neutral' version. The second, related, problem is that the accurate recording of a word uttered carefully in isolation might lead to the wrong phonological representation since that articulatory genre also applies its own rules. Examples include the word final neutralization of voicing oppositions in German -- whereby Bund 'league' and bunt 'multicoloured' would receive identical representation. Similarly, Hungarian [leːpç] for lépj 'step-2sgImp' with no further phonological interpretation would yield a misleading analysis. The morpheme to be described, therefore, should not be considered in itself but in the context of morphological facts that are given against, and prior to, phonetic constraints. In the examples at hand: Bund [bunt] has a related genitive Bundes, while bunt has a neuter buntes, with /d/ and /t/, respectively; lépj has [ç] but 3sgImp lépjen has [j]. In the critical (word final) position, both our German and Hungarian morphemes exhibit 'natural' (phonetically motivated) changes with respect to a morphologically determined unit.

Concerning the phonemic representation of morpheme alternants, NGP offers two kinds of solution. (i) Vennemann (1974) claims that each alternant, indeed each word form, should constitute an independent lexical entry in its surface phonetic form. The differences among alternants of the same morpheme will then be eliminated (or rather, variants will be subsumed under a common unit) by redundancy rules. (ii) In Hooper's (1976, 119--127, esp. 124) view, on the other hand, a common form underlying all naturally differing versions of a morpheme is not fully specified in the lexicon: "partially specified, archisegmental representations" will then leave room for phonological rules that specify all predictable feature values. For instance, if we find that the 1sg of Spanish montar 'mount' is monto (as expected) but that of contar 'count' is cuento [kwento], the phonological representation of the latter verb stem will be /k$\left\{\begin{smallmatrix} o \\ we \end{smallmatrix}\right\}$nt-/. The choice between disjunctive /o/ and /we/ is determined by a rule of 'allomorph distribution' that makes /we/ appear in a stressed and /o/ in an unstressed position. But notice that an account that bases the appearance of a diphthong on that of stress, is paradoxical.

In this case, (i) stress assignment induces diphthongization -- but (ii) the distribution of diphthongs motivates stress assignment. In a more recent paper, Harris (1985, esp. 36) proposes to resolve the paradox by assuming that alternating /o/ (as well as /e/, cf. [je]~[e] as in tiempo 'time' vs. temporal 'temporal') is underlyingly represented in some other way than non-alternating /o/ (or /e/). In particular, an alternating /o/ (as in contar) is linked to two units in the prosodic skeleton, whereas a non-alternating /o/ (as in montar) to just one:



The alternating mid vowels/diphthongs are represented in the lexicon by "single segmental units followed by a prosodic unit devoid of segmental content" (ibid. 31). Essentially, Harris's account is an example of how diverse countenances the same explanatory principle may assume. Neither approach takes into consideration the simple fact that the relation between /we/ and /o/ cannot be phonetically interpreted as a diphthong → monophthong change (or vice versa) given that the two items simultaneously differ both in terms of quantity and of tongue height. (Particle Phonology [cf. Schane 1984, esp. section 3.5] would account for this derivation, i.e. o → we, in two steps, by fission and mutation.) Note also that the two parts of /we/ are not realized as pretended in the above accounts: /w/ is partly simultaneous with /k/ -- hence the alternation should rather be stated for /kwe/~/ko/. More relevant than this matter of detail, the following objections can be made.

(i) In view of their distinct existential statuses, simple identification of underlying and surface/phonetic representations (cf. Vennemann 1974, 347), or the assumption of a direct relation between them (cf. Hooper 1976, 20), in the form that NGP proposes, is rather obscure in terms of logic. The entities that appear in surface forms, i.e. the types of realizations (like all the [a˙]s in átállás 'switchover' taken together) belong to the logical category of concrete general -- whereas the corresponding phonological enti-

ties (the phoneme /a:/ in this case) are either abstract individual or abstract general, as the case may be. Therefore, their relation can only be a mutual or one-one correspondence (cf. Szende 1984, 299). But if the relation between realizational patterns and components of a phonological representation is that of mutual correspondence, then we cannot, first of all, speak of identity between underlying and surface forms, and we must, furthermore, a posteriori exclude from phonological representation all alternations like */k $\left\{ \begin{matrix} we \\ o \end{matrix} \right\}$ nt-/ for contar. It is another consequence of the unjustified homogenization of logical levels that, in accordance with the Strong Naturalness Condition ("the lexical representation of non-alternating parts of morphemes be identical to their phonetic representation"), protagonists of this framework are forced to tacitly deny the possibility that phonological representations might include diverse combinations of elements at various levels of abstraction.

(ii) The theory does not provide any motivated information about what to consider a basic radical allomorph or, what amounts to the same question, what are the criteria on the basis of which one radical allomorph takes precedence over all the others. (This critical remark might be made clearer by Kenstowicz and Kisseberth's [1977] reasoning, cf. further below.)

(iii) The treatment of alternants within phonological representations is in some sense controversial. Namely, this may be done in one of two ways, as we saw above: (iii/a) by the inclusion of two or more alternants, between braces, in the phonological representation, or (iii/b) by way of archisegments. Neither solution appears to be adequate. First, note that the two do not merely differ graphically. The inclusion of several options licenses a disjunction of elements that could not be reduced to a shared archisegmental representation; this was the case with /o/ and /we/ in contar vs. cuento. The archisegmental solution is more restricted in that it permits less latitude in variability: in an archisegmental description of the Hungarian inessive suffix -ban/-ben, the underlying element [V, +low] (normally symbolized as /A/) will only permit two phonetically motivated choices, namely [ɑ] (= [V, +low, +back]) and [ɛ] (= [V, +low, -back]). Both solutions (disjunction and underspecification) have to face an objection raised in the framework of Natural Phonology. "The single argument that is offered for archisegments -- uncertainty -- has about as much force as a blindfolded man arguing that it

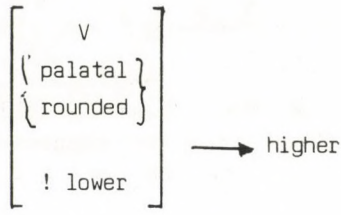
is neither night nor day (or that it is both) because he can't see which it is" (Donegan--Stampe 1979, 162). The listener will identify the segment at issue either as one or the other but never a third type: German Weg 'road' is [ve:g] or [ve:k] (depending on phonetic context), tertium non datur. The objection, even without further comment, is only apparently simple-minded. An aggregate of things of the same kind cannot include an element whose existential status differs from that of the others. If that is permitted, what we describe is not a phonological representation but a morphological paradigm. Furthermore, in both solutions, underspecification tacitly introduces, in the critical (morpho)phonological position, a phonological rule concerning an isolated point of the sequence of segments into the phonological representation. The objection is, again, obvious. A rule affecting a given position in a series of segments -- whether it is phonological (like assimilation) or morphophonological (like vowel harmony) -- it invariably applies to a whole sequence; otherwise the construction of phonological representations would be granted excessive liberty such that there would be no other type of rules than lexical (word formation) rules.

(iv) The definition of (historically determined) via-rules seems to be based on rather unstable notional grounds. In Hooper's (1976, 17) view, two historically related items (like Spanish leche 'milk' and lactar 'to milk'), connected by non-productive rules, are not derived from one another but separately intered in the lexicon and the relation between them is expressed by a via-rule. "Since each individual lexical entry must be marked as related to another individual item, it is possible... for a particular native speaker to grasp the phonological relation between ocho ['8'] and octavo ['8th'], noche ['night'] and nocturno ['nightly'], but not between leche and lactar. In this case the former pairs are marked as related by [a] via-rule, but the latter pair are not" (ibid.). If we take it for a fact that a native speaker actually relates some units within the lexicon, we must assume that he does so on the basis of some semantic and/or formal resemblance. Since semantic relatedness may be rather vague, it is not unlikely that phonologically unrelated pairs of items will also be connected, including homonyms (to use Hungarian instances): ég 'sky' and ég 'burn', nyúl 'rabbit' and nyúl 'reach for', etc.; pairs of loosely associated meaning and similar form: méh 'bee' and méz 'honey', ver 'beat up' and vér 'blood'; historically developed al-

ternants: tereh 'load' and metathesized teher 'id.'; opaque or transparent derivations and epenthesized items: ver 'beat' and verdes 'flutter', csónak 'boat' and csolnak 'id.', csinos 'pretty' and csintalan 'naughty'; free variants: per 'lawsuit' and pör 'id.'; etymologically unrelated but seemingly connected items: piros 'red' and Piroska 'feminine first name'; pairs going back to a single (polysemic) root but having undergone a divergent semantic development: tart 'keep' and tart 'last (for some time)'; and so on. The final conclusion is that via-rules either do not exist at all or -- as is more likely -- they do exist but in a lexicological (rather than a phonological) sense.

1.3. Natural Phonology

Along with its most obvious antecedents (Jakobson 1941, Martinet 1955), Natural Phonology has drawn some inspiration from a criticism of generative phonology; yet it is the most independent of all post-SPE frameworks. It was in 1965, practically simultaneously with the emergence of generative phonology, that Stampe first made the assumption (cf. Stampe 1969, 443) that the phonological system of a language is essentially the residue of a universal system of innate processes that are modified by the phonological conventions of that particular language and, furthermore, that "in its language-innocent state, the innate phonological system expresses the full system of restrictions of speech: a full set of phonological processes, unlimited and unordered" (Stampe 1973/1979, ix), where a 'phonological process' is "a mental operation that applies in speech to substitute, for a class of sounds or sound sequences presenting a specific common difficulty to the speech capacity of the individual, an alternative class identical but lacking the difficult property" (Stampe 1973/1979, 1). The framework, by nature, is sensitive to historical aspects. According to Miller (1972), the fact that the existence of chromatic (= front or rounded) mid vowel(s) in a vowel system presupposes that of high one(s) and that the existence of chromatic low vowels presupposes that of mid one(s) reflects the universal process by which the tongue height of chromatic vowels is raised both in child language and in historical changes; in a general formula:



From this it would follow by a straightforward syllogism that all vowel systems should be identical or at least should converge towards an identically homogeneous state. This is not the case. The explanation offered says that all (apparent) inconsistencies and 'aberrations' found in phonological systems are due to a number of conflicting optional processes competing for the elimination of some unnatural state of affairs and yielding diverse results depending on which of them gets the upper hand. This situation is "merely a reflex of conflicting characteristics of the capacity for speech itself" and results from the fact that speech organs are used for speech in a philogenetically secondary manner. "The speaking animal is imperfectly adapted for speech" (Stampe 1973/1979, 42).

The novelty of this approach lies primarily in the fact that its point of departure is not the (phonological) unit but a human species-specific, anthropologically determined (operational) process within which a component (like a segment) occurs as determined by certain laws of nature at a particular point of speech, and indeed -- as a phonotype -- at a particular point of the system. This way of looking at things has far-reaching theoretical consequences, especially if compared to the theory of generative phonology. The contrasts are most striking in two essential areas.

(i) Adherents of NP reject the claim that phonological representations arise after the application of morpheme structure (redundancy) rules and before the application of "phonological rules proper", governing alternations. On the contrary, natural phonologists propose that "some processes that govern phonological representation also govern phonetic representation" and vice versa (cf. Donegan--Stampe 1979, 161). Now if the processes concerned can equally apply to both types of representation, it follows that "underlying segments are ontologically of the same status as any segment in surface representation; they are mental representations of sounds which are, at least in principle, pronounceable" (Stampe 1973/1979, 35). Therefore, no archiseg-

ments are to be included in a phonological system, and even less so in a sequence, contrary -- among others -- to the claims of Hooper in NGP. In other words, phonological representations can only include units of the same status. Archisegments like the stop in German Weg 'road' that is a [k] finally but a [g] word internally (as in Wege 'roads') -- and would therefore be an archiphoneme /G/ -- are usually supported by a single argument: uncertainty; but this is insufficient basis for assuming them. The phonologist has to decide, in the same way as the listener always does, which of the two or more elements covered by a putative archisegment is the actual phoneme occurring at the critical point in the word form. This reasoning leads us to the unviolable principle for the interpretation of phonological forms according to which aggregates of things of the same category must not contain an element whose existential status differs from that of the others.

(ii) Another area of disagreement with the standard theory -- one that is just as grave with respect to phonological representation -- is that in NP temporal niches of the abstract elementary units of a segmental phonological form are filled by components as dictated by the phonological intention (or Lautabsicht, to use the old Praguean term) of the speaker. This idea is said to go back to those of early phonologists: Dressler (1984) cites Baudouin de Courtenay (1895), whereas Donegan and Stampe (1979) refer to Sapir (1933) as the ultimate source.

Donegan and Stampe (1979, 164--165) find it necessary to make another distinction that was crucial in traditional phonology: that between phonemes and allophones. In his dissertation, Stampe (1973/1979, 27) describes the latter as sounds not occurring in phonological representation that are eliminated by general processes prior to that level but which are subsequently reintroduced by allophone-creating (natural) processes. Under or behind them lie phonemic correspondences that are "deeper" than surface segments of the phonetic representation. Their depth (i.e. degree of abstractness) may vary across cases, but "only sounds which pass the muster of the obligatory fortition processes of a language are phonemes"; the rest are allophones.

NP acknowledges the following four universal ways of restricting innate processes. (i) Some processes are suppressed by the speaker; thus, the process that introduces closure into all consonants has got to be suppressed or else no other consonants than stops and nasals could exist. (ii) Other pro-

cesses are merely 'limited' in the sense that they are allowed to operate in certain positions or cases only. For instance, palatalization of consonants before front vowels, with the possible stages [k] → [kʲ] → [c] → [tʃ] (for [k]+[i]), may apply in some languages before any palatal vowel, in others only before /i/, and yet in others not at all. (iii) The speaker may restrict processes by ordering constraints as well; i.e., having substituted a unit encoded as x by y, he applies no further process to the y in question. For example, as soon as an American English child realizes that in his mother tongue a glottal stop stands for /t/, he will stop dropping glottal stops in this position, no longer saying [bʌn̩] for button ←→ [bʌʔn̩]. And finally, (iv) the speaker eliminates some natural processes by applying learnt rules instead; these do not correspond to any natural process, e.g. do not change intervocalic voiceless consonants into their voiced counterparts. The latter are very strong constraints and tend to remain at work even in allegro.

By applying the principle of natural processes, the theory finds a new foundation for the explanation of morphophonological facts as well. This has striking consequences for the interpretation of (stem) alternations, a crucial issue with respect to the exploration of phonological representations. Wolfgang Dressler, a follower and critic of NP, proposes the following theorem, attributing the idea to Reformatsky (1979, 47): "Morphonology belongs neither to morphology nor to phonology; it mediates between both components without being itself a basic component like morphology or phonology" (Dressler 1985, 4; cf. Dressler 1981, 113). That mediatory character is to be taken literally, as the following example suggests. There exist universal process types like the palatalization of [k g x] before [j i e]. Whatever takes place in the morphology of a language, e.g. in [pʼek] 'bake' → [pʼečɨ] 'baked' in Polish, can in principle be described in terms of one or several of these universal process types. In the present case, the individual steps of this universal process type are the following: (i) [k] → [kʼ] (palatalization); (ii) [kʼ] → [c] (the palatalized velar stop becomes palatal); (iii) [c] → [tʃ] (a palatal stop turns into a palato-alveolar affricate). The higher number of universal process types are necessary to describe (actually, to derive) a phenomenon, the more certainly it involves a morphological rule. On the contrary, phonological rules -- like the palatalization of !k! before a front vowel -- are always limited to a single universal phono-

logical process (ibid. 114). A practical analysis involves either phonology or morphology and, accordingly, the actual phenomena are taken to belong to one (or both) of these components. As a consequence, morphophonology is left without any contents that exclusively belong to it. In is in this sense that morphonology "mediates" between the two components "without being itself a basic component" (cf. Dressler 1985, 4; as a conclusion: 150). This state of affairs logically requires that in the domain stretching from phonology to morphology all that goes on is to be described in terms of an organic series of rule types. In particular, three types are necessary: phonological, morphonological, and allomorphic morphological rules. Hence, the notion of alternation is to be avoided since -- in isolation -- it cannot express the exact location of the phenomenon to be described along the phonology--morphology scale. Alternation is a cover term for phonological (like morpheme-final neutralization in German) and also morphological phenomena (like English plurals of the foot/feet type). (For further explanation and examples, cf. Dressler 1985, 11ff, 57.) The location of individual phenomena between the two extremes of the phonology--morphology scale is determined by a procedure called 'process matching', i.e. establishing the number of universal process types reflected by the rule(s) that describe it. The higher the number turns out to be (between the first and nth degrees), the farther away a given phenomenon is from the phonological component and the closer it is to morphology (cf. Dressler 1985, 59ff). Thus, morpheme-final neutralization in German is a first-degree phenomenon, assigned "the best score (= value) of phonological naturalness", whereas the rule of Spanish o/we alternation is a second-degree case if we analyse it in two steps as (i) o → wo diphthongization and (ii) wo → we dissimilation. This number -- hence, the distance from phonological naturalness -- may be quite high, too: in Hungarian, the 2sg suffix of the indefinite verbal paradigm is /s/ (vársz 'you wait', látsz 'you see', etc.) but after a fricative it is usually /l/ (főzöl 'you cook', keresel 'you search', etc.); /s/ and /l/ are obviously disjunctively related in the paradigm but there is no natural dissimilation process to explain the change of /s/ → /l/, not to mention the epenthesis (keres-e-l) that is also part of the phenomenon (cf. Dressler 1985, 59--62); the /s/~/l/ alternation in the indefinite conjugation is thus a definitely morphological phenomenon, accounted for by an allomorphic morphological rule.

In this framework, morphophonology has a rather blurred countenance and consists of universal process types, rules, their hierarchy, constrained or universal nature, and order. In spite of the fact, however, that each rule applies to and produces a segment or a (natural) class of segments that correlates with a (set of) phoneme(s), the phoneme as an entity or its internal structure is hardly discussed by the author. Yet the input and the output of the rules, as well as their contents (i.e. their structural description and structural change) and their manner of application (with their steps and directions) are not independent of the constitution of the units that the rule refers to. To put it rudely, the description of the units concerned is limited to the use of a graphic symbol and a few associated properties that are taken to be a matter of general knowledge. In reality, even the number of the process types, as well as the number and direction of the steps involved in a process, is determined by the properties that constitute a unit $\underline{x}$ or $\underline{y}$, where $\underline{x}$ and $\underline{y}$ are the two terms of a rule of the form $\underline{x} \rightarrow \underline{y}$ or of a correspondence $\underline{x} \leftrightarrow \underline{y}$. Accordingly, insofar as the members of sets of $\underline{x}$s and $\underline{y}$s acquire their reality-based, system-dependent definitions in terms of their constitutional properties, a clearer picture about the relationship between phonological representations and realized forms can be arrived at.

(i) What phonological rules do is that they restore direct biuniqueness between $/x/_i$ and $[x]_i$, e.g. between /t/ and [t] in English where /t/ $\rightarrow$ [t^h] is derived in one step (involving a single process type of word initial aspiration).

(ii) The case of other (morphophonological) rules is quite different. Here, biuniqueness or mutual mapping is replaced by a relation like $x_i \leftrightarrow Y = \{y_1; y_2; \ldots; y_n\}$. This is, in essence, why Dressler (1985, 135) claims that phonological rules, using Kiparsky's (1973) term, tend to be transparent, whereas other types are always opaque. And since the number of process types involved in a particular rule corresponds to its position in the hierarchy of rules, the degree of opacity monotonously increases in the triplet phonological -- morphonological -- allomorphic morphological.

With respect to the identifiability of phonemes, it follows that "there is ... a gradual continuum from natural and therefore very frequent phenomena (biuniqueness) to less natural and therefore rarer phenomena (types of uniqueness where inferability is possible under certain conditions) to very

unnatural phenomena (non-uniqueness)" (Dressler 1985, 136). The ambiguity of a word form can be eliminated, i.e. cases where the output (or surface form) does not reveal each element of the phonological representation with natural simplicity can be disambiguated, in several ways: (i) relying on additional information (based on context, for instance); (ii) by using the principle of 'default value' whereby a surface [x] is identified as /x/, unless parallel forms (like the shape of the same stem in another word form, cf. electri[s]-ity vs. electri[k]) require a non-default interpretation /y/ on the basis of available morphological information; (iii) by reference to the distributional properties of signs; (iv) by observing 'phonological iconicity' (roughly, the realizational resemblance of input and output; e.g. a vowel reduced to [ə] is more likely to correspond to /ɛ/ than to /a/); and (v) on the basis of the productivity of realization (expressing the probability value of a particular phonemic unit to be realized as a particular surface segment).

The system of connections between units and levels is based by Dressler on Peirce's (1932) theory of semiotics; a fact that fundamentally determines his view of the phoneme. This is primarily revealed by his restricting the investigation of the signans aspect of a phoneme to what (inter-sign) relationships it enters into. Dressler's notion of signans thus radically differs from that of Saussure: whatever helps the listener retrieve an "input phoneme intended by the speaker", in the sense of Donegan--Stampe (1979), is a signans. "A phoneme as a signatum is signaled", Dressler (1985, 282) says, in one of four different ways: (i) by a variant, as in English /t/ → [t^h] in ten; (ii) in neutralization or in cases of certain morphophonological alternations, by a signans normally corresponding to a quite different phoneme (this is the case with English /k/ → /s/ in electricity); (iii) by an "intermediate segment" that occurs in a derivation as a "false step", as in Polish /g/ → /dʒ/, if this /dʒ/ is obligatorily changed to /ʒ/ by spirantization; and (iv) by a "zero signans", if a rule deletes the original signans of the original phoneme. "The signs composed of phonemes and their respective allophones are signs on the signs of morphemes whose signantia are the formatives (morphs, exponents)" (ibid. 283).

As can be seen, Dressler's view aims at interpreting the phoneme, which he definitely assumes to be necessary as an elementary component, in terms

of an abstractness hierarchy of signs. Although it is not a crucial objection, we might note that the hierarchical order of degrees of abstraction is not that perfect with regard to the unbroken concatenation of levels. Irrespective of whether we take -l and -ll in Hungarian nagyol 'do superficially' vs. nagyoll 'find too large' as an instance of 'additive' or short/long opposition, their signata, the respective verb stems, are not of the same level of abstraction. Nagyol is a first-degree signatum (Dressler: 'sign on a sign'), whereas nagyoll is a second-degree signatum (Dressler: 'sign on a sign on a sign'), despite the fact that their signantia, i.e. the phonemes of both nagyol and nagyoll, are definitely components of the same hierarchical order. In Hungarian, the discrimination of elements of identical form and morphological status but of different degree of abstraction can be performed by blocking vowel harmony or other rules of alternation, cf. cél/célok 'aim sg./pl.' vs. cél/célek ('id.', as a metalinguistic sign) or bokor/bokrot 'bush nom./acc.' vs. Bokor/Bokort ('id.', as a last name), cf. Szende 1976.

(i) NP regards phonological representation as a point of departure to which phonological processes are applied (cf. Stampe 1973/1979, 1) as well as, in a historical aspect, as a result of operations that optimize it with respect to the human speech capacity (cf. Donegan--Stampe 1979, 161).

However, this apparent circularity does not involve self-contradiction but a dialectical process in which the results of its (former) applications undergo (current) operations of very similar nature or at least very similar motivation. The problems in this respect are rooted elsewhere. (i/a) First, in the fact that human physiology has a rather limited amount of direct impact on linguistic signs. It is true that, Saussure's (1916/1968, 100--102) principle of arbitraire du signe notwithstanding, some linguistic signs can be proved to be motivated (as it was repeatedly pointed out, with respect to sound inventories, by Fónagy 1956--57, 1957, 1965), but it is only occasionally the case that sequences of phonemes reflect a determination that can be said to be physiological (like e.g. the origin of words like mama and papa as explained in Jakobson 1960). This is rather loosely related to the present argument; but if the opposite were true, that would offer a very direct confirmation of this crucial point of the claims of NP. (i/b) Notice, furthermore, the dissimilarity of 'prelexical' and 'postlexical' processes; and

also the even more striking differences between natural processes and what are called the 'acquired rules' of phonology, i.e. rules that are not motivated by any natural demand of the physiology of speech production. Acquired rules differ from processes in that they can never alter the shape of lexical representations, while some natural processes do so (e.g. the lengthening effect of [r] on a preceding vowel in Hungarian may eliminate or obscure the difference of lexical representations like kor 'age' vs. kór 'disease'; but an acquired rule like vowel harmony will never change the lexically defined forms of stem morphemes). Acquired rules may be violated by various slips of the tongue (e.g. in a way that non-existent but non-excluded consonant clusters are produced); while forms violating a natural process are not produced even by mistake. Acquired rules may be 'suspended'; thus, electri[k]ity, in violation of the acquired rule of Velar Softening, is "not hard to pronounce at all", that is, the regular [s]-form can easily be replaced by a [k]-form. The validity of acquired rules invariably has conditions determined in terms of a particular language, whereas natural processes are as it were automatic, exceptionless, and mostly context-independent. (These and further items of contrast are usually given in varying numbers. Donegan and Stampe [1979, 143--5] list seven of them, Sommerstein [1977, 253--6] lists ten.) In general, it appears that too much latitude is allowed for factors that either do not follow from, or even contradict, principles of naturalness in constructing sequences of segments, a fact that does not increase the persuasiveness of the hypothesis.

(ii) It is undoubtedly the case that a wide range of morphological variation can be described in a natural [i.e. phonetically regular and coherent] manner. But this framework cannot always account for exception-ridden morphophonological alternation and especially of suppletive relationships of morphemes (like Hungarian jön 'come' vs. gyere 'come-2sgImp' or German denken 'think' vs. dachte 'thought'), even if some historical connection can be attested between the two elements. (Examples include denken/dachte in German and hisz(-)/higgy(-)/hiv-/hi- etc. 'believe' in Hungarian.) This makes the relevant alternations, quite reasonable as they are in a historical perspective, appear to belong exclusively to the domain of morphological analysis: to link hiv- with higgy- by synchronic derivation (in terms of natural processes) would involve an incredibly large number of steps, even though their

historical relatedness is obvious and fairly direct. In sum, process matching does not always reveal the right correspondences. (This criticism is not meant to suggest that stem alternants are connected in the speaker's mind by his awareness of historical processes; the actual point is that a framework that professes the principle of naturalness cannot be characterized as non-contradictory if it accounts for some alternations in a way that is at odds with historical -- hence, par excellence natural -- correspondences.)

(iii) If phenomena belonging to diverse levels are forced into a unitary account, inconsistency is unavoidable. Dressler (1985, 12) suggests that oxen should be derived from /ɔks+z/ by an appropriate allomorphic morphological rule. What is most inconsistent here is the derivation of a historically earlier form from a later one in synchrony and the postulation of a sporadically occurring but paradigmatically non-existent form as underlying.

(iv) Two important objections can be raised against the way the notion of the phoneme is interpreted within NP. (iv/a) To cite Dressler (1985, 282) again, an articulatory pattern $[x_i]$ as a phonotype, or even a 'zero segment' may correspond to (in the original: may 'signal') a phoneme $/y_i/$ in terms of some rules (neutralizations and deletions, respectively). This may well be a matter of terminology; but it is quite clearly the case that, to retrieve a phoneme (or to identify it as a listener), one does not simply rely on $[x_i]$ as acoustic (+ visual) information but rather on $[x_i]$ plus context plus information concerning the relevant rules (neutralization, deletion, etc.) as process organizing principles that are revealed by the context. (iv/b) Even though NP sharply criticizes NGP for assuming archisegments, i.e. units that differ in existential status from other portions of the sequence of segments (cf. 2.2.1), it posits something similar itself in deriving a surface form from the corresponding phonological representation. A 'derivation' obviously means that rules/processes leading to the articulatory pattern are conceived of as successive steps. In other words, a derivation may involve intermediate forms or even phonological entities the existence of which cannot be attested in the actual articulatory pattern or the phonological system of the given language, respectively. In this kind of interpretation, each process (except the first) applies to the output of an earlier process (this type of interaction is called 'feeding order'). For instance, in an NP derivation of the common pronunciation of divinity, the result of step 12 (elision of the

flapped /t/) undergoes resyllabification in step 13, thus [dɔ.vɪ́.i] goes to [dɔ.vɪ́i̯] (cf. Stampe 1973/1979, 59). But the latter form is unpronounceable since, within the syllable, nasality must spread onto the [i̯] as well (cf. Lee--Howard 1974, 221ff). On the other hand, an NP analysis will postulate units (and steps) within a derivation whose sole purpose is to make the derivation consist of successive steps of uniform size. The price it has to pay is the introduction of 'false steps' and, with them, units that are nowhere attested in the language, sometimes not even in its history. A unit of this type is *[ɨ] in present-day Hungarian, postulated on the basis that it makes the harmonic behaviour of <u>híd</u>

$$(\leftarrow\leftarrow \text{hid} \begin{bmatrix} \text{V} \\ \text{short} \\ \text{back} \end{bmatrix} \text{-}) \text{ 'bridge'}$$

easier to account for. (The above procedure is, of course, not unique to NP. It is an old device of <u>SPE</u> [1968], frequently employed both for the Hungarian vowel system, cf. Szépe 1969, 393 and passim, Vago 1980, 3, 25--6, Jensen --Stong-Jensen 1986, etc., as well as to account for certain assimilation cases like Polish /g/ → (/dʒ/ →) /ʒ/, Dressler 1985, 184--5 and 282, the latter being a 'false step' in the strict sense.)

(v) NP identifies the segments occurring in phonological representation with what is called the speaker's sound intention (cf. Donegan--Stampe 1979, 163; Dressler 1984, 32--3, with further references); this goes back to very early predecessors in the history of phonology, as stated above. This claim can hardly be maintained. (v/a) If we take it for granted that the description of a word (form) must include a statement of its constituent phonemes and if, furthermore, we assume that the set of words/word forms are independent of the individual speaker, it follows that the givenness of a phoneme in that word (form) is not based on the speaker's intention but on an intersubjectively obligatory, well-defined, 'constant' character of phonemes. (As can be stated more succintly, phonemes are objective in the sense of intersubjectivity, cf. Szende 1980, 64.) It is appropriate to remark here that a similar objection against the notion of sound intentions was first raised as early as during the Prague Spring of phonology, cf. Tamás 1939.) Speakers' intentions are insufficient as a basis for a thoroughly and exhaustively defined phonological representation, among other reasons, because a (linguist-

ically untrained) speaker may well be unaware of what his intention is supposed to be at a particular point of a word (form). To put it differently, he may not even have preconscious knowledge (i.e. one that is not consciously possessed but can be retrieved if necessary) concerning what he 'wanted' to pronounce. For instance, he would not know whether Hungarian kámfor 'camphor' ([kɑ̃ˑŋ̊ˌr], [kɑ̃ˑŋ̊or], [kɑ̃ˑŋ̊or], [kɑ̃ˑŋfor] or [kɑ̃ˑŋfor]) has /m/ or /n/ as its third phoneme since [ŋ̊], [ŋ̊], [ŋ̊ˑ], [ŋf], etc. can equally correspond to /mf/ and /nf/, on the basis of rules (a) and (b), respectively, where the variant [ŋf] is selected for analysis, or the schema in (c) that collapses the two (and generalizes them to include [ŋv] cases like honvéd 'soldier'):

(a) $m \rightarrow ŋ / V \_\_ f$

(b) $n \rightarrow ŋ / V \_\_ f$

(c) $\begin{bmatrix} -voc \\ +ant \\ +nas \end{bmatrix} \rightarrow ŋ / V \_\_ \begin{bmatrix} -voc \\ +ant \\ -cor \\ +cont \end{bmatrix}$

(cf. Szende 1988, 178). (v/b) As Sommerstein (1977, 236) notes in his critical overview, NP assumes that sequences of segments, as they occur in lexical items, are determined by what is called a 'paradigmatic' or 'dominant' subset of natural processes. That hypothesis would entail -- in an extreme formulation -- that the lexicon of a language should exclusively consist of 'natural forms'. But the phonotactic filter of a language may also license 'unnatural' patterns. For instance, in Hungarian teremt 'create', we should get /n/ instead of /m/, given that the occurrence of /m/ before /t/ contradicts the 'natural' rule of nasal place assimilation; incidentally, other verbs tend to obey that rule: ment 'rescue' (no alternation), ront 'spoil' (as opposed to rombol 'destroy', with the same etymon), bont 'take apart' (cf. bomlik 'fall apart'), etc. (The assimilatory tendency is observable in sporadic historical occurrences of teremt with /n/, cf. TESz III, 897.)

(vi) The arguments are not quite transparent concerning what role (natural) phonological processes are claimed to have in the replacement of sound

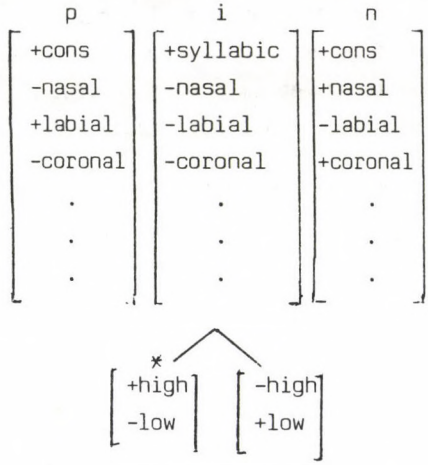
(sequence)s that represent some difficulty for human speech capacity. A significant part, indeed the majority, of natural processes apply in allegro speech where we come across hosts of phenomena violating that theorem in its unrestricted form. For instance, in a sentence like The difficulty is that I am not sure about it, the lento version of the subject [ðə dɪfɪkʌl̪ːˀtɪi] is replaced in fast casual speech by [d:ɪfx̟l̪̃tɪi], even though the phonology of English does not include long consonants or permit a word initial cluster of identical consonants, and does not acknowledge syllabic fricatives (cf. Lass 1984/1985, 295--6).

1.4. Autosegmental Phonology

Among theoretical attempts at finding a proper formulation for phonological (including phonemic/underlying) representations, it was proposed in 1976 that phonological factors (including those traditionally characterized as segmental and suprasegmental) should be considered as constituents of the same type, thus being ascribed to a single category; in particular, that intonation and/or tonal components should be an integrated part of phonological descriptions. Goldsmith (1976a, 1976b) elaborated this idea, calling it Autosegmental Phonology, fairly extensively for Igbo, and in some respects also for English. (Rudiments of this framework were reviewed and its adequacy in accounting for certain aspects of Hungarian was demonstrated by Siptár 1984; for a more extensive application to Hungarian cf. Kornai 1986.)

The original aim of Autosegmental Phonology was to describe -- "at the same logical level as the idea that phonetic representation is a linear sequence of atomic units" -- both phonetic and phonological representation as "composed of a set of several simultaneous sequences of these segments, with certain elementary constraints on how the various levels of sequences can be interrelated" (Goldsmith 1976a, 16). The fundamental unit of description, then, is the sequence. This is expressed by the fact that the theory defines itself as a "theory of suprasegmentals" (ibid. 14). In AP, linguistic representations are entities of 'double articulation'. Thus, even though (i) the word pin consists of three linearly ordered segments, it is (ii) realized by articulatory activity that connects segments (or disregards segment boundaries). (In this respect, AP essentially does exactly what Brücke [1863] did

in his descriptive system; for a comparison of descriptions based on similar principles, cf. Szende 1991.) In a more complete account one segment of the sequence is further specified for pitch components; which makes pin appear like this:



(cf. ibid. 19; the asterisk signals stress). When a tone-bearing vowel disappears from the sequence, say by some type of elision, "the tone that was being borne does not delete also, but rather shows up elsewhere on a neighbouring segment" (ibid.). Partly as a consequence, pitch -- as a "suprasegment" -- may freely move above the sequence of segments, making up an independent (actually, just divorcible) sequence of its own, and thus "each [sequence] is independent in its own right" (ibid., 21). On the other hand, the sequences consist of groups of independent components in another sense, too. The features indicated in brackets above are separated from 'timing units', represented by the pairs of brackets themselves in the figure where the latter are actually unspecified (or rather very vaguely specified) slots in the abstract pattern, constituting its 'skeleton'. Each articulatory feature, in turn, is represented on its own 'tier', defining the contents of these skeletal slots with the help of 'association lines'. (As they fall outside the scope of the present study, we will leave the other assumptions of AP unmentioned. Rather, we will focus our attention to what makes it unthinkable for us to take advantage of this proposal, either as a theoretical framework or as a notational method, of the description of phonological representations.)

The most important objection to the basic idea (more exactly, the basic procedure) of AP is its arbitrariness.

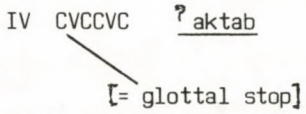
(i) Goldsmith's original theory -- for all its apparent abstractness -- takes articulatory factors that lack any linguistic role, especially that of contrastivity, to be categorially identical with phonemic/contrastive units. This inevitably brings confusion to a practical segmental phonological description of a language. Let me illustrate this point on a language the morphology of which is not (exclusively) concatenative, Classical Arabic, as it is presented by McCarthy (1981). In binyans I to III of the Classical Arabic root /ktb/ 'write' (where a 'binyan' is a conjugation/declension/word formation class), the skeletal templates belonging to each binyan are associated to the three radical consonants in this order but in diverse configurations (the examples are in past tense, active voice, 3sg):

I	CVCVC	katab	
II	CVCCVC	kattab	(this may be interpreted as /kat:ab/)
III	CVVCVC	kaatab	(that is, /ka:tab/).

But the corresponding templatic representation of binyan IV is this:

IV	CVCCVC	ʔaktab

(In this approximate form, the template for binyan IV appears to be identical with the general skeletal template of binyan II. This would not be a serious mistake in itself, since this is a non-specified (or, rather, severely underspecified), generalized representation anyway. A less ambiguous formulation might nevertheless be suggested, and one that does not necessarily contravene the basic assumptions: CVC_1C_2VC, with the proviso that $C_1 \neq C_2$.) The template for binyan IV, then, has an additional element, a glottal stop represented by C that should properly belong to one of the melodic tiers but not the skeleton. The reason is this: the first C in the template for binyan IV is merely a concomitant articulatory property of the first V (here, initial /a/ $\rightarrow$ [ʔa]), rather than a constituent of the phonemic representation. A more explicit formulation of this template, and one that avoids the ambiguity noted above, is this (cf. Yip--Maling--Jackendoff 1987, 218):



Thus, the autosegmental description introduces an additional consonant into this form, creating a new root of the form */ʔktb/. -- Needless to say, this "ghost" root type contradicts the sui generis set-up of Semitic basic forms, and also the morphonological facts. It is similar to adding a morphological /m/ to each root on the basis that in a derivative of this stem, /ktb/ → /maktab/ 'school', it in fact appears, hence /ktb/ → */mktb/, although the /m/ concerned belongs to a different paradigm in Arabic. But the error in AP is even more striking. Given that a putative */ʔaktaba/ -- to mirror surface [{ʔ/ø}aktaba] -- elevates an articulatory concomitance to a phonemic status, it is as if we wanted to claim that the phonemic representation of Hungarian [ʔami] is */ʔami/, in view of the fact that a phrase initial /a/ may begin with a rapid voice onset or indeed a full-fledged glottal stop.

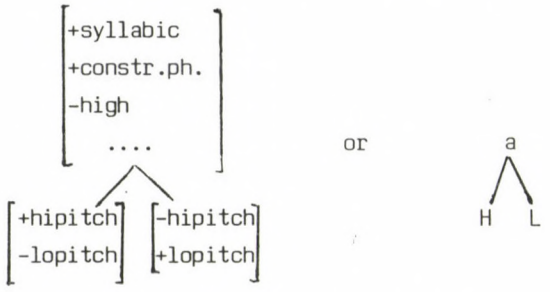
The erroneously deduced */ʔ/ (← [ʔ]) of binyan IV of /ktb/ would, in addition, be an abstract component of the same level as the actual contrastive phoneme /ʔ/ as in /qrʔ/ 'read'; as if we wanted to trace back Hungarian casual [fiʲam] (fiam 'my son') to a phonemic representation */fijam/ and say that the intervocalic consonantal segment really belongs to the phoneme /j/. This interpretation, incidentally, conflicts with the distributional principle of Prague phonology, too. In particular, whereas a phoneme realized as a glottal stop can occur in any position in the root (initial, medial, final), the glottal stop appearing in the autosegmental analysis as C is restricted to word (or rather phrase) initial position.

(ii) Nothing supports Goldsmith's and his followers' assumption that a sequence can be analyzed into a skeleton and other tiers. In AP each feature or component is regarded as an autosegment ('a segment in its own right'), whereas a segment correlated with a phoneme is represented as a geometrical configuration associated to an (abstract) skeletal slot in a given position of a sequence. While the tiers contain realizable phonetic values, the skeleton whose timing slots these features are associated to, is merely a series of empty spaces or phonological niches; the only notional content they have

is a property that can never occur on its own, but simply indicates category membership (a major classificatory feature, as it is called in the standard theory): consonantality/vocalicness (alternatively, nonsyllabicity/syllabicity). But entities of diverse existential status cannot be "added up". (The situation is similar to André Breton's witticism in which a wheel of a locomotive is defined as a concrete and happy encounter of iron and rotation on the surface of a rail.)

Furthermore, if skeletal slots are not interpreted as neutral and uniform Xs (as in more recent versions of AP) but 'prejudged' as Cs and Vs, the situation is as follows. Given that AP intends to map actual surface forms into its own model, it cannot help recognizing ambiguity where a segment may either correspond to V, or to C, or indeed to a "C" realization of a V, cf. Finnish [joisØsa] ← /joissa/ ← joka 'relative pronoun' vs. [joØisØsa] ← /joissa/ ← joki 'river'.

(iii) On the basis of the axiom that no segment may be doubly specified for a feature, including pitch features, AP regards tonal quality as an independent autosegment, asscciated to a segment (= a combination of features) from the outside, as it were. Thus, if a vowel has falling tone, this vowel should be specified as $\begin{bmatrix}+\text{hipitch}\\-\text{lopitch}\end{bmatrix}$ and as $\begin{bmatrix}-\text{hipitch}\\+\text{lopitch}\end{bmatrix}$ at the same time. If, on the other hand, we place tonal quality outside the brackets of the combination of features, the contradiction appears to be eliminated. For a falling-toned /a/ → [a], then, Goldsmith (1976a, 23) gives the following representation:

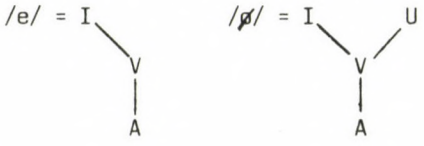


With this notational modification, however, no real change has taken place: the two different values of tonality still remain in the same segment since, despite being placed outside the brackets, all of the falling pitch contour

is still realized on the same vowel. Therefore, if we maintain the original idea, double specification is unavoidable. The source of self-contradiction is a quite trivial error. As Vennemann (1986, 19--20) emphasizes, the author assigns to a single segment a factor, tonal quality, that properly belongs to another structural level, that of the syllable, as a suprasegmental feature. (In this respect, Gussenhoven [1983, 1985] later corrected the original claim of AP, linking tonal constituents, the features H and L, directly to the syllable node. However, this correction -- by depriving the framework of one of its earliest piers -- "backtracks" to pre-SPE phonology and makes AP lose one of its most spectacular (apparent) advantages over its predecessors; cf. also the relevant views of Dynamic Phonology in 1.9.5.)

In view of (i), (ii), and (iii), the final conclusion is that AP is undoubtedly suitable as a -- somewhat complicated -- method of constructing a visual display of an actually uttered word form, yet it is unable to reflect its linguistic (including phonological) representation in a convincing manner. The above evaluation primarily concerned the degree to which Goldsmith and his followers' ideas, heavily relying on the visual suggestiveness of a graphic arrangement of phonological entities, actually conformed to reality. With respect to descriptions of the phonology of some natural language within this framework, it is futile to raise issues like that of internal coherence: wherever function is not given its due role, phonology ceases to exist. Still, Kornai's (1986) analysis of Hungarian in terms of the categories (not merely the terminology) of AP deserves some comment, for two reasons. First, because his point of departure is superior to that of the basic theory in that he focuses on the inventory of phonemes, rather than immediately accessible surface phonotypes. Second, because his analytic criteria include certain phonological events (primarily some phenomena of assimilation). However, the author appears to go astray on both counts. (i) First, he identifies the inventory of Hungarian phonemes with the set of graphemes occurring in the spelling system (cf. Kornai 1986, 14). In doing so, he refers to an alleged consensus with respect to the exact inventory of Hungarian phonemes (cf. ibid. 14) that does not really hold (cf. e.g. Gombocz 1925, 60; Laziczius 1931--34, 180, 182; Bakó 1942, esp. 172; Tarnóczy 1942 and 1943; Deme 1953, 1958, and 1971--72; Szépe 1969, 392--424, esp. 423; Lotz 1972a, 5--6; 1972b, 29--30; Vago 1980, 2--3 and 31--33; Szende 1982; Beöthy--Szende 1985;

and so forth). The assumption that the inventory of graphemes coincides with that of phonemes, i.e. that some (graphic) "biuniqueness" obtains, is false with respect to Hungarian, as it is for most languages with old orthographic traditions. (ii) The application of assimilations as analytical criteria is also dubious in that the occurrence or non-occurrence of assimilation cannot be unambiguously verified in some cases, i.e. the set of instances is distributed in a probabilistic manner. E.g. szkiff 'skiff' → ?/skif/∼/skif:/ (more exactly, in Kornai's interpretation, /skiff/) given that szkiffből → [skifbø'l] or [skivbø'l] 'from skiff' (cf. ibid. 34). The phonemic classification of a unit cannot be based on a heuristic that is built on potentially and/or actually ambiguous linguistic data. (iii) Finally, note that the way of representing systematic correspondences among phonemic segments (in particular, vowels) in which simultaneous presence of one, two, or three units of indeterminate existential status within a single phonemic unit, thus e.g.



(cf. ibid. 26), may express a native speaker's visual impression about some kind of relationships among vowels by a geometrical metaphor, but as long as the components involved do not get some phonetically based definition -- and they do not --, the whole analysis will expiate by instability and will tend to become an instance of mere instrumentalism.

1.5. The full specification principle and alternations

The foregoing sections of this overview clearly reflect the demand that a coherent account of alternation and alternants should be provided by phonological description. In this respect we find that points of departure may be polarized but, at the same time, the claims of the respective frameworks tend to converge on essential points.

1.5.1. The general dilemma of alternation

One of the relevant attempts has been based on the straightforward insight that all accidentality ought to be eliminated and it is sufficient to rely -- approximately in the way the native speaker does -- on what is firm and secure, i.e. on consistently constant components. Everything else should be excluded from phonological representation; or more exactly, relegated to the domain of rules (of various categories). What remains as a task then is to develop a strictly defined phonological representation into an articulatory program.

Kenstowicz and Kisseberth (1977) initially accept Postal's (1968) 'Naturalness Condition', whereby their point of departure is the same as in NGP: phonological representation is identical with surface representation, unless and until a phonological rule intervenes -- obviously discounting all redundant articulatory contingencies of surface forms. (The latter may exhibit a particular ordered distribution, e.g. in sociophonetic terms, conveying complementary linguistic information in this way, but this is not pertinent to the issue of phonological representation.) Ideally, then, "the UR [= underlying representation] of a morpheme consists of all and only the invariant phonetic properties of that morpheme's various PRs [= phonetic representations]" (Kenstowicz--Kisseberth 1977, 8). In view of the principles referred to above, phonological representations can be relieved of some of their redundancies by adding a clause like "invariant properties of morphemes that are predictable by rule may be omitted" (ibid. 11). In the case of alternating morphemes, the UR should be based on one of the surface alternants; in particular, one that is least derivable from the others. Thus, "the UR of a morpheme includes those variant (alternating) and invariant phonetic properties that are idiosyncratic (unpredictable). But it may include only those variant properties that occur in the PR that appears in isolation (or as close to isolation as the grammar of the language permits)" (ibid. 18). However, isolated forms may be misleading (e.g. isolated articulations merge in German Bund 'league' vs. bunt 'colourful'). Hence, it is preferable to pick "those variant properties that occur in the greatest number of 'contexts'" [= affixed forms of the word concerned] (ibid. 26), such that all other surface forms be derivable from that constituting the UR, the basic alternant. It is worth mentioning at this point that, given these principles, a special

problem is raised by stem alternants like Hungarian hi-, hisz(-), higgy(-), etc. 'believe'. In cases like this, Kenstowicz and Kisseberth propose that we take one or more features of all surface segments that participate in the alternation and construct the UR segment out of these features (ibid. 51). But given that the alternating segment in e.g. Turkish gök 'sky' has [k] and [j] as its surface alternants (cf. nom.sg. gök and nom.pl. gökler vs. acc. sg. göğü ⟷ [gøjy], the only possible underlier will be /g/. However, /g/ is not phonetically represented in any affixed form of gök (cf. ibid. 50). Similar difficulties of interpretation are presented by what is known as 'h aspiré' in French. That language has no [h], and the realization of 'h aspiré' by a glottal stop is occasional; the assumption of an archiphonemic segment [+consonantal] is untenable since, along with le héros 'the hero' ⟷ [lᵊ eʀo], we also find l'héroine 'the heroine' ⟷ [leʀoin], hence 'h aspiré' is not even a 'ghost segment' (ibid. 58) like final /g/ for gök. (Tranel [1981, 314] actually writes that since 'h aspiré' words behave regularly in terms of optional schwa-elision, liquid-elision, and glottal stop insertion, 'h aspiré' can be described in phonological representation such that its behaviour follows from independently motivated rules. This account tacitly implies the inclusion of a rule feature in phonological representations.) This completes a vicious circle and reveals the failure of a phonological attempt that intends to define its subject-matter by introducing an increasing number of limitations of its original definition, i.e. by proposing increasingly less severe restrictions on what is an acceptable UR. (i) Kenstowicz and Kisseberth either give up the Naturalness Condition or cannot provide a phonological representation for alternating stems; if it is possible to introduce /-g#/ in gök and /#h-/ in héros -- notice the phonetically contradicting equivalents in the PR --, the representations in question will no longer be "natural", i.e. consistent with the corresponding surface forms. (ii) The possible (but uncomfortable) way out is offered by Kenstowicz and Kisseberth as follows: "The failure to find any absolute condition determining the relationship between an UR and its PRs leaves open the possibility of describing any case of contrasting patterns of morphophonemic behavior in terms of an underlying phonological contrast" (ibid. 59). Accordingly, if in Turkish suffixed forms like göz 'eye' + ü 'his/her' + de 'in' → gözünde 'in his/her eye' we find an n that is not found in either the stem or any of the suffix-

es involved, a morphophoneme /n/ is inserted into the phonological representation of the suffixed form. This solution conflicts with the principle that all segments in the phonological representation are of equal status. In an exigency like this, we can either posit several phonological representations whose difference is neutralized in some position, or else we must submit the morphemes of the language to a nonphonological (lexical) categorization in terms of which the various versions are located in distinct categories.

In order to diminish the distance between (abstract) underlying representations and surface forms, following Kisseberth (1969) and Miller (1973), Sommerstein (1977, 221) cites two standard criteria that motivate the choice of a particular underlying segment. (i) "If a given feature in a given segment has the same value in all surface realizations of a morpheme, that must be its underlying value." (ii) "Where an abstract segment is posited, there must be some non-arbitrary grounds in the data for positing just that segment rather than a non-abstract segment or another abstract segment."

These constraints undoubtedly curb the liberties that might be taken in positing phonological representations but in fact they are both trivial. The first is essentially a paraphrase of Postal's (1968) Naturalness Condition, and the second is not more restrictive than the usual practice of standard generative phonology in which corresponding portions of morphologically related forms are traced back to a single abstract underlying representation. The situation, therefore, is that phonological representations are a mixture of concrete general and abstract individual elements within a unit whose implementation (and applicability in speech) would presuppose the homogeneity of its elements.

1.5.2. The Homogeneity Principle of Concrete Phonology

As a reaction against analytical procedures proposed in transformational generative grammar in general and generative phonology in particular, the tenets of Concrete Phonology emphasize the primacy of surface structures in the sense that they consider the latter as a necessary starting-point in any analysis. This is done by discarding 'underlying segments' both as real entities within the competence of the speaker and as useful constructs for the phonologist. Two relevant points of the proposal can be briefly summarized as follows. (i) Linguistic description -- in view of the criterion of learn-

ability and other similar criteria -- should only posit a particular segment type in phonological representation if it corresponds to one at the level of surface structure (cf. Goyvaerts 1981, 120). (ii) Only fully specified matrices are allowed as input to phonological rules. In other words, a rule of phonology can only apply to segments that are completely determined with respect to all of their identifying features (ibid. 120).

The phonology of natural languages in fact supports the view that surface phonetic constraints are really operative, e.g. in phonotactically motivated phonological rules (cf. limitations of word initial occurrence in a variety of languages). Furthermore, they take precedence over MSRs (morpheme structure rules). The reason is that universal (intrinsic) rule order is to be preferred to language-specific (extrinsic) ordering; note that the former affects surface forms -- and relies on surface phonetic constraints -- to a larger extent than the latter does (cf. Goyvaerts 1978, 120--1). We might add that the native speaker's competence must include, for each word (form), a representation that makes it (re)producible at any time. But (re)producibility is only possible if phonological representations contain fully specified matrices. This does not imply that redundancy rules should not be formulated for whatever is redundant in phonological representations. However, such redundancy rules must be taken for what they are: rules, and not parts of phonological representation in the guise of segments. In order to sharpen this claim, we can say that rules are objects that are valid (are assigned truth value) in another area of (phonological) reality; but unless phonological representations contain fully specified matrices they lose their point and become vacuous.

1.5.3. Diachronic parallels in derivations

The two levels of representation are defined within standard generative phonology (cf. Lass 1984/1985, 57--69) in terms of the Unique Underlier Condition: "Every non-suppletive alternation is to be accounted for by assigning to each morpheme a single, phonologically specified underlying representation, with the allomorphy derived by general (preferably phonologically specified) rules" (ibid. 63, original emphasis). The procedure is like this: "Where possible, select the most widely distributed allomorph." In deriving the remainder, "let the description fall out naturally from the phonotactic

rules of the language" (ibid. 64). In the case of Latin rex 'king' vs. regis (gen. sg.) this means (i) starting from the stem form /re:g-/ from which all oblique forms (dat.sg. regi, acc.sg. regem, etc.) follow naturally -- except (ii) nom.sg. rex that is generated by what is known as a 'false step' from /re:g/ + /s/ → re:gs, which then undergoes a 'rescue rule' that enforces a phonotactic regularity (word final */-gs/ is impossible), producing the correct output [re:ks]. (iii) "Get maximum mileage out of independently motivated rules; use 'free rides' where possible" (ibid. 67). This means that a shared relevance area of independently motivated rules allows the derivation to go through steps that are not attested in the form at hand but that occur elsewhere. For instance, in miles/militis 'soldier (nom./gen.sg.)' we could easily assume a /mi:lets/ → /mi:les/ change on phonotactic grounds, but the alternation of e~i cannot be explained within the nominal paradigm. We may then appeal to parallel verbal alternations like teneo 'I hold' → attineo 'I keep', sedeo 'I sit' → assideo 'I sit by', premo 'I press' → comprimo 'I compress', etc. On the basis of this e~i alternation (in which e is underlying and i occurs in the noninitial penultimate syllable of the stem if the preceding syllable has a vowel other than e) we can now posit the phonological representation /mi:lets/ (ibid. 67).

This explanation of alternations is superior to some other proposals in that it does not include a disjunction of elements, thereby excluding units that are not of equal existential status with the rest. The fundamental attitude of this approach apparently goes back to that of Bloomfield. As Lass points out (1984/1985, 59--61), Bloomfield (1933, 218) also accounted for stem alternation in German Rad 'wheel' vs. Rades (gen.sg.) etc. by positing the same phonemic unit in both forms, in conjunction with the relevant phonotactic rule ("of permitted finals"). However, this superiority (of Lass's claims over those of some predecessors) cannot obliterate the fact that, by allowing free rides, he includes intermediate forms in his derivations that do not occur on the surface (cf. *regs, *milets, etc.). Another unavoidable problem in this conception is that the biuniqueness of phonemic and phonetic units is overridden by the emergence of a new distinction between 'underlying' and 'derived' units like the second [i] in principis 'chief (gen.sg.)', derived from /e/ (cf. nom.sg. princeps) or [e:] in ens [e:ns] 'reason (nom. sg.)', also derived from /e/ (cf. gen.sg. entis). In this respect, contrary

to what Lass (1984/1985, 68) proposes, it is rather the case that such units (i) are systematic members of the inventory of phonemes, irrespective of being due to raising or compensatory lengthening, just like the [u] in Polish [ruk] 'horn' (← /rog/, cf. plural [rogi]) or /e:/ in Hungarian hév 'heat' (vs. heves 'hot(-tempered)'), and their realizations are constant; furthermore, they are (ii) morphologically determined, therefore the natural area of their interpretation is morphology; thus in a segmental phonological perspective they are not to be regarded as special 'class-alien' figures among underlying segments. Also, selecting the "most widely distributed" segment as the one occurring in the basic alternant entails that phonotactically unpermitted sequences are assumed to exist (and automatically trigger the relevant rule).

1.5.4. Summary and conclusions

As the above considerations suggest, the treatment of the phonological problem of alternation is on the right track to a satisfactory fulfilment in two respects: (i) (archi)segments of defective specification cease to be involved in alternating portions of morphemes in some descriptive hypotheses; accordingly, (ii) in the representation of alternating word forms and in the formulation of rules of alternation, the principle of full specification is enforced for each and every segment of the forms concerned (see further the relevant claims of Dependency Phonology, reviewed in 1.6). In the present, strictly phonologically oriented approach these theorems are supplemented by the following: (iii) Alternants are related to one another by rules that, in general, point towards historically more recent alternants from earlier ones (to recapitulate some of the above examples, Latin reg(is) → rek(s), Turkish gög(V) → gök(-), German Bun[d]({V; #C[+voice]}) → Bun[t], Hungarian hiv- → hi[ɟ:](-)). (iv) Rules are processes: they select directionality for alternations in the dimension of the phonological--communicative naturalness (pronounceability and perceptibility) of strings (sequences of segments as wholes); in particular, this is done -- in terms of a strength hierarchy -- (iv/a) in the direction strong → weak, if ease of pronunciation dominates, and (iv/b) in the direction weak → strong if perceptibility gets the upper hand. It can be observed that with an increase of the length (number of segments) of morphemes tendency (a) will gain force whereas in the reverse case

tendency (b) has a more important role. (v) Alternations tend to involve the 'loosely programmed' portions of strings in the sense that they affect word edges less than segments flanking an internal morpheme boundary; thus, stem initial phonemes in Hungarian do not participate in any alternation, whereas stem final and suffix initial phonemes often do. (A more thorough discussion of items (iii--v) will not be provided here as they are beyond the scope of the present study.)

1.6. Dependency Phonology

A number of current phonological innovations refuse to put on the methodological straightjacket of criticizing and trying to improve on the standard SPE framework. A sign of this new approach is that suprasegmental phonological devices are now taken to be part and parcel of sequence construction such that a sequence of segments simply cannot be produced without them (cf. 1.4). With the emergence of non-linear phonologies the discipline has undergone radical changes such that (i) the syllable has been (re)introduced into phonological theory ('Syllabic Phonology'); prominence and pitch relations have been extracted from segmental representation, the latter in a "pre-defined" form as extremes of a scalar pattern ('Autosegmental Phonology'); or syllables and tonal/prominence features have both been invoked ('Metrical Phonology', 'CV Phonology', 'Dependency Phonology'). Secondly, (ii) different and/or additional structural properties, constant and variable, have entered into the characterization of segments or systems of segments ('Particle Phonology', 'Autosegmental Phonology', 'Dependency Phonology').

The new approach focuses on the hierarchy of constituents, with special emphasis on internal dependency relations of that hierarchy. In particular analyses, dependency is a crucial notion in terms of principle and methodology, and indeed one of the frameworks has just this word as a designation. Dependency Phonology attempts to account for everything that a multifactor surface form may, or rather must, contain. Anderson and Durand's (1986) survey presents linguistic forms as aggregates of a number of levels that are interconnected by dependency relations. In addition, similar dependency relations characterize each level in itself, and their relevance is in accordance with what is called the 'structural analogy' assumption. This assump-

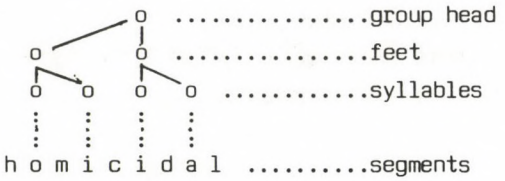
tion predicts that the same structural properties recur at different levels. Structural properties postulated as unique to a particular level are unexpected and have to be supported by especially firm evidence of their unique appropriateness. Two levels of structure (syntax and phonology, for example) may be 'heteroplanar': although they share structural properties, the basic 'alphabets' of categories do not overlap (cf. Anderson--Durand 1986, 3--4). The crucial shared structural property is what is called the head--modifier (dependency) relation, e.g. the dominant constituent (the head) of a sentence is the predicate, modified by the subject; in turn, the head of the predicate is the verb, modified by e.g. the object, etc. The direction of modification may differ from level to level. Assuming the dominance principle and a unique alphabet, phonological representations will exhibit a novel kind of patterning.

For the identification of segments, DP uses a small set of basic components that are meant to constitute a logically tight system. For instance, the components used to describe vowels are i (palatality or acuteness/sharpness), a (lowness or sonority), u (roundness or gravity/flatness), cf. Anderson--Durand (1986, 25). (In the earlier Hungarian literature, Deme [1958] had proposed the same "phonologically utilized sound properties", with the additional property of 'duration'.) In DP, components are elementary units of phonological processes as well (the reduced form of English to, [tə], is derived from /tu/ by reduction or 'dearticulation', conceived of as a simple omission of the component u).

The description of phonological forms involves two major principles in this framework. (i) Natural recurrence: phonological groupings (paradigmatic and syntagmatic) are not random: certain groupings recur; furthermore, phonological groupings (and the relationships between them) have a phonetic basis: they are natural (cf. Anderson 1980, 165). (ii) Natural appropriateness requires that a phonological notation should optimize the expression of such groupings (cf. Anderson--Durand 1986, 7). For instance: given that the feature [+high] characterizes a whole natural class of vowels, it is a recurrent property that has a consistent phonetic correlate, i.e. high tongue position, hence it is also natural. In addition, it shows clear affinity with some consonants that are also characterizable as [+high], both in paradigmatic (inventory-related) and syntagmatic (organizational pattern-related)

groupings. Its use, consequently, is optimal.

With respect to phonological description, it follows from the foregoing principles that the phonological representation of a word (form) has essentially the same structure as that of a phrase-size linguistic form; e.g.



(cf. Anderson--Durand 1986, 19). The lowest row in this four-row structure, that of segments, contains units that support the whole structure on the one hand, and appear in speech as delimitable, self-contained wholes on the other. But the theory extends the notions of dependency and dominance to the analysis of segments, too, on the basis that they allow "the expression of relative degrees of salience among the components of segments" (ibid. 19). Based on a hierarchy of components, a more realistic and simpler description of some phenomena becomes possible. For instance, nasal place assimilation (e.g. n → m / ___ p as in Hungarian színpompás 'richly coloured') is described in the standard formalism as

$$[+\text{nasal}] \Longrightarrow \begin{bmatrix} \alpha\text{ant} \\ \beta\text{cor} \\ \gamma\text{back} \end{bmatrix} / \_\_\_ \begin{bmatrix} -\text{son} \\ \alpha\text{ant} \\ \beta\text{cor} \\ \gamma\text{back} \end{bmatrix}$$

But if we realize that homorganicity is not a pairwise agreement between individual features but identity of articulation of segments as wholes (yet we do not want to return to the unenlightening traditional view that assimilation replaces one entire segment by another, as the notation n → m deceptively suggests), the solution readily comes to mind that nasal place assimilation concerns a submatrix or 'gesture'; thus:

$$[+\text{nasal}] \Longrightarrow [\alpha\,\text{ARTIC}] \;/\; \_\_\_ \begin{bmatrix} [-\text{sonorant}] \\ [\alpha\,\text{ARTIC}] \end{bmatrix}$$

The novelty in this formulation is the claim that each segment matrix consists of organically related groups of segments (submatrices, gestures) that can participate in processes as 'molecular' units (cf. Anderson 1975, Lass 1976). Notice, however, that the 'articulatory gesture' is defined in DP as involving nasality, see below. Hence, on a strict interpretation, the rule incorrectly turns an n before p into b or w, rather than the intended nasal, m. This means that although the idea is valid (as well as informally used in the standard literature), its particular implementation proposed by Anderson and Durand involves an oversight.

There are several different proposals in the DP literature with respect to the details of the internal organization of segments; one particular proposal in this respect runs as follows:

(i) Categorial gesture: consonantality, voice, continuancy, sonorance;

(ii) Articulatory gesture: place, height, rounding, backness, nasality;

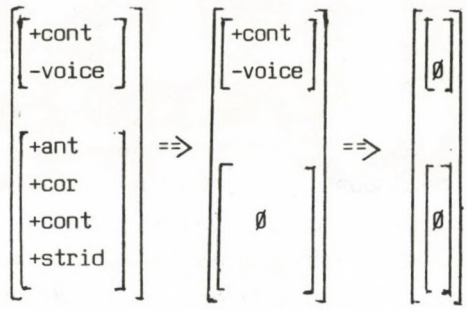
(iii) Initiatory gesture: glottal stricture, glottalicness, velar suction (cf. Anderson--Durand 1986, 21); an alternative classification (cited by Lass 1984/1985, 290) is the following:

(i) Articulatory: 'Place', Lip attitude, Velic attitude;

(ii) Categorial: Consonantality, 'Voice', Continuancy, Sonorancy;

(iii) Initiatory: Glottal stricture, Airstream direction, Airstream source.

A word form matrix is not necessarily specified for all the features or submatrices of all segments in it. For instance, the articulatory submatrix remains empty for [h] as this segment is not defined for any specific tongue or lip position. Similarly, [ʔ] is sufficiently determined by one initiatory and two or three categorial features. The rest are represented by Øs in the matrix. Accordingly, this notation has a spectacular way of reflecting lenition processes or historical changes in which certain consonants are deleted in several steps. For example, in some dialects of Spanish, word final [s] was reduced to [h] before being totally deleted; this can be indicated like this:



(cf. Anderson--Durand 1986, 22).

In DP the principle of structural analogy has unrestricted application. Hence, the internal structure of segments is also accounted for in terms of dependency relations (like higher-level linguistic structures). Segments are defined by infrasegmental dependencies, expressing relative degrees of salience among the components of segments. However, 'relative salience' can only be made sense of if those components are not regarded as independent pairs of polar values but rather as standing for scalar values along a specific dimension. Therefore, we expect that DP will reject the Jakobsonian idea of binary features; and it in fact does. What is more, the theory does not allow for the notion 'feature', either. Instead, it introduces a set of unary components that may either be absent from a representation or present in it. If present, they may enter into simple combinations with other unary components of equal or unequal strength (cf. Anderson--Durand 1986, 24). In particular, components A and B can be related in terms of salience (strength), within a single segment, as follows:

1	2	3	4	5
A > Ø	A > B	A = B	A < B	Ø < B

(B is absent in 1, A is absent in 5). In cases where A and B are both present, A may govern B (2), B may govern A (4), or they may mutually govern one another (3); where government is not mutual, the stronger (governing) component is the dominant one. It is worth pointing out that the physical correlate of strength is relative sonority -- with respect to articulatory components. The two limiting cases are V for highest and C for lowest sonority; these are components of the categorial gesture and define vowels and voiceless plosives, respectively. All intermediate values of sonority are defined by some dependency combination of these (e.g. liquids: V dominates a simple

combination of V and C; nasals: V dominates C; voiced fricatives: a simple combination of V and C dominates V; voiceless fricatives: V and C mutually govern each other; voiced plosives: C governs V; cf. Anderson--Durand 1986, 34). Notice that this is essentially an extension of Pike's (1947, 5, 13--4 and 244) classification vocoid/contoid to the subsegmental domain.

Since DP tacitly assumes that in the case of vowels (i) the initiatory gesture invariably involves periodical vibration of egressive airstream in the glottis (i.e. excludes voiceless vowels) and that (ii) no obstruction is formed in any part of the vocal tract (i.e. the various aerodynamic effects of oral configurations do not qualify as 'obstruction'), the description of vowels and vowel systems is exclusively based on articulatory components, thus ignoring initiatory and categorial specification (other than V).

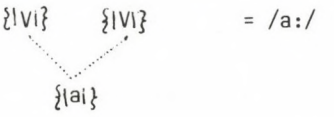
On the other hand, the multiple possibilities of manner of articulation in the case of consonants require that sound systems as wholes be defined in a rather wide notional space. The dependency principle is observed in the representation of consonants, too, but -- surprisingly -- the subclasses of consonants and (phonotypes of) individual consonants are not defined by the same criteria. The basis for the classification of the total inventory is, tacitly, the potential articulatory power (sonority) of the various classes, i.e. the total sound energy output per time unit (cf. Tarnóczy 1982, 30ff). In particular, the relative contributions of 'relatively periodical components', V, and 'decrease of periodical energy', C, are established and expressed in terms of combination and dependency relations defined over V and C. The groups are listed in terms of decreasing energy output (see above).

It appears to be a peculiar contradiction within the theory that the classification of segments is essentially based on acoustic criteria but individual segments (in the case of consonants) are exclusively defined in articulatory/physiological terms. (There is a single exception, gravity, covering both 'velar' and 'labial' -- 'peripheral' would be a corresponding articulatory designation -- that is unmistakably an acoustic/perceptual term.) The components are u -- grave, l -- lingual, i -- palatal, t -- apical, d -- dental, r -- pharyngeal, i.e. tongue-root retraction, λ -- lateral, and n -- nasal (cf. Anderson--Durand 1986, 38--9).

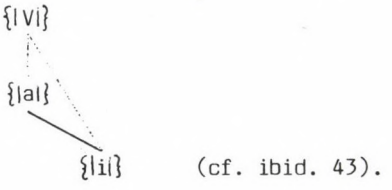
Theoretical problems that are relevant for the structure of phonological representation can primarily be detected in the manner in which segments

are constructed from these components. In particular, complex units are represented in the same problematic manner as in AP (and in CV-phonology, cf. Clements--Keyser 1983).

(i) Long vowels are represented by a single articulatory gesture associated with two successive categorial gestures; the description is bisegmental in a strict technical sense in that it involves a repetition of V:

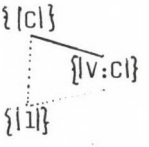


(cf. Anderson--Durand 1986, 42). Conversely, short diphthongs appear to be represented as monosegmental, e.g. for /a$\hat{i}$/:



(cf. ibid. 43).

(ii) Among consonants, affricates are worth comment. To the extent that they are to be analysed as monosegmental, their representation will include two categorial gestures in a dependency relation, and associated to a single suprasegmental node; e.g. for /t$\hat{s}$/:

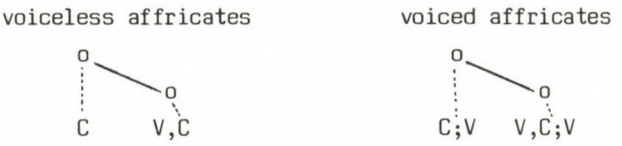


(cf. ibid. 43).

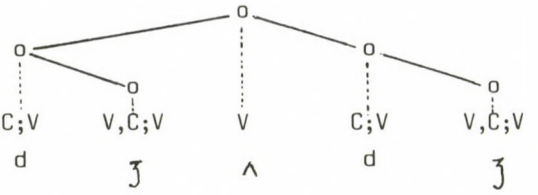
This representation is more consistent than the traditional approach; but it is still not fully satisfactory given that any kind of dismemberment into a stop phase and a fricative phase necessarily conflicts with the real articulatory and acoustic character of affricates (cf. section 2.1.5.2 below).

In other DP accounts, affricates are represented in an even more problematic manner. If affricates are treated as truly bisegmental (i.e. involv-

ing two suprasegmental nodes in a dependency relation), an additional difficulty arises concerning how they can be included in a word form without violating the basic conventions of the dependency relation and without contradicting the principle of 'sonorancy arches' in syllable structure. According to Anderson--Jones (1974), the general representation of affricates is this:

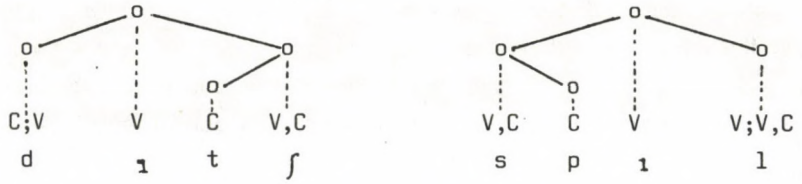


Accordingly, judge will appear as



(cf. Davenport--Staun 1986, 136). Against such a representation, two objections can be raised. (i) The 'syllabic governor' (i.e. the vowel, V) directly governs a segment C;V to which it is not immediately adjacent in the linear sequence whereas it does not directly govern the segment V,C;V to which it is immediately adjacent. Secondly, (ii) the first part of [dʒ], the initial turbulence phase (generally referred to as the stop component) governs the second part, the release phase (in traditional terms, the fricative component), even though its sonority is lower than that of the governed segment (cf. Ewen 1980). These circumstances involve a relaxation of two basic principles of the model: that dependency relations progress regularly from the syllabic governor "outwards"; and that in a dependency hierarchy more sonorant segments govern less sonorant segments (cf. Davenport--Staun 1986, 136). Similar sonority paradoxes are presented by syllable initial /sC/- or /ʃC/-sequences (English stir, steel, German Stein 'stone', starren 'stare'). The solution that Davenport and Staun (1986, 142) propose involves a reversal of dependencies in both problematic cases, whereby the 'greater governs lesser' sonorancy principle remains intact (although the discrepancy between adja-

cency and government is not resolved):



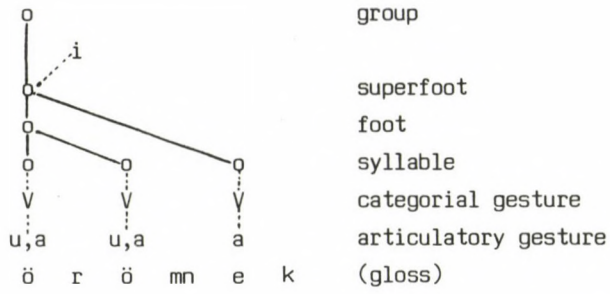
(cf. Davenport--Staun 1986, 142). This solution is not satisfactory. As is well known, the sequence interpretation of affricates has to face a number of counterarguments. It will suffice to refer to just one here: short intervocalic affricates are not divided by a syllable boundary, cf. Hungarian <u>kacsa</u> 'duck' → /kɑ$tʃɑ/.

The problem of affricates is even more serious than it first appears to be. In particular, it highlights a hidden internal inconsistency of DP. The principle of syllable-based word form (or generally, sequence) construction is one of the most crucial theoretical underpinnings of DP (cf. Vincent 1986 for a general discussion), a fact that is clearly shown by its treatment of French <u>liaison</u>. (In his DP account, Durand [1986, 175] reiterates the now generally accepted claim that examples like <u>deux amis</u> 'two friends' involve a 'floating' or 'stray' segment, /z/, that is not deleted in this case because it is attached to the initial vowel of the second word; i.e. to an immediately adjacent syllabic governor.) Therefore, with the inconsistency of the analysis of affricates, the theory goes wrong in an area where both its ambitions are the highest and its arguments are (otherwise) the soundest. The latter is perhaps not quite true for sequence phenomena outside the syllable domain, although sequence structure constraints are a crucial aspect of this framework.

As an illustration, consider the issue of Hungarian vowel harmony. The DP description of vowel harmony involves a lexical prosody <u>i</u> for each front-harmonic stem. Given that in compounds it is the last member that suffixes harmonize with, the domain of harmony is not the word but the foot (or superfoot, as the case may be) whose head is the initial syllable of the stem (in compounds, the last stem), cf. Anderson--Durand (1986, 51). This is the level where the <u>i</u> component is attached. As a prosodic (suprasegmental) component, this <u>i</u> is superimposed on the segmental level and specifies all vow-

els in its domain as front vowels (cf. ibid. 52).

For example, <u>örömnek</u> 'joy (dat.)' will be represented like this:



To posit a suprasegmental component in order to account for vowel harmony, and especially for irregular or vacillating or otherwise anomalous cases like <u>híd</u> 'bridge', <u>ír</u> 'write', <u>derék</u> 'waist', <u>Ágnes</u> 'proper name', <u>sofőr</u> 'driver', <u>amőba</u> 'amoeba' is a well-established practice of AP and other nonlinear approaches, too. For instance, Kálmán (1988, 6) claims that irregular stems (like <u>híd</u>) "come equipped with" a **[[**BACK**]]** autosegmental tier; this is Kornai's (1988, 25) solution as well, and roughly corresponds to the basic idea of Booij (1984). Jensen and Stong-Jensen (1988, 3) account for vowel harmony by feature spreading, too, as does Olsson (1986). Details apart, the point of all these analyses is the same. In particular, the individual segments (or several vowels of a sequence) may have infrasegmental components of their own, as well as an opposing component superimposed on them from another (suprasegmental or separate autosegmental) level. The latter has priority in the organization of the full sequence (the suffixed word form) over the infrasegmental component. Meanwhile, the infrasegmental component is not allowed to change, hence the vowel is phonetically realized in the same way as if the suprasegmental component did not exist. Thus, the frontness of /i/ in <u>hidakat</u> 'bridges (acc.)' is unaffected, even though the whole word form is governed by a suprasegmental 'velar' component. (Notice that the DP account outlined above is superior in this respect to the specific autosegmental treatments mentioned in this paragraph.)

The main objections to DP (matters of principle and matters of methodology) can be systematized as follows:

(i) It is unclear whether some units are mono- or bisegmental. In particular, long vowels and affricates are analysed in a controversial manner, just like in Autosegmental Phonology. The latter are sometimes verbally described as monosegmental but formally represented as occupying two segmental 'slots' as if they were phonemically complex elements analysable into a stop portion and a fricative portion. This assumption corresponds to the cluster analysis of affricates that is inappropriate both to Hungarian and a number of other languages.

(ii) DP analyses often make crucial reference to phonetic facts, especially with respect to segments but also to suprasegmental factors pertaining to the structure of word forms (cf. e.g. Davenport and Staun's 1986 analysis of affricates or Anderson and Durand's 1986 overview of the representation of sound systems). However, these phonetic facts are not supported empirically, sometimes not even clearly stated (cf. Anderson--Durand 1986 again).

Phonetic inconsistencies can be found, not independently of the foregoing, in complex representations of word forms (i.e. ones that include every level of actual realizations). Thus, nothing verifies the assumption that a subsegmental (in DP terms: infrasegmental) component may also play a role as a prosodic constituent (like the component i at the (super)foot level, cf. Anderson--Durand loc.cit.).

The categorial components V and C, and their various combinations, cannot be assumed to participate in any dependency relation. What is referred to as dependency here is actually the proportion of sonorance and damping in the acoustics of phoneme realizations, in terms of which a sonority hierarchy can be established among speech sounds.

(iii) It is not satisfactory to rely on "empty" or partially specified segments. Both h and schwa, however underspecified they may be at a far-from-surface level, always exhibit some specifics that, though potentially characterized by widely scattered actual values, contribute to the identifiability of the sequence that contains them. The values they take are properties of the sequence that may occur outside the segment itself (like noise components of [h] in the adjacent vowel), but without them the sequence is incomplete. This difficulty can be explained away by claiming that these are phonetic details that are irrelevant with respect to the phonological evaluation of these segments. Yet, the contrary view of Concrete Phonology is more

convincing, on the basis of (iv) below.

(iv) In its concrete analyses, DP subsumes actual historical events under its theoretical claims such that they fall into place in putative causal relationships. For instance, the change [s] →→ [Ø] cited above for some Spanish dialects has an intermediate stage, [h], in which a Ø in the matrix of the articulatory gesture stands for very vague and scanty specification, or rather an extensive domain of variable values of articulatory properties. Even if we assume that the values of those articulatory properties are extremely scattered, due to phonetic context and other factors, each particular realization of [h] will necessarily have concrete values in those matrices. Furthermore, even an extremely unordered set of values is situated at an ontological level that is quite different from that of the Ø of the final (elision) stage of the historical change. Note also that the implicit claim about historical change that it follows the above linear order of events, is a somewhat arbitrary assumption. As Fónagy (1966, 1967, 1975) pointed out, historical change cannot circumvent an intermediate stage of free variation.

1.7. Particle Phonology

Closely resembling DP in its basic principles and methods, e.g. in assuming elementary components and in the way it describes segments and (phonological) processes, Particle Phonology is a partial theory of vowels. Just like DP, it is based on a complete rejection of the tradition of distinctive features.

Schane (1984) claims that distinctive features cannot reflect the "nature" of phonological processes because they do not make explicit the shared properties of all factors participating in a given process or change. Therefore, he proposes a segmental phonology of vowels that represents the entities participating in processes in a more insightful manner. PP assumes that the basic phonological elements or 'particles' are the phonological/phonetic properties themselves whose sets then make up the various segments; in particular, two 'tonality particles' (i and u) and an 'aperture particle' (a) are posited, reflecting chromatic and sound capacity characteristics of vowels, respectively. The extreme values of these properties (as represented by one of the elementary particles on its own) coincide with the vowels occupy-

ing the vertices of the vowel triangle: the highest degree of palatality coincides with [i], the highest degree of labiality with [u], and the highest degree of aperture with [a]. Intermediate vowel qualities are determined by the number and kind(s) of elementary particles they contain. For instance, !e! includes an aperture particle and a palatality particle (and no labiality particle). Short vowels can be described along the following lines:

[i]	i	[u]	u	[ü]	iu		
[e]	ai	[o]	au	[ö]	aiu		
[ɛ] or [æ]	aai	[ɔ]	aau	[œ]	aaiu	[a]	a

Further details can be indicated by a number of supplementary devices; thus + indicates syllable boundary, space signals length, and a small crescent underneath the symbol of a particle stands for non-syllabicity. Examples: a vowel sequence [ia] is represented as i+a; long vowels like [i:] or [e:] are represented as i i and ai ai (the latter can be simplified as ai i), respectively (where space indicates length itself and the repeated particles indicate tenseness where relevant); and a diphthong like [ei̯] is written as aii̯ if (phonologically) short and as ai i̯ if long. If the vowel system of a language is also partitioned by an opposition of 'tense/lax', the indication of tenseness as above is reinforced by the indication of laxness (by way of an additional aperture particle). Thus, it is also possible to describe a system where tenseness is unaccompanied by length:

(short tense) [e] ai vs. (short lax) [E] aai

There are two errors involved here. (i) aai may stand for [ɛ] or [æ] or lax [E]; the author must have assumed a tense/lax opposition to be incompatible with a rich system of E-type vowels (so that they cannot cooccur in the same language). A possible amendment would be to introduce a 'laxness' sign, say a pair of parentheses: (a)ai. (Siptár [1987] thinks that "this flexibility is a virtue, rather than a shortcoming: it is the vowel system of the given language that decides whether aai is [ɛ], [æ], or lax [E]". This rescue operation is not quite successful. If Schane is earnest about the phonetic determinatedness of the articulatory correlates of particles -- as he appears

to be --, he cannot abandon the principle of biuniqueness. This would amount to a rejection of Postal's 1968 Naturalness Condition and the adoption of an "anything goes" view of interpretation.) (ii) Schane derives all lax vowels by adding an aperture particle to the corresponding tense vowel. This is not borne out by the phonetic data. (Laxness involves a decrease of intensity in terms of several articulatory components of the whole vowel configuration.) The same objection applies to length being represented by additional tonality particles.

The author's original aim, the description of phonological processes is done in a much more logical form using these elementary components than ever before. In addition, it is definitely simpler. The individual operations are as follows.

- Fusion and fission: diphthong to monophthong and monophthong to diphthong changes, respectively; e.g. [au̯] ⇄ [o] is au ⇄ au.

- Mutation: the (dissimilatory) interchange of tonality particles; e.g. [i:] → [ii̯] → [ui̯] or [u:] → [uu̯] → [iu̯].

- Cloning and droning: a particle from one syllable is copied into the vowel of another syllable; respectively, a vowel loses a particle due to the assimilatory effect of a vowel in an adjacent syllable (this happens e.g. in umlaut processes).

- Accretion and decay involve context-independent changes in the number of particles; e.g. prior to Middle English Open Syllable Lengthening, short [i e u o] must have become lax by spontaneous addition of an aperture component: this is demonstrated by the fact that, upon lengthening (in open syllables), they became [e: ɛ: o: ɔ:], respectively. An example of decay can be observed in the final stage of the chain shift Latin me [me:] →→ French moi [mua̯] 'me':

[e:]	→	[ei̯]	→	[oi̯]	→	[ue̯]	→	[ua̯]
ai i		aii̯		aui̯		uai̯		ua̯
	Fission		Mutation		Fus/Fiss		Decay	

(where the third step involves a complex operation in which the particle of aperture and syllabicity are both shifted from the first to the second position within the diphthong but the particles involved remain exactly the same -- this can be interpreted as a fusion of aui̯ into aiu with immediate refis-

sion into uai).

The methodological yield of this framework is extremely rich. It uses a minimum number of components that is just sufficient to tell vowels from one another. Its notation is simple (e.g. the number of diacritics and operation symbols is low), and it can be applied to any language (though the latter is an obvious requirement for any theory and is met by all frameworks discussed here). On the other hand, it is not quite consistent in expressing relations of long/short/reduced vowels and does not reflect quantitative relations of groups of particles in a completely exact manner (while degrees of aperture are clearly indicated).

1.8. 'Parsing' and Lexical Phonology

The divergence of lines of research in post-SPE phonology resulted in a multitude of explanations of phenomena concerning the composition and application of the inventory of primitives on the one hand but, occasionally, in a radical reduction of the domain of phenomena investigated on the other. A thematic diversification of the subject-matter of phonological analysis is an unavoidable consequence. The DP principle of structural analogy cannot be maintained in its full generality; the 'Strong Naturalness Condition' of NGP is even less supported when we find that whether or not certain phonological processes apply may depend on the morphological structure of otherwise completely identical sequences of segments, cf. e.g. Hungarian lép 'spleen' + -vá/-vé '(turn) into' → lé[p:]é vs. lép 'step (verb)' + -va/-ve '-ing' → lé[pv]e; or when we find that a sequence that is permitted within a morpheme is forbidden in a heteromorphemic situation, cf. sofőr 'driver' vs. *portől ('from dust'; correctly: portól). In short, we need a 'parsing model' to account for these discrepancies. It is a straightforward assumption that the set of rules is non-homogeneous. As Leben (1979) put it, phonological rules fall into two groups: (i) a block of idiosyncratic rules that apply within the lexicon and (ii) a set of general rules that may also apply within the lexicon but their main purpose (for some of them, their only purpose?) is to generate surface forms out of lexical representations (cf. Leben 1979, 179). These groups of rules differ in terms of their degree of phonetic motivatedness. (Thus, umlaut is a conventional morphophonemic alternation, while word

final devoicing is a natural, phonetically motivated rule.) The rules of the first group are not, or not necessarily, motivated in direct phonetic terms. In the case of the second group, however, the variation that occurs in realizations of word forms can be explained on the basis of articulatory/acoustic/perceptual criteria. However, the point of departure for such explanation cannot be an abstract segment like SPE's /x/ in right (cf. section 1.1) since the speaker can only store/access (pronounce and identify) both or all alternants of a morpheme as sequences of phonemes. Accordingly, the correct description of word forms requires that the phonological representation of each phoneme should "be nondistinct from at least one of its realizations" or, rather, a generalized equivalent of one of its realizations (cf. Leben 1979, 179). (Notice that this assumption ignores Kenstowicz and Kisseberth's 1977 arguments, cf. section 1.5.) Thus, lexical representation is defined as a level from which derivations start in both directions. Rules of the second group lead, in the usual direction, to surface forms, whereas those of the first type are applied backwards, in a reverse order and direction, to more abstract representations. The relatedness (or "compatibility") of two morphologically related but superficially distinct forms is derived from their (distinct) lexical representations by undoing the appropriate rules until the two forms are traced back to identical abstract forms like /krīst(Ījən)/ for Christ vs. Christian (cf. ibid. 183).

A derivation of this type is apparently not more than an 'upside down' version of the original assumptions of generative phonology since the idea of a systematic phonemic level seems to be retained. Consequently, it is as if the description acknowledged abstract entities, /Ī/, /x/, etc., in phonological representations. The actual situation, however, is not this. Leben's parsing model attributes real existence to nothing more abstract than lexical forms; the abstract output of morphological matching serves to indicate the rules that connect the two lexical alternants at hand merely as reflexes of former historical processes.

However, there are pairs of alternants that cannot be accounted for by a derivation of this type. On the basis of cellist, a form like soloist is unexpected and "should not" exist; in -ion words like subversion, diversion, assertion, exertion, i.e. /VC_1C_2/-ion where C_1 = /r/ and C_2 = /ʃ/ or /ʒ/, C_2 "should not" involve alternation but, as parallel forms show (subvertive vs.

diversive, etc.), some of these stems contain /t/ while others contain /s/. Yet we cannot assume a putative /ver$\{^{t}_{s}\}$/ as NGP would, given that all these words eventually contain a single morpheme, -vert- (cf. Leben 1979, 187). The solution must be a "flat" type of description with no alternating phonemic positions, in the spirit of Kiparsky's (1973/1989, 113--4) Alternation Condition. (For a general description of the principles of Upside-Down Phonology, see Leben--Robinson 1977. Operational aspects of (deep) phonological rules and their ordering were also amply discussed and demonstrated, in the framework of Cyclic Phonology, by Siptár [1988a] on instances of substantive word formation in English, following Mascaró's [1977] Strict Cyclicity Principle and relying on Rubach's [1981] collection of data and rule categories; although the latter approach does not share Leben's view concerning the direction of derivation, the overall way of looking at things might be claimed to be similar.)

A more elaborate system describing the phonological structure of word forms derived from the same stem is offered by the framework of Lexical Phonology. In particular, (i) word forms are segmented at morpheme boundaries into constituent morphemes, and (ii) classes of rules deriving surface forms from them are established. Each constituent will form the domain of a separate cycle; the full form will constitute a multicyclic domain of rule appliation. For instance, national is analysed into cyclic domains like this:

$[[[\ \underline{\text{nat}}\ ]_{\text{nominal stem}}\ \underline{\text{ion}}\ ]_{\text{noun}}\ \underline{\text{al}}\ ]_{\text{adjective}}$ (cf. Rubach 1984, 23),

whereas Hungarian tanítsátok 'teach (2plImpObj)' is similarly analysed as

$[[[[\ \underline{\text{tan}}\ ]_{\text{ns}}\ \underline{\text{ít}}_{\text{vs}}\ ]_{\text{verb}}\ \underline{\text{s}}_{\text{ms}}\ ]\ \underline{\text{á}}_{\text{os}}\ ]\ \underline{\text{tok}}_{\text{ps}}\ ]$

where ns = nominal stem, vs = verbalizing suffix, ms = mood suffix, os = objective conjugation suffix, ps = personal suffix.

Cyclic domains are built from the inside, i.e. the first cycle involves $[\ \underline{\text{nat}}\ ]_{\text{ns}}$, the second $[[\ \underline{\text{nat}}\ ]_{\text{ns}}\ \underline{\text{ion}}\ ]_{\text{noun}}$, etc., or in the Hungarian example $[\ \underline{\text{tan}}\ ]_{\text{ns}}$, $[[\ \underline{\text{tan}}\ ]_{\text{ns}}\ \underline{\text{ít}}_{\text{vs}}\ ]_{\text{verb}}$, etc. Rules essentially (phonologically) of the same kind will then partitioned in terms of whether their application depends on morphological information (lexical rules) or not (postlexical rules), cf. Mohanan 1986, 9. In a more down-to-earth formulation, this means the following. To produce an actually pronouncible word form, several well-defined groups of rules are needed (cf. Rubach 1984, 22): (ii/a) First, word formation rules apply to create each morpheme and concatenate them in a

word form; then (ii/b) cyclic rules are applied (for each successive cycle) that leave domain-internal material unaffected but may adjust units flanking boundaries of cyclic domains under certain conditions. These conditions are stated in the Strict Cyclicity Principle, cf. Kiparsky (1973), Halle (1978, 18). (ii/c) The rest of the rules are postcyclic, i.e. apply subsequently to the last cycle of application of cyclic rules. (An example is Vowel Shift in English that -- in terms of Rubach's (1984, 35) explanation -- specify the actual vowel appearing in a given vocalic position on the basis of the full structure of a word form. Similarly, an optional postcyclic rule states the shortening of /i:/ in the Hungarian example above inasmuch as that shortening (tan[i:]t/tan[i]tsátok) depends on the presence of [t∫:] and partly also on the length of the whole word form.)

LP regards all (lexical) phonological issues as closely related to morphology. In particular, this involves focusing on the problem of what structural (eventually, lexical semantic) relationships determine the concatenation of morphemes in a word form (cf. esp. Kiparsky 1982). Note however that morphological levels are determined on a mutual basis: phonological factors may also exclude semantically possible morpheme concatenations, and not only the other way round. For instance, nominalizing -al in English can only be added to end-stressed verb stems (cf. arrival, reversal vs. *recoveral, see Siegel 1974, as cited by Kaisse--Shaw 1985, 10, and Kiparsky 1982, 33--4). Nevertheless, such mutual relatedness does not put an end to the autonomy of morphology and phonology with respect to word formation and compounding. The same phonological rule may apply in both components: cyclically (subject to the Strict Cyclicity Princliple) in cyclic domains, as well as postcyclically ('across the board'); its actual effects may be different in the two cases but the rule itself is the same. In addition, one particular rule (say, nasal place assimilation in English) may be lexically obligatory in some of the levels and blocked in others, and postlexically optional. Thus, sets of (partly identical) rules in the various lexical levels and in the postlexical component "constitute essentially independent mini-phonologies" (Kiparsky 1985, 86).

With this strictly hierarchical organization of phonology, LP manoeuvred itself into serious difficulties in some practical matters of analysis. (i) It turned out that, at least in some cases, lexical rules must be al-

lowed to operate in non-derived environments. (This contradicts the original principle of strict cyclicity that blocks the application of cyclic rules to material inside the domain of an earlier cycle or to structures internal to a cyclic domain in general.) This difficulty can only be resolved by allowing some lexical strata to be non-cyclic. Indeed, Mohanan and Mohanan (1984) did not find any proof of cyclic rule application in any of the four lexical strata of Malayalam (cf. Kaisse--Shaw 1985, 24). A related problem area involves the exact number of strata within the lexicon. In Kiparsky's (1982, 1985) original model, there were only two lexical levels (in addition to the 'level' of bare stem morphemes): that of derivational suffixes traditionally symbolized by morpheme boundaries (propos + al) and that of compounding and inflection (as well as some derivational suffixes like -ment, -ness, -ish, -ly, etc. and some prefixes like un-, pre-, etc.), conventionally symbolized by internal word boundaries (e.g. re#air#condition). Halle--Mohanan (1985) and Mohanan (1986, 26--41), on the other hand, propose that there are four lexical strata in English. The source of disagreement is a different interpretation of word forms that are structurally similar but behave in diverse manners. (ii) Postlexical rule application may also be cyclic. For instance, Liu (1980) proposed an analysis of tonal sandhi in Mandarin Chinese in which cyclic rules (of tone shift) are applied in phrases such that several words define a single cyclic domain (cf. Kaisse--Shaw 1985, 24).

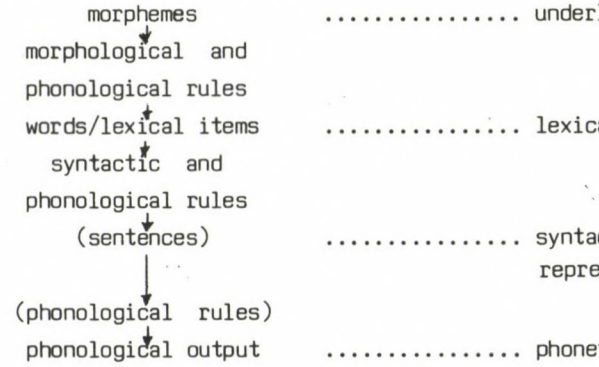
Part of the reason why Kiparsky (1982, 1985) recognizes just two levels rather than four is that level two affixation and compounding are mutually input to one another (cf. neighbourhood gang vs. re-air condition). If, however, they are assigned to different strata (as they are in Halle--Mohanan (1985), some device has to be supplied for cases where compounds have to go back to the second level. This device is called the 'loop' whereby the output of stratum n can reenter stratum n-1 and be subject to morphological operations (and phonological rules) that belong to that stratum (cf. Mohanan 1986, 51).

The dilemma in (ii) above can be resolved by assuming that the cyclicity of individual levels is language-specific, as proposed by Halle--Mohanan (1985) for lexical strata and by Liu (1980) and others for postlexical ones. (These issues seem to concern Hungarian quite indirectly if at all; perhaps only if preverb+verb constructions like át#jön 'come over' are not taken to

be compounds.)

Although its attention is focused on the morphosyntactic architectonics of word forms, LP relies on suprasegmental factors, too. The reason is that a suprasegmental factor like stress can determine the internal structure of a sequence (cf. black bird vs. blackbird) or the lexical class membership of a word (cf. preSENT vs. PREsent). So, in some respect, suprasegmentals are bound to be lexical and the theory is supplemented, as much as necessary, by word-level aspects of 'prosodic phenomena' (to use a term that has recently been reintroduced into mainstream phonology). The idea is as follows.

The phonological representation of a word form is not completed as soon as all morphological information has been used up. This may be sufficient to tell the word form at hand from other items of the virtual inventory of word forms but is not sufficient to characterize it with respect to its syntactic role. In the following example, quoted by Mohanan (1986, 11) from Bresnan (1971), structural homonymy cannot be resolved unless nuclear stress is indicated: John has plans to leave → John has plans to LEAVE 'John wants to leave' or John has PLANS to leave 'John wants to leave some plans'. Hence, between lexical representation and phonetic representation, an intermediate level of 'syntactico-phonological representation' is required that supplies sentence-level suprasementals. The flow chart of derivations will therefore be the following (cf. Mohanan 1986, 11--2):



(This overall schema can be further refined by an internal stratification of individual levels. In particular, by that of word forms in the manner presented above.)

To summarize, the keynote of LP is the stratification or modularization of linguistic derivations. Each module constitutes a separate domain of application of phonological rules. Every module contributes different types of systematic linguistic information: those concerning morphological structure are in the lexicon, those concerning syntactic structure are in the syntax, and those concerning larger units are in the postsyntactic component. Since this kind of modularity is based on diverse modes of application of phonological rules, a word form goes through several phonological "turns" before its phonetic representation is finally worked out. Each module receives the word form being produced in a different stage of its development for further processing. Consequently, phonological representations are stratified themselves: the level of morphemes gives an underlying representation, that of lexical items gives a lexical representation, that of grammatical structures gives a syntactico-phonological representation, and the postsyntactic level yields a phonological output on which phonetic realization is based. Of the four levels, the two intermediate ones (lexical and syntactico-phonological) are significant entities of the mental representation of speech (cf. Mohanan 1986, 205). It is clear that the underlying level cannot have that role because the original morphemes are often unaccessible for a naive speaker (for instance, in Hungarian képesség 'ability', the speaker is able to detect kép 'picture', but in emlő 'mamma' he will not find obsolete em- 'suck'; and in egyebütt 'elsewhere', he may or may not detect egy 'one' or egyéb 'else'. The postsyntactic module is similarly non-conscious: most of the additional information influencing its contents is context- and register-dependent (and therefore partly unaccessible). Consequently, the 'mental setting' of phonological representation must be word forms in terms of the 'lexical alphabet' and/or 'syntactico-phonological representations' in which the former appear supplemented by syntactic information. But which of these two corresponds to our notion of phonological representation? In Mohanan's terms, it is unnecessary to make a unique choice. If we insist, lexical representation can be selected on the basis that syntactico-phonological representation is defined as "a stretch of phonological material bounded by pauses, containing no morphological or syntactic specifications" (Mohanan 1986, 11).

As can be seen, the framework of LP focuses on word-form-internal hierarchical relationships and can describe them in an exhaustive manner; but as

far as the suprasegmental component is concerned, LP takes it into consideration at most with respect to the amalgamation potential of words. Thus, the assumption of an autonomous system-constituting role of suprasegmentals is mostly beyond LP horizons. In other words: LP does not separate suprasegmental programming from the word level, even though (i) word-level rule application always involves segments, whereas the programming unit of suprasegmentals is the phrase; (ii) at the utterance level, distortion processes invariably affect word forms as wholes -- or, as Mohanan (1986, 152) writes: "operations involving ... subsegmental information (i.e. ... gradient operations or phonetic properties ... outside the universal inventory of distinctive features) are restricted to the postsyntactic module".

The other general objection concerns segmental aspects. LP is a theory that puts severe restrictions on the abstractness of description and gravitates towards taxonomic phonemics to a significant extent. Perhaps following Schane's (1971) arguments, LP claims that some phenomena can be best treated in terms of the category of phonemes. Accordingly, it drifts away from generative phonology/phonologies (cf. Kaisse--Shaw 1985, 2--3). This remains true even if scholars working within this framework make use of the idea of underspecification and, as part of the principle of Structure Preservation (cf. Kiparsky 1985, 92), they claim that some constant and constructive features -- e.g. voicing in nasal consonants -- are to be excluded from lexical representations. (Obviously only if the given feature is non-contrastive for the given class of segments.) In view of a low-level, i.e. next-to-phonetic phonemic representation -- serving as the input-to-programme formula --, licensing underspecified matrices burdens the theory with an inhomogeneity of description (cf. points 1.5.1 and 1.5.2). In this way, LP is half-hearted about assuming an autonomous level of segments, too: it makes the inventory of segments a point of departure for rule application with the specification of some segments made defective.

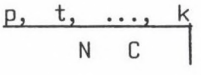
1.9. "Bird's eye view" phonologies

Other types of restriction of the domain of phonology may involve cases in which the description of word-level phonological representation is either completely, or at least with respect to (sub)segmental analysis, excluded as

a task. In the final section of this overview, five of these frameworks will be mentioned. Although they do not treat it in detail, all of these theories presuppose the existence of (word-level) phonological representation either as a point of departure or as the result of phonological operations/rules. In their diverse ways, 'Prosodic Phonology', 'Metrical Phonology', 'Atomic Phonology', 'Charm and Government Theory', as well as 'Dynamic Phonology', all explore the general conditions and ways of the formulation of some kind of phonological representation by relying on frameworks specifically devoted to issues of (word-level) phonological representation as direct or indirect antecedents.

1.9.1. Prosodic Phonology

As far as the specific label is concerned, the term 'prosodic' does not always and everywhere cover exactly the same area as the term 'suprasegmental'. In Firth's (1948) theory, it will be recalled, 'prosodic' referred to constituents of a sequence erected over groups of segments as in homorganic nasal + stop clusters in Kannada where the place of articulation of the N is always the same as that of the subsequent consonant, thus N → m before bilabials, N → n before dentals, N → ŋ before velars, and so forth; in a general form:



conceived of as an articulatory component over several segments: a 'prosodic unit'.

Another preliminary remark: although it involves phonology at a few important points and although it focuses on prosody, Selkirk's (esp. 1984 and 1986) prosodic theory is primarily of a syntactic character, thus it will be ignored here. (Opinions differ concerning the classification of that theory: Vogel 1990 makes it clear that in her view Selkirk is an exponent of prosodic phonology; whereas Lass (1984/1985) does not even mention her -- earlier -- work in his phonology textbook.)

In Prosodic Phonology in the strict sense, originally proposed by Nespor and Vogel (1986), the syntactic/phonological structure of utterances is based on a hierarchical arrangement of 'prosodic constituents'. The highest

systematic level is that of phonological utterances, dominating those of intonational phrases, phonological phrases, clitic groups, phonological words, feet, and finally the level of syllables. The principal issue is whether the existence of all these constituents can be supported by their phonologically unique behaviour (i.e. by each constituent having a set of rules particular to it). Vogel (1990) demonstrated the validity of this assumption on Hungarian (among other languages). For instance, to define phonological words in Hungarian, she offered the following criteria: (i) vowel harmony that encompasses stems with all their suffixes (kez-em-ben 'hand-my-in: in my hand', ház-am-ban 'house-my-in: in my house') but not preverb+verb sequences (fel-darabol 'up-divide: divide up') or nominal compounds (halál-büntetés 'death penalty', épület-fa 'building-wood: timber'); (ii) n-Palatalization that applies or fails to apply as a function of the structural properties of the juncture of n and j: in menjen 'go-3sgImp' we get [ɲ:] but in agyonjótékonykodta magát 'he practised charity to the point of bankruptcy' or in kánonjog 'canon law', i.e. between preverb and verb and across compound boundary, assimilation fails to take place. Thus, Hungarian has a relevant prosodic constituent (the phonological word) that can be made up by a stem + suffixes, or a preverb, or a compound member (+ suffixes) (cf. Vogel 1990, 3--4). The crucial criterion for a clitic group is that only one of its constituents, the head, can be stressed (e.g. the verb in eszik valamit 'eats something', the first compound member in csónakverseny 'boat race', or the noun in egy ablak 'a window'). A further property of Hungarian clitic groups -- as opposed to English, for instance -- is that they may contain several non-clitic elements provided that they involve a compound (cf. ibid. 7), e.g. a premodified verb. It is also stress assignment properties that make the phonological phrase a constituent, whereas intonational phrases are distinguished from phonological utterances by some assimilation phenomena and stress erasure in the former (cf. ibid. 10ff).

As can be seen, Prosodic Phonology attributes particular sets of phonological rules (n-Palatalization, l-Palatalization, stress erasure, etc.) to various prosodic constituents corresponding to syntactic units. Their application or blocking is a diagnostic of whether two adjacent segments like /n/ and /j/ or /l/ and /j/ are separated by constituent boundary or both belong to the same constituent of a given type. My first objection concerns exact-

ly this procedure. (i) Across-word-boundary assimilations may occur in cases where Vogel (1990) or Vogel--Kenesei (1987) predict they would not and may fail to occur where they predict they would. In examples like Szóval jelentkezik 'So he volunteers'/'He volunteers orally', depending on whether szóval is an adverb ('in other words') or a case-marked noun ('with words, orally') syntactic structure is different but the phonological behaviour of l + j is identical; similarly for n + j in Biztosan jó 'It is presumably good'/'It is good, you can rely on that'; and conversely, the surface equivalent of n + j in énje 'his ego' can be either [ɲ:] or [nj]. It is true that l-Palatalization is more likely to be blocked in -/l##j/- if the j-initial word carries primary stress; but this does not exclude (a) the application of the rule $l \rightarrow j \,/\, \_\_ \#\# j \begin{bmatrix} V \\ +stress \end{bmatrix}$ in Pál Jánost látta 'Paul saw John' or (b) the blocking, without any particular communicative condition, of the complementary rule $l \rightarrow j \,/\, \_\_ \#\# j \begin{bmatrix} V \\ -stress \end{bmatrix}$ as in Csak Pál játszik 'Only Paul plays' (cf. Vogel 1990, 13--5 for the opposite claim). Hence, it is difficult to employ phonological processes as criteria for distinguishing classes of phonological constituents. (Note that the blocking vs. application of the rules referred to seems to depend on semantic criteria at least as heavily as on structural properties of the sequence. In the present case, it is not to be overlooked that the examples involve proper nouns. In addition, speech style properties of the utterance are also crucial: in allegro speech, the process type $l \rightarrow j \_\_ \#\# jV$ tends to generalize irrespective of stress patterns, whereas in lento speech a more restricted application of both (a) and (b) is expected.) (ii) Prosodic Phonology shows moderate interest in the inventory of (sub)segmental components or in the structure of segmental units. Taking them for granted, it uses them in structural descriptions of rules/processes as criteria defining prosodic categories. (iii) The summit of the phonological hierarchy is claimed to be a prosodic unit, the phonological utterance, that cannot be satisfactorily defined in pure phonological terms. The criterion mentioned by Vogel (1990, 18) for Hungarian, (obligatory) voice assimilation of obstruents, does not seem to be convincing:

$$[-son] \rightarrow [\alpha voice] \,/\, \ldots \_\_ \begin{bmatrix} -son \\ \alpha voice \end{bmatrix} \ldots \Big]_{PU}$$

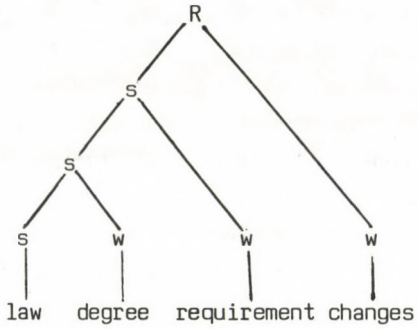
The rule says that e.g. in Itt van János. Beszéljük meg ezt a dolgot most rögtön 'John is here. Let's talk this over at once', the [ʃ] of János will become voiced if the two sentences constitute a single utterance. But even if the two sentences exhibit logical coherence (i.e. 'John is here. [Therefore,] let's talk this over...'), and constitute a single utterance in some sense, there are at least two types of realization in which the above rule does not apply. First, if there is a pause between the two constituent sentences, and second, if the second sentence, in order to indicate its imperative character, begins with pitch upstep or shift of register. In my view, 'utterance' as a category cannot be assigned any phonological criteria (and hence, Vogel and Kenesei's 'phonological utterance' does not coincide with 'utterance' in the general sense).

1.9.2. Metrical Phonology

If Prosodic Phonology is the phonology of quasi-syntactic constituents of speech, Metrical Phonology is a specific theory of stress patterns. With respect to our subject-matter -- the establishment of phonological representations of the word level -- the unfavourable consequence is that the level of segments is interpreted in Metrical Phonology merely as a 'carrier' of suprasegmental patterns, with no reference to properties of segments other than their rhythmic or stress-bearing role.

The basis of Metrical Phonology is the observation that words and phrases tend to constitute regular rhythmic patterns in which prominent and non-prominent units alternate in certain well-defined ways. The general form of prominence/non-prominence is a distinction between 'strong' and 'weak' beats where strong beats are implemented as stress, as opposed to stressless elements that are usually reduced in duration or in terms of other articulatory aspects.

Stress, or rather the 'strength' of strong constituents, is a relative matter: its actual degree is determined by the internal structure of the sequence it occurs in. Although the basic values appear to be binary ('strong' vs. 'weak'), strength is actually a gradual scale, as can be illustrated on law degree requirement changes (cf. Liberman--Prince 1977, 257):

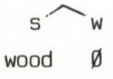


This figure illustrates practically all major tenets of Metrical Phonology. On the basis of Liberman and Prince's (1977) seminal paper (esp. 262), these are as follows. (i) The stress feature is n-ary; (ii) nonprimary values of the stress feature can only be defined in relation to a primary stress elsewhere in the string; (iii) stress features do not have any 'local' phonetic import: primary stress does not imply any specific articulatory or acoustic property of the segment that bears it; (iv) relative prominence is preserved under embedding: this has provided the clearest evidence for cyclic rule application; (v) stress rules bring about a widespread pattern of change rather than simply change the feature specification of a single segment; finally, (vi) stress-assignment rules typically permit their locus of application to be indefinitely far away from some other term necessary to define their environment.

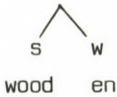
At the level of word forms, 'strong' and 'weak' positions are not taken to be identical with degrees of stress in a sequence. s designates a strong element, and w designates a weak element, of a metrical foot; all that follows with respect to stress patterns is that a vowel in a 'strong' position cannot be stressless, and one in a 'weak' position cannot bear (primary) stress (cf. Liberman--Prince 1977, 264). (This makes good sense in phonetic terms but appears to be hard to reconcile with the assumption of several degrees of stress.) Thus, an English vowel is reduced in an unstressed position, whereby another vowel appears as stressed by contrast (ibid. 283).

More specific objections to Metrical Phonology concern the hierarchy of stress degrees. The facts of Hungarian allegro speech suggest that (i) a sequence of primary stresses is possible, both in regular phrasal stress envi-

ronments and in what Varga (1988) refers to as utterances of 'stylized' intonation. (ii) Primary prominence peaks may exhibit smaller or larger differences of degree among themselves, not only as opposed to secondary and/or tertiary stresses. Variability of this kind has a communicative (sign) value even if it does not directly affect the relevance of the Metrical Phonology frame of 'strong/weak' graduality. (iii) Along with these practical objections, theoretical problems also occur -- at least in the 'tree only' analysis of Giegerich (1985) -- as follows. This approach is forced to posit both real and hypothetical/potential units in its representations. (iii/a) A relevant point is that a strong constituent can only be s (strong) with respect to a weak constituent. Hence, the only possible way of representing a monosyllable, say wood, as follows:

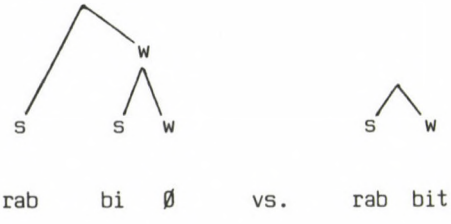


expressing further that on adding a virtually stressless suffix, we necessarily get a w value for that suffix, replacing the ∅ of the above representation:

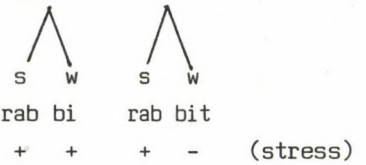


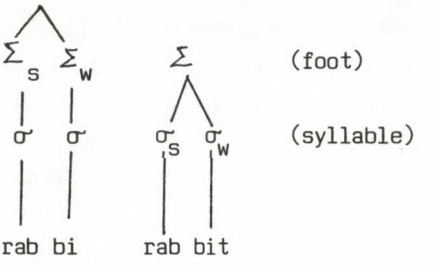
furthermore, the ∅ rubric can also be filled in by the first unstressed syllable of the next word in the sequence, given that metrical structures ignore word boundaries:

In addition, (iii/b) in bisyllabic English words whose second syllable is heavy (bimoric), that second syllable can never be fully unstressed. E.g. rabbi [ræbai] vs. rabbit will consistently be represented (as cited by Lass 1987, 109ff) like this:

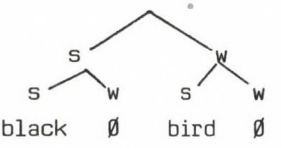


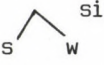
Notice, however, that there are some other -- syllable-centric -- solutions within this framework, as given by Liberman--Prince 1977 and Selkirk 1980, respectively:





As for the former solution, the remark is evident: blackbird, although its hypothetical rhythmic pattern is



will necessarily occur in an isolated form as  since its w has no point

of reference relative to which it could be characterized as s. In context, however, it will enter such relationships. In a sentence like A blackbird can never be white, the words a and can will be assigned a lower (or higher) w quality, i.e. a nondefinite scalar value influenced by the given position in a stratified syntactic structure via the appropriate rules -- rather than by the hypothetical internal architectonics of blackbird.

1.9.3. Atomic Phonology

This framework can be metaphorically labelled as an instance of "bird's eye view" phonology to the extent that it looks for what is common (universal) in the phonological rules or categories of particular languages. With this choice of topic, it follows the footsteps of the traditional search for universals (especially of the type of Greenberg 1963) on the one hand and it reflects on particular aspects, results, and notions of a variety of post-SPE phonologies, using terms like 'mirror-image rule', 'naturalness', 'nat-

ural process', or 'implicational hierarchies' on the other.

In Atomic Phonology, "all linguistic variation requiring distinctly varied formulations of phonological rules is predictable from a set of atomic rules and universal principles of grammar" (Dinnsen 1979, 31). Atomic rules are the "most basic, most specific" rules that are empirically motivated, independent rules of grammar which specify the initial conditions for a process to take place in any natural language. In the hierarchy of rules, atomic -- i.e. fundamental -- rules have a set of 'satellite' rules labelled as "complement rules", sharing some features of their structural descriptions. The existence of a complement rule presupposes that of a corresponding atomic rule. What do these assumptions imply with respect to the practical procedures of phonological analysis? E.g. for Terminal Devoicing, we can write rules like

(a) $\begin{bmatrix} \text{-sonorant} \\ \text{-continuant} \end{bmatrix} \rightarrow$ [-voice] / ___#

(i.e. word final stops are devoiced);

(b) $\begin{bmatrix} \text{-sonorant} \\ \text{+continuant} \end{bmatrix} \rightarrow$ [-voice] / ___#

(i.e. word final fricatives are devoiced).

(a) and (b) are complementary (i.e. potential complement rules with respect to each other) as their SDs "equivalently characterize the set of input representations defined by the combined effects of the two rules" (ibid. 32), whereas

(c) $\begin{bmatrix} \text{-sonorant} \\ \text{-anterior} \\ \text{-coronal} \end{bmatrix} \rightarrow$ [-voice] / ___#

(i.e. word final velar stops and fricatives are devoiced)

is not a possible complement rule to either (a) or (b) as the domains that (a+c) and (b+c) define do not cover the same set of input representations. We find that rule (a) can certainly be attested in languages, hence it is an atomic rule, with respect to which (b) is a complement rule as its independent existence is (empirically) unattested. (a) and (b) can be collapsed as

(d) [-sonorant] → [-voice] / ___#

uniting an atomic rule (a) with its complememnt (b), whereas (a) and (c) can not be collapsed in a similar fashion (cf. ibid. 32--3).

Complement rules have a specific role in rule generalization. For example, if we find that a mid vowel like o is originally lowered before r, i.e. o → ɔ / ___ r, and later also lowered before the rest of [+coronal] consonants as in the Schaffhausen dialect of Swiss German, we will conclude that the scope of the rule has been extended and, accordingly, the two rules will be conflated as the appropriate generalized rule. But rule generalization of this type can also be conceived of as a special case of rule addition and is in fact invariably expressed in Atomic Phonology by rule addition where the added rule is always a complement rule (cf. ibid. 33--5). This is at odds with the solution of the standard theory where rule generalization is indicated by the omission of a feature (rule simplification) or by the introduction of Greek-letter variables. This is theoretically interesting, but the most important difference between Atomic Phonology and its competitors is as follows.

(i) In Atomic Phonology, mirror-image rules are claimed to be inappropriate for the purposes of phonological description. A mirror-image rule (or 'neighbourhood convention') states that A → B takes place both in environment C__D and in environment D__C:

A → B % C___D, i.e.
(a) A → B / C___D and
(b) A → B / D___C.

There are strong counter-arguments to this, however. (a) and (b) are not always independently motivated, i.e. it is often the case that both formulae express the same phenomenon; in some cases we cannot tell if (a) and (b) are to be applied conjunctively or disjunctively; "other cases reduce mirror-image rules to 'non-rules'"; one does not necessarily follow from the other, i.e. there may be no implication between the two subrules of a mirror-image rule; and so forth (cf. Dinnsen 1979, 37--8). As can be seen from these objections, Atomic Phonology (in its treatment of the mirror-image convention) provides an instance of phonological argumentation at a superficial level, based on distribution and motivatedness. At the same time, it is able and ready to use -- as a similarly important criterion -- the discrimination of rules in terms of systematic levels, primarily with respect to rule categories. In telling apart atomic and complement rules, this latter criterion is used as follows.

(ii) Recall Hooper's (1976, 136--7) generalization: it is a natural restriction on both phoneme inventories and phonological rules that, "if there is a voicing contrast for fricatives, there will also be one for stops" and that "if stops undergo a context-sensitive process involving voicing, fricatives do as well. That is, intervocalic voicing affects fricatives before stops (as in Latin and Old English)". It is in the interpretation of facts like these that Atomic Phonology turns out to be superior to other, partially similar frameworks. In fact, the rule at hand is Janus-faced: it is not valid for phonemic contrasts but is valid for processes. The difference corresponds to the distinction between atomic rules (in the first case, referring to phonemic contrasts) and complement rules (in the second case where mere allophones are produced). In this fact, Atomic Phonology sees a proof of dominance relations between rule categories (cf. Dinnsen 1979, 40ff). An especially significant rectification is offered by Atomic Phonology in this second respect, as follows.

In a number of post-SPE frameworks, both before and after Dinnsen, rule ordering and rule hierarchies are forcefully highlighted. Yet these theories generally content themselves with establishing applicational precedence relations of various sorts among groups of rules. Thus, non-taxonomic phonologies posit a large number of derivational rules for all possible (and impossible) pairs/sets of forms; various ordering constraints are then superimposed on pairs of rules either implicitly (by universal principles like the 'Proper Inclusion Precedence', cf. Koutsoudas--Sanders--Noll 1974) or else explicitly by language specific ('extrinsic') ordering statements (cf. Vago 1977 for Hungarian). Contrariwise, in Atomic Phonology the crucial claim and supporting pillar of classical phonology (as in Trubetzkoy 1939), the categorical distinction between phonemes (of a functional linguistic value) and variants is faithfully preserved.

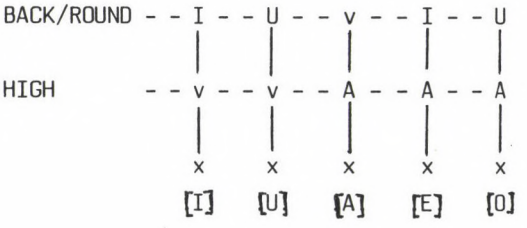
1.9.4. The Theory of Charm and Government

The program of Charm and Government Theory is of a "bird's eye view" (or, indeed, metaphonological) character in that it regards phonology "as a system of universal principles defining the class of human phonological systems" (Kaye--Lowenstamm--Vergnaud 1985, 305). With this specification of the purpose of study, an important aspect of the theory is that it will concen-

trate on the internal structure of the inventory of primitives and is expected to be little concerned with phonological processes that are so crucial in other frameworks, especially in NP. This is exactly the case; hence the affinity of this framework with Atomic Phonology and Dependency Phonology is quite evident.

The ultimate constituent in this theory is not the phonological feature; rather, it is a unit of segment constitution, the 'element', which is a fully specified matrix per se, phonetically interpretable in terms of features. Every phonological segment is either an element in itself or a combination of elements. Thus, these elements constitute the primitives of phonological systems and are phonetically autonomous, independently pronounceable units.

Among the features of an element, exactly one is 'hot'; it is the only feature whose value is marked (e.g. [BACK] in I, [ROUND] in U, and [HIGH] in A, with the marked values [-BACK], [+ROUND], and [-HIGH], respectively). All other features will have their unmarked value in an element; a vowel with no hot feature is known as the 'cold' vowel. (In the paper outlined here, Kaye, Lowenstamm and Vergnaud [1985] concentrate on the description of vowels and illustrate the fundamentals of the theory on the vowel system of Kpokolo, a Kru language spoken in the Ivory Coast.) All vowels of a language are represented by a system of lines; each element is found on it own line. The lines are labelled by the name of the hot feature of the element found on the line in question. For a feature to be active in a system, its marked value must be borne by an element. All elements by definition bear the unmarked value for all features except the feature on the line of which they reside (their hot feature). A vowel that has elements on more than one line is a compound vowel. Lines may be fused; i.e. a single line may contain more than one element. But elements that share a single line cannot be combined with one another in that system. An example of a usual five-vowel system is as follows:



(where v represents the cold vowel, i.e. an 'empty' position not occupied by any element; the representation is simplified in that the ATR line is omitted, hence the phonetic transcription -- that is not part of the representation -- appears in capitals).

Combinations are produced by the fusion of elements; in particular, fusion involves a head and an operator and consists of substituting the value of the hot feature of the operator for that of the corresponding feature of the head (all remaining features are those of the head). For instance, a lax [ɛ] is produced by the fusion of A as an operator and I as a head. (The system bears some resemblance to DP and PP, as the authors note [ibid. 310].)

Elements (and consequently, vowels) are further characterized as either 'charmed' or 'charmless'. (These are articulatorily/acoustically definable terms, referring to a stiff vs. loose state of resonators, where the former produces a pattern richer in well defined harmonic components and the latter produces the opposite acoustic effect.) The charmed elements are A+ for the oral cavity, ꟾ+ for the pharyngeal cavity, and N+ for the nasal cavity; I-, U-, and v- are charmless elements.

Vowel systems are defined in terms of the charm requirements imposed on their members. An unmarked vowel system contains only positively charmed segments. A+ is positively charmed in itself, whereas I- and U- are combined with ꟾ+ to give charmed [i] and [u]; similarly, the two compound vowels in the chart above, combined with ꟾ+, give [e] and [o]; this gives us the usual (unmarked) five-vowel system of /i u e o a/. If the system involves tenseness (ATR) opposition as well, each expression of the system will tend to be at least partially positive (contain at least one positive element). These are the seven-vowel systems /i u e o ɛ ɔ a/, where an ATR opposition exists for mid vowels. The principle of charm markedness states that "the presence of a negative segment in a vowel system implies the presence of its positive counterpart" (ibid. 314). Thus, the theory predicts that systems of the form /i u ɛ ɔ a/, if they exist at all, are quite rare (and highly marked).

With respect to the architectonics of syntagmatic sequences, the theory claims that the dominant/subordinate relations of elements, termed 'government', can be extended to syllable constituents and the suprasegmental level as well. However, the theory does not go beyond the level of word struc-

ture. At that point, it becomes unfalsifiable. For instance, in Kpokolo we find gradation (somewhat similar to that of Germanic languages) in noun plurals, but with a high amount of indirectly derivable residue. In such cases, certain exceptional devices are employed (cf. ibid. 325). Pending further research, the appropriateness of the theory of 'Charm and Government' cannot be definitely proved (or rejected).

1.9.5. Dynamic Phonology

The theoretical point of departure of Dynamic Phonology is that, almost since the very moment when phonology first emerged, the relationship of phonetics and phonology has always been obscure and the two areas have not been properly coordinated. The most fundamental contradiction is that between the analog signals of speech and the discrete entities of phonological analysis. The components of a segment to be matched against a phonological unit do not respect the boundaries that phonology assigns to them within a word form but rather melt into realization processes of larger units as wholes. For example, lip rounding as a defining property of a labial vowel shows up on adjacent segments -- e.g. on the preceding fricative in short -- as much as it does on the vowel whose inherent property it is supposed to be in segmental phonological analysis.

The dilemma is obviously just as old as the study of phonology is; but Dynamic Phonology proposes a solution that is quite different from that offered, for example, by generative phonology. On the other hand, the frontiers it draws to cordon itself from other present-day theories are just as sharp as those separating it from the recent past. Namely, Dynamic Phonology rejects autosegmentalism, the point of departure of which it partly shares, claiming that Goldsmith (1976, cf. section 1.4) "almost reaches the development of a truly nonsegmental phonology ... Yet, he then snaps back into a system which recognizes segmental sound units and prosodies" (Griffen 1985, 14). These words appear to reflect a Firthian point of view; but their consequences are more far-reaching: they point towards a total elimination of segmental phonology as a field of inquiry.

In his radical program, Griffen (1985) bases his claims on the views of what is called 'dynamic phonetics'. In particular, that (i) segmentation is a controversial procedure within phonetics as well: speech is not a series

of 'stationary' units but that of dynamically ongoing changes of positions of the speech organs. Articulatory movements -- as modelled by Mermelstein (1973) by changes of position of measurement points -- render phonetic patterns of successive phonological elements predictable. Mermelstein proposes that the trajectories of characteristics are hierarchically ordered e.g. for [t] like this: 1. tongue tip, 2. the angle of jaw opening and tongue height, and 3. lip position, where the latter is only "articulated if possible". The initial configuration of speech organs invariably corresponds to a (neutral) vowel position, hence consonants can be regarded as restrictions on vowel configurations (cf. Griffen 1985, 32). On the other hand, (ii) the study of transitions in CV, VC, etc. sequences (relevant references include Liberman 1970 and Liberman--Cooper--Shankweiler--Studdert-Kennedy 1976) reveals that the elements involved "are transmitted in parallel rather than in sequences" (ibid. 32).

On the basis of the foregoing considerations, a novel, dynamic model of phonology can be postulated with the following crucial components:

1. a laryngeal pattern that includes all source features and F_0 movements;
2. the syllable as a distinct organizational unit;
3. obstruction -- or, to use Lotz's (1973) acoustically-oriented term, filtering -- that encompasses a syllable-size vowel, producing (rather than a VC sequence) a formation that can be graphically represented as

$$\begin{array}{c} C \\ | \\ \$\ V\ \$ \end{array}$$ (ibid. 38);

4. the prosodies, including tones, tunes, stress, pitch, length, tension, and nasality.

Components 1--4 are superimposed on natural breathing. At the level of words this entails that e.g. in German Lan[t] ↔ Lan[d]e 'country' (nominative vs. the optional dative), archiphonemic neutralization will be achieved by the 'prosodic lenition' effect of breath resulting eventually in devoicing (cf. ibid. 42--3). If we represent a set of components constituting a speech unit in terms of overlapping domains, the problem of segmental transitions automatically disappears under the overlaps. Other discrepancies likewise disappear; e.g. classes of variants are no longer necessary to assume: an alternation like [k] ~ [c] (depending on [±back] in the environment) is explained

in Dynamic Phonology by extending the backness specification to all constituents of the syllable. As far as the speech process is concerned, its course is determined by the bidirectional character of restrictions: syllable construction imposes restrictions on the laryngeal dimension, thereby disrupting the natural laryngeal process; similarly, obstruction/filtering properties determine syllable construction in their turn.

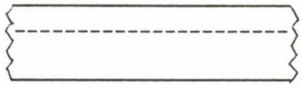
Therefore, the abstraction of segments is to be discarded in phonology. Segments are to be replaced by a dynamic hierarchy of constraints. By this maxim, the theory is given a nonlinear countenance. A nonsegmental and nonlinear description is thus envisaged in which speech units are conceived of as tissues of articulatory components patterned by constraints, tissues that may contain knots, but no discrete building blocks.

According to the dynamic model, a speech unit is an aggregate of products of three physiologically and acoustically discernible divisions: an obstruction prosody with consonantal components, a syllable prosody with vowel components, and a laryngeal pattern prosody with components involving the larynx:

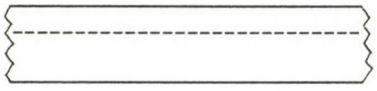
Obstruction Prosody	Consonantal Features
Syllable Prosody	Vocalic Features
Laryngeal Pattern Prosody	Laryngeal Features

Viewing speech units in dynamic terms, the basic pattern is a syllabic frame, containing combinations of the above products, i.e. consonantal, vocalic, and laryngeal components, making up a closed construction. This can be represented as follows (cf. Griffen 1985, 44):

Obstruction Division (consonantal features)



Syllable Division (vocalic features)



Laryngeal Division (laryngeal features)

One of the main aspirations of Dynamic Phonology is to provide us with a device to handle variation in a most convenient and consistent way. If we regard a speech unit as a process, variants show up as identical units that exhibit realizational differences by, and not simply within, the speech process. For instance, in a segmental framework, in Spanish [d]ama 'lady' vs. la [ð]ama 'the lady', [ð] is a combinatory variant of /d/, i.e. /d/ appears intervocalically as a homorganic voiced fricative. In terms of the new interpretation, things are quite different. Due to different pulsation of syllables, the two cases differ on the fortis/lenis scale by (i) the ratio of high-to-low frequency and by (ii) the ratio of relative width of the orifice at the larynx. In an intervocalic position the prominence of the constrained vocalic element "should reduce the psychological and acoustic ratios" (ibid. 48). In other words, the realization of /d/ is shifted to another articulatory type due to its different syllabic position where its original laryngeal and obstruction properties are weakened. The result is a lenis [ð] (cf. ibid. 48). The obstruction component is the same in both cases but culmination, i.e. the highest impedance value of filtration, results in one type of sound in one case, and another type in the other.

Griffen's theory is a true 'process phonology' that insists on phonetic facts perhaps the most consistently of all post-SPE phonologies. Its explanatory power is demonstrated by an economical treatment of allophony, as well as by a novel interpretation of umlauting. Yet, its scope is rather narrow: (i) the elimination of the traditional unit of abstraction, the phoneme, is

an irreparable theoretical and practical loss (cf. the argumentation in section 2.1); and (ii) the theory does not surpass the domain of syllable-size units in an explicit form.

§

The final conclusion of the present critical overview of post-SPE phonologies is that none of them offers a completely elaborated theoretical and practical framework for the description of (word-level) phonological representation that we can rely on in our account of lenition processes. It appears that a new Archimedean point should be found for such an account.

2. SYSTEMATIC PHONOLOGICAL REPRESENTATION

In accordance with the programme and purpose of this study, the analysis of phonological/phonetic processes characterizing present-day Hungarian will be based on the relationship existing between a pattern (A) and a realized form (B) (cf. Section 1, introduction). In this relation factor A is a word-level systematic phonological representation as defined in general by lemmata L(v/a--d) above (loc.cit.). In section 2, aspects of the systematic phonological representation that are essential with respect to the present investigation will be considered. Thus, above all, the notion that the term 'word-level phonological representation' (PR) covers will have to be explicated in some detail. Furthermore, a description of the form and internal structure of the PR -- as motivated in 1.1 above -- has to be given. Let us, first, formulate the following lemmata as a point of departure.

L(vi) The input strings that distortion phenomena apply to are (underlying) phonological representations. Schnitzler's (1972) investigations suggest that, with respect to deletion, this can be directly demonstrated in aphasics' pronunciation errors. In syllable elisions like catholicize →→ /kæθəlāyz/, solidify and solidification →→ /sāləfāy/ and /sāləfəkēyšən/, respectively, philosophical →→ /fəlāsəkəl/, the phonetic (attested) output as a phonotactic construction corresponds to the base form of the derivative: catholic, solid, and philosophy, respectively (cf. Schnitzler 1972, 24--9). If, in particular, deletion applied to the respective phonetic representations, the phonological structure of full forms would be retained, stress would be assigned elsewhere, and possibly other (morpho)phonological rules would also apply. These data show in a most spectacular way that, simply speaking, the path from the attested output back to the underlying form is shorter than that between the output and the surface representation of the correct version.

L(vii) Distortion processes apply to (underlying) phonological representations as wholes, i.e. to unitary sequences between pairs of boundaries. The claim that distortion processes involve larger units is supported by perception studies revealing the primacy of larger (word size) constituents in this respect. For instance, Sendlmeier (1985) presents experimental proof of the fact that in the analysis of partial data referring to a single cate-

gory (e.g. stress on simple compounds, 'Schallgestalt', etc.) perception is based on the category as a whole and individual data, such as acoustic cues corresponding to distinctive features, are of secondary importance only or are highlighted in special communicative situations (Sendlmeier 1985, especially 162--3). (The author finds Bühler's [1934] respective views to be essentially borne out; in a (psycho)neurological/(psycho)phonetic perspective, these views are also embodied in Massaro's [1987] model of information processing, see also 2.2.2.3 for some more details.)

L(viii) Systematic phonological representations are fully specified objects (cf. Szépe 1969, 368--9), and are subject to distortion processes as such. Unspecified slots, i.e. empty cells in matrices of phonological representations (cf. 2.2.2.1), cannot induce distortions; it is only segments that are filled in by phonetic correlates of abstract constituents that can.

On the basis of lemmata (v/a--d) and (vi--viii) -- and in view of the specific aims of this investigation, with regular contingencies of spontaneous speech taken into consideration -- word-level systematic phonological representations will be defined as follows. They are sequences

(i) whose upper limit is the phonological phrase, i.e. sequences that are contained in a single unified phonological phrase (feketekalapos 'black-hat-wearing' in feketekalapos [nő] 'a woman wearing a black hat' constitutes a phrase characterized by a single virtual primary stress, hence a single word form, whereas in fekete, kalapos [nő] 'a black(-haired) woman wearing a hat' the same phonemic sequence may be characterized by two virtual primary stresses, and possibly by two successive intonation contours, hence it is two words);

(ii) whose lower limit is a sentence frame that is filled in either independently or depending on another virtual sentence/clause (in particular, a sequence that could be a context-independent sentence, e.g. Esik 'It is raining'; or else a sentence depending on the presence of another sentence or clause, e.g. Meg (as in Megjöttél? 'Have you arrived?' -- Meg 'I have'); hence, formatives like -ság/ség '-ness', -va/ve '-ing', -ban/ben 'in' are excluded from the category of 'word-level systematic phonological representation' since it is only with a stem morpheme that they can make up a [minimal] sentence and a bare stem morpheme cannot, by definition, make up a sentence/clause by itself);

(iii) whose semantically self-contained occurrence in construction with a sequence satisfying both conditions above is possible but does not create a separate phrase or clause (this is the case of Hungarian articles and some conjunctions like s 'and').

The first problem concerning the structure of PRs is the status of the phoneme. In particular, the phoneme as a category remained, in my view, of central importance in the constitution of the PR even if, as is well-known, the phoneme as a category is not necessarily posited in generative phonology -- and the same holds true of some of the post-SPE frameworks as well.

2.1. The phoneme as a central constituent of phonological representations

The notion of 'phoneme', hence the existence of an autonomous phonemic level, had been an incontrovertible postulate in linguistics for at least three but -- considering the antecedents as well (cf. Robins 1967, 204ff; Telegdi 1977/1979, especially 132) -- actually for as much as seven decades. That tradition was interrupted by the appearance of generative phonology (especially Chomsky--Halle 1968; in Hungary, almost concurrently with the publication of SPE: Szépe 1969). The effect and countereffect are still so strong that we cannot avoid the question, fundamental as it is with respect to the subject-matter of this study, whether phonemes are necessary as central constituents of phonological representations or otherwise. As is well-known, Chomsky and Halle's view was that morphophonological and allophonic rules did not essentially differ from one another. Consequently, the separation of those two levels would entail a number of unavoidable repetitions in our grammar. In addition, the latter would contradict the principle of (maximal) simplicity of description.

First of all, this view (whose turning into a dogma was overhanging the field for quite some time) was indeed criticized within generative phonology itself. "The phoneme was the offspring of structuralism, the pride and joy of post-Bloomfieldian linguistics. Since then the child has been abandoned. Yet some of us may have felt guilty about disinheriting the child. As generativists, if we acknowledged him, then it was as an illegitimate child. Perhaps we can now recognize the little bastard for what he really is." (Schane 1971, 520). The laborious procedure actually started in the year of publica-

tion of SPE, with Postal's (1968) assault on the category of (abstract) morphophonemes. However, the matter will not be dealt with here in a historical perspective but rather on a practical level.

2.1.1. On the ontological/logical status of the phoneme

The ontological status of phonemes does not usually emerge in a clear-cut form in phonology. Still, the undercurrents of the relevant processes of cognition can be clearly recognized in the way the issue kept cropping up throughout the history of phonology, as the following landmarks suggest.

(i) Within the functional approach, speech is taken to be an unbroken chain of phonemic units; the constituent phonemes of each chain are realized in a variety of ways in diverse individual speech events. Such divergences and their types are not fortuitous but are causally related to communicative circumstances in the broadest sense. This interpretation applies to historical processes and actual speech events alike (see, e.g., Martinet 1955). Realizational variation also conveys extra-phonological information which is part of the message just as much as its grammatical meaning is (cf. e.g. Fónagy 1977), maintaining biuniqueness between realized forms and the corresponding abstract units, i.e. phonemes. However, this view does not really consider the phoneme in its relation to individual speech events but rather with respect to certain well-defined groups thereof: those exhibiting identical properties in terms of certain aspects of communication. Accordingly, realizations $[n]_1$, $[n]_2$, ..., $[n]_n$, whose place of articulation is adjusted to the subsequent plosive, share a common property: they belong to a class of variants [n], and in the perspective of functional description their explanation lies in the fact that they are always related to such a class. In this approach, therefore, no direct correlation is actually posited between individual speech events and phonemes.

(ii) Another type of reasoning, this time one that is indeed directed towards the relation between phonemes and (units of) speech events, seeks proof of the phoneme as a member of an abstract system in the psychological reality of phonemes. The notion of 'psychological reality' has been employed as a criterion in some§actual attempts at proving the validity of phonemes (cf. Sapir 1930). The debate around the related notion of 'sound intention' [Lautabsicht], also used as a criterion, as well as its refutation (see sec-

tion 1.3) can be supplemented here by ontological criteria on a phonological basis. (ii/a) Whatever appears to be the real presence of a phoneme in human mind may involve some content more complex than a phoneme, only one of whose components is the hypothesis called 'a phoneme'. (ii/b) The psychological reality of something may at most provide unquestionable proof of the ontological status of the possessor of the mind in question, not the mental object whose psychological reality is at stake.

(iii) Direct coupling of phoneme and realization is posited by a third type of approach. Kenstowicz and Kisseberth's (1977, 1) initial statement runs as follows: "an examination of the work of generative phonologists reveals that in most, if not all, instances a UR [underlying representation] and its PR [phonetic representation] are not identical". -- Given a phoneme /P/, it must be the case that each feature value of /P/ occurs in one of its realizations $[P]_i$, though not all of the feature values are required to occur together in the same realization (cf. ibid. 46). Which of them occurs where is determined by separate rules relating to phonetic representations, rules that are sequential and are formulated in terms of the various levels of grammar. Apparently, phonemes and phoneme realizations are kept distinct here as well, but the individual distinctive features of a phoneme as an abstract entity and the identifying properties of the corresponding phenomenon in speech are taken by the authors to be completely identical, hence they do not consistently keep things ontologically apart at the level of components.

Starting anew from the same question as above, but this time proceeding along logical lines, the general picture turns out to be somewhat more complex. Prior to the appearance of structuralists -- especially of the Prague School and Bloomfield -- 'sound types' were defined in terms of one of the central rules of class logic. Signals, undeniably standing in the foreground from the point of view of linguistic function, were subsumed under a variety of classes within which the interrelationship of the individual signals was identity (for a critical appraisal of this view, cf. Jones 1950, 8--9). The procedure only apparently involves abstraction. The result is that the class of signals, rather than signs, and the inventory of functionally obligatory signs of the given language, do not coincide (cf. Szende 1984, 295--6).

The notion of the phoneme, properly speaking, was ground out within the various trends of structuralism. The point of the change of attitude with

respect to that of the Neogrammarians was the recognition of phonetic facts, i.e. articulatory and acoustic realia, as well as of differences used for linguistic purposes as abstract entities (cf. Saussure 1916/1968, 64--6). The first functional definitions of phonemes were offered in Thèses (1929) and in Projet (1931). The earliest phonemic criterion was meaning discrimination (for a detailed exposition, see Trubetzkoy 1939). Another major structuralist criterion for the phoneme, derivability, was also suggested virtually at the same time. Although using different terminology, Bloomfield (1933; 1939, 21-4; and 1961, 19) and Bühler (1934, 43-5) both argued that every language presupposes distinctive oppositions and that the phoneme is the minimal linguistic unit, not further decomposable into smaller oppositions. With respect to its linguistic role, the phoneme derives its function from being opposed to other phonemes. The logical approach (Twaddell 1935), consciously applying the devices of class logic, resulted in similar argumentation. The notion of phoneme, arrived at in that way, was immediately put to use as a practical tool while its definition was further refined and made more elaborate (see Pike 1947). From an ontological point of view, the eventually emerging picture is that types are generalized from (speech) signals such that they are elementary points in hierarchical relationships as members of a totality within the sound pattern of each language. The horizons of the various structuralist frameworks did not extend beyond that point as their theoreticians refrained from a further elaboration of the notion of phoneme, derived as above, in a double sense. First, they did not make further attempts to find the lines of force linking phonemes to subsystems above the level of lexemes. On the other hand, in this interpretation, 'types' -- as in the definition of phonemes -- lose contact with the physiological, acoustic, and perceptual universe of corresponding (speech) signals. Rather, they consistently and exclusively emerge as abstracta, hence they get expelled, once and for all, into the terra incognita of abstract entities. And once they are there, structuralists refuse to give them an exactly defined domicile, or indeed clear criteria for their identity.

Undoubtedly, one of the great exponents of the Prague School, Jakobson, made a few steps forward. First of all, he stated that the phoneme was a complex unit that could be described as a 'bundle of distinctive properties' (Jakobson 1939/1962, 303). The modification of the 1931 Prague definition

was indeed an essential change as now it came to refer to articulatory--acoustic features as components making up the phoneme. It is to be regretted that generative phonology only paid attention to the second half of Jakobson's definition. In addition, Jakobson was also the first to point out that the phoneme necessarily resides in the speech sound as an inherent part of it (Jakobson 1939/1962, 315). However, the formulation implies a one-way relationship between phonemes and speech sounds.

In the procedures of generative phonology, phonemes do not play a crucial role. That role is assumed by operations involving distinctive features rooted in Jakobsonian binarism, without any independent entities being assembled from those features. On the contrary, the independent entities are the features themselves, and phonemes (whose expressis verbis denial nevertheless does not take place in generative phonology) are just a sort of garnish around the bundles of distinctive features.

Thus, phonemes in generative phonology are merely convenient labels for sets of distinctive features: in a generative phonological matrix for Hungarian kutya 'dog', the bundles of features are 'called' /k/, /u/, /c/, and /ɑ/, but /k/, /u/, /c/, and /ɑ/ themselves do not independently exist as entities possessing their own attributes (cf. Szépe 1969, 368). The strange contradiction is that an independent though undefined unit referred to as a 'segment' and mediating between distinctive features and morphemes is indispensable for generative phonology as well. Sets of distinctive features making up morphemes are necessarily divided into bundles e.g. in rewrite rules. The fact that this slicing is called for is a hidden proof of the demurely concealed postulation of an abstract entity, that of the phoneme.

Generativists' forbearance from the phoneme is unwarranted, as is generally revealed by arguments brought up against transformational generative grammar as a whole. The first point was actually made in connection with generative phonology. (i) In particular, generative phonology has been claimed to involve unverified formal entities (cf. Hammarström 1973) in that some items figuring in some of its rules do not actually play a role in the corresponding linguistic processes. (ii) The best try-out of transformational generative grammar is a comparison with language acquisition. In learning his mother tongue, the child gains information by data analysis, segmentation, and generalization (cf. Derwing 1973, esp. 75). But then in the seg-

mentation of vocal sequences the child has nowhere to go beyond types (of phonemic value). (iii) The representations formulated by generativists are counter-intuitive (Derwing 1973). With respect to the phoneme, this is to be interpreted as follows. To perceive and mentally store a high number of combinatory patterns in terms of sets of distinctive features is incomparably more complex as a task than to learn 10 to 70 items, the usual phoneme inventory of a natural language. (iv) Whereas some 'surface' or, to use Szépe's (1969) wording, 'low-level' phenomena -- generative phonologists' terms for morpheme-internal processes -- can be conveniently described in terms of rules based on distinctive features, for instance, English consonant harmony for [+coronal] consonants, some others -- like metathesis -- are more appropriately handled 'in terms of phoneme-sized units' (cf. Smith 1973, 189-90). (v) Generative phonology does not establish an organic relationship between phonemic (or underlying) and phonetic representations -- it simply excludes surface phonemic forms as a level of representation (this is prpposed e.g. in Chomsky--Halle 1968; for a morphophonological elucidation, see Mártonfi 1974; for early critical remarks cf. Schane 1971, Linell 1976). Rather, such relationship is postulated to exist between surface contrasts (often co-extensive with phonemes in the classical sense) and the morphological level. Since a phonemic representation is less abstract than the corresponding morphophonemic one, the phonetic representation can only be directly related to the former. Therefore, the phoneme must necessarily have an independent status (see Schane 1971, esp. 512--4). (vi) It would be self-contradictory to deny the independent system-constituent status of phonemes -- but grant that independence for distinctive features and bundles of distinctive features at the same time. In the process of communication, it is only the latter that can be identified as units, the distinctive features cannot. Hence, phonemes are elements whereas features are merely subconstituents (cf. Szende 1976a, 79--80). This claim is not undermined by the fact that certain distinctive features, or rather the corresponding articulatory--acoustic properties can perform partially independent movements, as was the case in medieval Hungarian complementary lengthening where the property of [+long] was transposed from the n<u>th</u> phoneme to the n - 1th. (vii) A bundle of distinctive features appearing in itself -- say that of some [a::] sound -- will not constitute a phoneme. An [a::] represents the phoneme /a:/ if and only if in a number of

contexts [a::] as a bundle of distinctive features acquires a distinct value that is not given in some totality of distinctive features as such but turns bundles of distinctive features into an independent quality. This quality will necessarily have to be recognized, under the name of 'phoneme', as an independent system-constituent.

The problem, however, cannot be exhausted by simple criticism of a phonological framework which, although still alive and vigorous, represents the past rather than the future.

2.1.2. Types of practical justification for autonomous phonemes and the phonemic level

The problem is general and of a theoretical nature. Therefore, the argumentation also has to offer extrinsic evidence that is independent of particular natural languages. Such evidence involves the following points:

2.1.2.1. Evidence ordered in terms of systematic linguistic levels

L(ix) The phoneme is the elementary constituent that is capable of semantic discrimination among morphemes in the lexicon. This lemma -- as was pointed out earlier -- was clearly formulated as one of the crucial tenets of the Prague School and can be demonstrated by oppositions exemplified in minimal pairs (e.g. Hungarian kap 'get' vs. kép 'picture').

L(x) Another, related role -- that was recognized just as early -- is discrimination among grammatical forms (see first in Laziczius 1931-4, 129). The latter function is kept separate from morphemic distinctiveness on the grounds that it may create new oppositions in the phoneme system of a language. (E.g. in French there is no distinctive opposition /e/ vs. /ɛ/ among root morphemes but this is the opposition that separates parlais 'I spoke' from parlez 'you speak', cf. Richman 1976.)

L(xi) The phoneme is functionally related to larger (non-morpheme-level) units of communication as well, in which case it need not have an 'essential' role in meaning discrimination (i.e. one that is frequently exploited in morphemes); 'inessential' oppositions may play a part in organizing the flow of speech into messages since, in a more populous system with its increased entropy, a larger number of differences facilitate the partitioning of linguistic sequences (cf. Herman 1976, esp. 336).

2.1.2.2. Evidence based on speakers' linguistic intuitions

L(xii) The postulation of the phoneme as a real unit of an autonomous level is also supported by various types of intuitive evidence:

- the initial segments of two words can be interchanged, e.g. in word games or in order to create a humorous effect;

- alliteration and rhyming are used as poetic devices; what makes this possible is that the elements in question constitute a closed and homogeneous set;

- the natural emergence of phonemic alphabets proves the psychological reality of phonemes (although that mental reality originates in a primary acoustic/articulatory unit of speech: the syllable, cf. Bever 1971).

L(xiii) The relatedness of alternating segments (e.g. in English vowel shift alternations) is not based on similarities in their Chomsky--Hallean combinations of features, but rather on their unitary character that is reflected in phonemic writing systems by striking similarities in their orthographic representations. The identity of pairs of written equivalents helps the speaker assign identical phonemic interpretation to such pairs. As John McCawley (1986) claims on experimental-phonological grounds, "the entities 'underlying' the alternating segments are not complexes of phonological features but rather just Sapirian relations among phonemes" (ibid. 32).

2.1.2.3. Evidence pertaining to the autonomy of the phonemic level

Positing the phoneme as an abstract entity does not necessarily imply the existence of an autonomous level of phonemes in the hierarchy of systematic linguistic levels. However, (partly) independent motivation is also available for such a postulation as specified in L(xiv/a, b, and c) in the form of antecedent conditions:

L(xiv) With respect to their identifiability and minimal transmittability, word-level constituents of a natural language can be satisfactorily described as sequences of phoneme-size segments. (This lemma is valid for tone languages with the proviso that the tonemes associated with their elementary units are conceived of as part of those elementary units.)

L(xiv/a) The elements in question are reconstructible in themselves. The result of reconstruction is a phoneme-size segment that is, for the most part, identical (constant) across languages. A segment like [s] or [t], ap-

pearing in isolation due to some segmentation process, does not only retain its differences from other segments but also its phonetic properties. In two distinct languages both of which employ these segments to implement phonemes it is in a completely systematic fashion -- and quite independently of other conditions -- that they serve as realizations of exactly the phonemes concerned. Thus, an [s] or a -- preconsonantal -- [t] synthesized for Hungarian but inserted at appropriate places in a German text will assume the same phonemic value with respect to linguistic identifiability as it does in Hungarian (cf. Olaszy 1985, 47--9 and 99--101).

L(xiv/b) A morpheme, taken in its bare form as a sequence of phonemes and actualized as a sequence of phonetic segments -- deprived of all suprasegmental features -- can unambiguously refer to the semantic content that it embodies in actual (i.e. unrestricted) speech events. This lemma is valid with the following restrictions. (i) In tone languages it holds only if the condition specified in L(xiv) is met (we could refer once again to synthesized speech with no suprasegmental factors superimposed); (ii) homonymy is allowed in languages using stress for discrimination of morphemes or classes of morphemes (like English or Russian, e.g. PREsent (n) vs. preSENT (v) and MUka 'torture' vs. muKA 'flour'); (iii) for Hungarian it holds in general, except for certain sentential interjections like Ahá! 'I see', Nono! 'Come come!' and with the further exception of contrastive stress as in helység 'town' vs. he['ji]ség 'room' (cf. Deme 1961, 116; Szende 1976a, 120).

L(xiv/c) The alphabetic writing of non-tonal languages in which the use of sequences of individual written symbols excludes, on the word level, the indication of suprasegmental components can nevertheless unambiguously identify the semantic unit that the given word refers to. This is due to the fact that written characters (roughly) correspond to, and/or induce the implementation of, phonemes. (For instance, in a set of written forms like H. egyen 'he should eat', egye 'he should eat it', egy 'one', it is by deleting a single letter [corresponding to a phoneme] that we get a different semantic unit in each case, leaving all else unchanged.)

L(xv) Phonological processes are mostly undergone by units that represent a single phoneme of an utterance and which may be completely independent of suprasegmental factors. (For instance, most accommodation rules are of this type.)

L(xvi) Some phonological rules are uninterpretable without a given inventory of phonemes as such, given that the rule concerns a single unit-size slot of the sequence. (For instance, vowel harmony in Hungarian noun declension.)

L(xvii) Metathesis as a sound change, although it can be accounted for in other ways as well, is best interpreted (where 'best' means the simplest, most logical, and most economic account) if the existence and sequentiality of phonemic units is assumed. With some qualifications, epenthesis, mispronunciation, and sound substitution can be given as further examples.

L(xviii) Surface contrasts tend to influence the phonetic properties of the system of units in a natural language. For instance, the phonetic value of the realization of Finnish /s/ is shifted in the direction of [ʃ] because there is no /s/ vs. /ʃ/ opposition in Finnish (cf. Goyvaerts 1981, 8); similarly, also in Finnish -- as well as in Hungarian -- /i/ and /e/ are neutral with respect to vowel harmony because these phonemes do not have a [+ back] counterpart in the system (cf. Kiparsky 1973; 1989, 136--7).

2.1.3. The phoneme as a unit of systematic phonological representation

On the basis of the foregoing (2.1.1--2, and L(viii), see the introductory paragraphs of section 2), the following theorems will be proposed:

T(i) The unit of systematic phonological representation is the phoneme -- as an element of a system.

T(ii) Phonemes are abstract entities that are objectively given (in the sense of intersubjectivity).

T(iii) Phonemes are substantial constituents in language structure inasmuch as one of their prime attributes is the constancy -- or rather: the recurrent representation -- of their self-identity at all given points in individual speech events. Self-identity, the essence of the abstractness of phonemes, is the identity of indivisible entities, identity of the type a≡a. This is logically necessary. Thus, phoneme realizations of the type [a:] appearing at various spatial and temporal points in a speech event (as in the word hálátlan 'ungrateful') all represent the same /a:/, even if the individual phoneme realizations $[a:]_1$ and $[a:]_2$ in hálátlan directly correspond to the "phonemic events" $/a:/_1$ and $/a:/_2$, respectively. Labelling $/a:/_1$ as x and $/a:/_2$ as y, the relation of the two will be $(x=y)\square(x=y)$. This necessary

identity obtains at all existential levels of /a:/ or, using Carnap's (1934) terminology, "in all worlds of its existence", i.e. $(x=y) \rightarrow \Box(x=y)$. The two phoneme realizations of type [a:] in hálátlan, $[a:]_1$ and $[a:]_2$, exhibit another type of identity, that of distinct things that are "practically identical" from some point of view; that type of identity is based on the similarity of two things having distinct spatial and temporal parameters. (The definition is made necessary by the unfortunate fact that at least in part of the literature, articulatory/acoustic phenomena are referred to as 'substantial' while their abstract components, the linguistic contents they include are called 'formal'. The absurdity of such terminology is revealed by the fact that the distinctive features of phonemes -- e.g. in terms of Jakobsonian binarism -- include perceptual features as well: ones that are not in the material of the vocalic phenomenon but are nevertheless part of the phonemic self-identity of the sound event. The notion of 'substance' in the usual sense would automatically exclude such features. What is more important, however, is that in an elementary speech event, it is the phoneme that is constant, not the way it occurs.)

T(iv) Phonemes are abstract objects of the highest level of abstraction among elementary speech events that are still actually represented in communication. (This fact makes it possible for us to distinguish phonemes from allophones. That distinction cannot be based on social determination since allophones as well as phonemes can be determined socially as it is documented in sociolinguistic investigations, e.g. in Labov 1966; for a theoretical treatment cf. Fónagy 1977.)

T(v) The abstractness of phonemes is derivable from their referential character. The attributes of a given phoneme -- which is both individual and abstract -- make definitive reference to the corresponding speech phenomena which on their part 'enact' that phoneme in a given speech event. (In present-day language use it is this evidence that the conventional/social character of phonemes can be derived from, and not the other way round.)

In view of the foregoing, phonemes -- being both referential and synthetic -- are also of a symbolic nature.

T(vi) The abstractness of phonemes specifically resides in the fact that they refer to secondary uses of biological functions. (The correctness of this theorem is indirectly demonstrated by what is called the motor theo-

ry of speech perception, cf. e.g. Liberman--Mattingly 1985. If the listener actually performs mirror images of the production of the message to be processed -- and this is supported by a number of valid arguments --, this is only possible if phonemes actually refer to sets of articulatory movements.)

T(vii) The manner of existence of phonemes is valid-ness (Gültig-Sein) based on the constancy of their identity and their referential character.

T(viii) Phonemes exist within individual unitary instances of speech events: that is, the existence relation between phonemes and the corresponding units of speech events is one of mutual inclusion. 'Mutual inclusion' is an interrelationship realized in the direction phoneme → elementary speech event as an instruction for identificational data analysis. (This theorem draws its significance from its appropriateness as an explanatory principle for phonemic change. The ontological aspect of change is as follows. The change of a given phoneme is nothing else but a reorientation in the set of [partial] references of attributes constituting that phoneme within the confines of unitary instances of speech events. The constancy [or a persistent repetition] of the reorientation of reference results in the modification of phonemic identity while the validity of the phoneme is maintained. The termination of the validity [or, equivalently, existence] of a phoneme is not a case of the change specified above. It is, instead, a component of historical change in "higher-level" elements of a linguistic system.) This theorem exactly corresponds to the idea of word-level phonological representation as a unit (of global programming).

2.1.4. Consequences for the analysis of the phonemic level of Hungarian

On the basis of the foregoing -- and especially T(iii, v, vi, viii) and L(x, xiv/a--c) -- some general methodological points can be put forward with respect to the description of the phoneme inventory of Hungarian.

(i) The systematic properties of (phonetic components of) elementary speech events may make it necessary to postulate more than one simultaneous phoneme systems even within (the synchronic structure of) a single language. This is what Laziczius (1931--4) did for the vowel systems of Hungarian dialects. It is proper to follow this principle with respect to Standard Hungarian as well, since the latter also includes distinct and autonomous phoneme

systems rather than varieties of a single phoneme system -- across which the number of /E/-type phonemes varies. Thus, Hungarian is one of the languages in which several simultaneous phoneme systems are operative (cf. Fries--Pike 1949, esp. 29; Hajdú 1951, 220).

(ii) All relevant phonological descriptions must contain all (and only) elements that satisfy the criteria based on the relationship between elementary speech events and phonemes. Accordingly, Lotz's (1972a) insistence on the inclusion of what are called marginal items in the Hungarian phoneme inventory is justified. It is also appropriate and necessary to include monophonematic long consonants in the consonant system of Hungarian (cf. Szende 1972; Kassai 1979, 45; Bolla 1982, 166; see also 2.1.5.2).

(iii) In accordance with the principle of mutual determinacy of elementary speech events and phonemes, the phonological analysis of a phoneme system cannot do without an indication of the hierarchy of use of its phonemes. What this means is that one has to tell phonemes in full vs. restricted use apart (this was partly done, through indicating the role of phonemes in discriminating grammatical forms, by Laziczius (1931--34) and, mentioning but a few cases yet drawing conclusions with respect to the full phoneme inventory of Hungarian, by Décsy (1970); later also by Szende (1982) and Beöthy--Szende (1985).

(iv) The inventory of Hungarian phonemes can be described in a way that its elements are not specified for pitch or stress. (This is completely in keeping with tradition.)

2.1.5. The inventory of elements at the phonemic level

Our aim now is to enumerate, on the basis of the foregoing (2.1.1--4), the inventory of phoneme-level elements that figure in the next-to-phonetic phonemic representations of Hungarian lexical items. Two additional criteria will be used with respect to the inclusion or otherwise of individual items: (i) full specification on the basis of L(viii) and (ii) actual occurrence as an antecedent condition of analysis, in keeping with what has been brought up against positing archiphonemes in phonological representations (see esp. 1.1 (iii and iv); and 1.3 (iv/b)).

In the subsequent discussion of the problems of the inventory, we will stick to a traditional distinction, that between the categories of 'vowels'

and 'consonants', even though it would be quite justified to draw up a system in which -- along the lines of either the sonority or the strength hierarchy -- the major classes and further "neighbouring" oppositional groups of elements would both be arranged in an unbroken circle (cf. Bodnár 1991). The unified treatment of vowels and consonants would be supported on the syntagmatic plane by analytical criteria restricted to articulation as well: within the "gestural organization" of articulatory sequences, vowels serve as a 'ground' for the 'figures' of consonants (cf. Browman 1991).

The two large classes of the inventory, those of vowels and consonants, cannot be described for Hungarian in equally homogeneous terms since the vowel system subdivides into two alternative subsystems (see 2.1.2 (i)). On the other hand, no such division is needed for consonants. Thus, it is not only tradition but also organizational considerations that motivate the separate treatment of the two classes. This desideratum raises the issue of categorial delimitation of vowels and consonants. Starting from vowels, the problem is as follows. (Needless to say, the starting-point is arbitrary. We could just as well begin with the question of what a consonant is.)

Traditional Hungarian terminology gives us some fascinating insight into the way the native speaker fights his way through directly observed properties in an attempt at categorization. Earlier Hungarian terms denoting the class of vowels (cf. Vértes O. 1980 passim, esp. 92--120) highlight three of the characteristic properties of vowels as ones that help discriminate them from the other large class, that of consonants. (i) The fact that vowels can be uttered on their own (cf. magánhangzó 'sounding in itself') emerges as an external point -- one that abstracts away from all communicative situations -- in the traditional terminology, hence the theoretical status of the differentia specifica based on it is rather doubtful in a functionally inspired description. In addition, articulatory and acoustic observations definitely disprove the criterial validity of the claim embodied in this term. In particular, to a varying extent depending on their degree of sonority, consonants can also be articulated in isolation. Indeed, one Hungarian word, the conjunction s 'and', is made up by a single consonant (this is obviously also a syllable; though as a word it is one that cannot constitute a sentence by itself, cf. Kiss 1974, 63--4). This interpretation of s is also supported by the fact that it can occur in sequences of three identical consonants --

a pattern that is otherwise disallowed across word boundary in Hungarian -- as in tanulás s segítés 'learning and helping', as well as by theoretical considerations. The interpretation of s as a clitic is excluded by a strict notion of that category as consisting of bound morphemes (cf. Zwicky 1972), and also by considerations like the connection and alternation of s with és 'and'. (ii) Syllabicity (cf. szótevő 'word-maker') is not only characteristic of vowels, either. Consonants can be syllable nuclei in several languages (e.g. /r/ in Czech or in Serbo-Croatian, /s/ in the Hungarian interjection pszt! 'hush'). On the other hand, certain vowel reduction phenomena may put an end to the syllabicity of vowels in the actual flow of speech (cf. e.g. the shorter version of French la fenêtre → [laf(ə)nɛtRə]), provided that we take [ə], on the basis of Kassai's (1977) acoustically well-supported investigations, to be a vocalic segment. Another type of evidence in support of this point is 'gliding' as in Hungarian autó 'car' or in English barrier. (iii) Finally, vocalicness -- i.e., the consistent presence of voicing and the absence of obstruction -- cannot be a (typologically) full-fledged discriminatory criterion in the definition of vowels, either. Phonemic voiceless vowels occur in several languages of the world (cf. Ladefoged--Maddieson 1986). Further, the acoustic pattern of vowels is often supplemented by a (mostly [quasi]periodic) noise component. A well-known example is nasality which is a constitutive feature in a number of languages like Portuguese or Polish.

However, languages themselves offer a delimitative criterion that helps us tell the two large classes of sounds apart. In Hungarian certain pronouns (e/ez 'this', ama/amaz 'that') as well as the definite article (a/az 'the') alternate depending on which large class the initial phoneme of the following word belongs to: vowel-initial words are preceded by the consonant-final alternant and consonant-initial words by the vowel-final version. Similarly, the suffix morpheme -val/-vel 'with' is added as it is to a vowel-final stem but in an assimilated form to a consonant-final stem (cf. mivel 'with what', ezzel 'with this'). In other languages the distinction can also be based on similar rules: in French some morpheme alternants preceding a word boundary inform us that the language keeps the two categories apart (in possessive pronominal constructions feminine and masculine nouns are both preceded by mon, ton, etc. if they are vowel-initial like ami(e) 'friend'). The French

example further reveals that linguistic evidence is often, as in this case, ambiguous or misleading with respect to the classification of certain items. The appearance of the n-final alternant or the 'floating segment' [z] in the French sequences mon oie /mon/ /wa/ 'my goose' and mes yeux /me/ [z] /jœ:/ 'my eyes', to borrow Nádasdy's (1988) example, merely reflects an earlier stage of the language and does not exclude the (phonemically) consonant-initial interpretation of such words, as opposed to the diphthongal analysis.

With respect to Hungarian, some doubts have recently emerged concerning the classification of two segments, [j] and [w].

(i) Kylstra and de Graaf (1981) suggested that in Hungarian -- as in Finnish, on the basis of the acoustic pattern that is claimed to be identical in both cases -- the [j] of [V(:)j] clusters should be the offglide of a diphthong (whose nucleus is the [V(:)] concerned). This was refuted in two articles by Kassai (1982, 1984) on the basis of linguistic criteria.

Nádasdy and Siptár (1987, 14--16) -- otherwise denying the idea of [j] being the offglide of a diphthong -- cite an argument first offered by Lotz (1972a) to the effect that [j] is not to be classified as a consonant. Thus, [j] must be a semivowel (glide) since e.g. hord 'carry' takes a linking vowel -o- before consonant-initial formatives, as in hordotok 'you-pl. carry', whereas j-initial endings are added directly to the stem-final d as in hordjon 'he should carry'. This reasoning cannot be accepted. A look at the history of these forms reveals that hordjon could exactly be formed from earlier hord[V]jon -- incidentally, just like the alternative hordtok from hordotok -- because j was taken by the language to be a 'pure' consonant. As is well known, this development was due to what was described by Horger (1911) as the 'two-open-syllable tendency'. -- But the phonologically (semi)vocalic character of j is not supported by any other data. Hence, the putative semivowel or glide *[i̯] does not force us to posit an intemediate class between vowels and consonants in Hungarian.

(ii) The issue of how to interpret [w] is a somewhat different matter. First, the theoretical possibility arises again that, with respect to [aw] realizations of /a/ + /u/, a diphthong /au̯/ might be posited for present-day standard Hungarian. Lotz (1972a, 8--11) found that the segment following /a/ in autó 'car', tautológia 'tautology', etc., consistently occurs as [w], hence a marginal consonant or semivowel (/w/) should be assumed to exist.

But then, since this putative element occurs only after /ɑ/ and possibly /ę/ (as in Európa 'Europe'), we should rather think of the diphthongs /ɑu̯/ /ęu̯/. However, according to Deme (1961, 72), the au-, -au- in question is monosyllabic (augusztus 'August') in some cases and disyllabic (tautológia) in others; this duality can be attested diachronically (cf. kalauz 'conductor' vs. kalóz 'pirate') as well. Nádasdy and Siptár (1987, 17) provide experimental support for this claim: on the basis of the intonation of 'yes/no' questions they find that "autó (at least for a considerable number of speakers) is disyllabic" whereas the same test shows kalauz to be "definitely trisyllabic". They claim that the interpretation of [ɑu̯] as a vowel cluster appears to be the most feasible, with a (possibly optional) realization rule /u/ --> [w]. This view can be supported by a Praguean argument as follows. [w] invariably appears in a strictly delimited phonotactic position, i.e. after /ɑ/ and possibly /ę/ and, although this is not a crucial criterion, mainly in words where the segment concerned seems to go back to /u/ in the source language. This supports the variant status of this element. And since no morphemic alternations require the postulation of diphthongs /ɑu̯/, /ęu̯/, the occurrence of [w] in such words can be accounted for as over-rounding due to the adjacent [ɑ]. (Consider a parallel case: between bilabial stops as in pupilla 'pupil (of eye)', púp 'hunch', strong labialization can be observed on [u] and [u:], respectively.) On the other hand, a simultaneous tongue lowering can be observed with the effect of centralizing and thus 'de-characterizing' the vowel in question. (Similar results are reached on the basis of different arguments by Szépe [1969, 415] as well.)

The foregoing considerations lead us to an apparently trivial theorem as follows.

T(ix) In Hungarian, all phonemic segments are either vowels or consonants; no member of the phoneme inventory belongs to a third, intermediate category.

Note that it is necessary to state T(ix) because among lenition processes one finds types of phenomena that would otherwise permit another solution as well. Thus, in [ʒęręx:nęk] ← gyerekeknek 'for children' [x:] could be falsely interpreted as $\begin{bmatrix}+\text{cons}\\+\text{syll}\end{bmatrix}$ if the appropriate phonemic background is

ignored. The interpretation would be false in the sense that Hungarian morpholexemic rules permit at most /s/ and /ʃ/ to be [+syll] consonants; [x:] would have to be marked [+voc] along with [+syll], which is contradictio in adiecto.

2.1.5.1. The vowel inventory

The discussion of the vowel inventory of Standard Hungarian is to begin with two lemmas that are also controversial: those concerning (i) marginal elements and (ii) the unity of the system. These issues will not be treated as mere theoretical problems but also with reference to the relevant literature: Hungarian representatives of post-SPE trends (cf. primarily Vago 1980, Kornai 1986, Nádasdy--Siptár 1987, Dressler--Siptár 1988, Siptár 1993, etc.) have discussed these issues in a new light but their conclusions will have to be refuted here.

(i) Contextually bound elements, i.e. those exhibiting defective distribution like (/ɑ:/), (/a/), and (/ɛ:/), will be postulated as independent phonemes in accordance with their semantic discriminatory function. These elements, however, are used to a limited extent. The long marginal elements are bound to phonotactic positions adjacent to ## (word boundary) or, in the case of abbreviations or names of letters used as words, next to + (morpheme boundary). On the other hand, /a/ occurs in a limited number of loanwords -- whatever that term is taken to refer to -- like Svájc 'Switzerland', passz 'pass (in card games)', halló ⟷ [hal(:)o·] 'hullo', ámen ⟷ [am:en] 'amen', Weiss 'family name', etc. It is also true that the elements considered here -- except for /a/ -- can only discriminate root morphemes as semantic units, as opposed to other vowels that can discriminate morphologically complex forms as well (e.g. fűzet 'have sg stitched' vs. füzet 'copybook'; mondaná 'he would say it' vs. mondana 'he would say sg'). The notional basis of the analysis of marginal vowels, nevertheless, is meaning discrimination. Limited use is also more or less true of some other, more frequent phonemes: thus, the contrast /i/ vs. /i:/ is instantiated in just one morphic opposition: iv- (a bound stem alternant of iszik 'drink') vs. ív- (that of ívik 'spawn'), whereas that between /ø/ vs. /ø:/ is widely attested as in tör 'break' vs. tőr 'dagger', kör 'circle' vs. kőr 'hearts (in a card game)', elöl 'in front' vs. elől 'from before', etc. Foreign origin cannot

be a crucial factor in general. Thus, we have to subscribe to Lotz's (1966, 1972a) verdict though it is not quite unjustified to mark the special status of marginal elements (e.g. by parentheses, cf. Szende 1982, 257--8).

In the phonological analysis of short unrounded /a/ another possibility arises. It could be identified as a non-marginal (underlying) element from which [ɑ] is derived by an /a/ → [ɑ] realization rule (cf. Nádasdy--Siptár 1987, 10--2 and, especially, Siptár 1993, point 1.1). Thus, there would be no /ɑ/ at all; instead, there would be an /a/ from which surface [ɑ] derives secondarily (except where this derivation is blocked and [a] surfaces unaltered). In a thought-provoking discussion of this topic, Siptár (1991b) sets out from a classification of surface [a]'s (p. 215). It has to be objected, however, that his class (i) ([a] ← /a:/ in nonfinal closed syllables) includes non-collapsible categories of [a] realizations: the [a] of [a]ttörés 'breakthrough' is a syllable structure dependent realization, whereas those in !a!ltalános 'general', vás[a]rváros 'market town' depend on coarticulatory conditions, viz. the length modifying effect of [l r ?j] or [?C_{nas}]. In the subsequence containing the two elements, the medial 'temporal niche' is filled up from both sides, producing a V, VC, C pattern, due to the characteristic gesture of the consonants listed. In general, if /a:/ is posited in e.g. királyfi 'prince' (or indeed in Svájc with its single closed syllable), such cases should be assigned to class (i) rather than (ii). The real novelty in Siptár's account, however, is the claim that the vowel inventory does not include /ɑ/; rather, both /ɑ/ and marginal (/a/) are subsumed under an /a/ that surfaces as [ɑ] in the general case but that is "underlyingly unspecified for rounding" (ibid. 215). Our framework that postulates a next-to-phonetic phonemic layer in the phonological representation of word forms -- without which lenition phenomena cannot be accounted for -- makes it impossible for us to follow the author's solution. For instance, the word változás[a] 'its change' occurs in one of our samples with a delabialized final vowel which then would have to undergo two steps in its phonological derivation: (i) rounding of underlying a, followed by (ii) its unrounding. Such sequence of operations would be difficult to support empirically. (From the point of view of the present study, Siptár's account of short mid [e] has to be rejected, mutatis mutandis, on similar grounds.) To summarize briefly, my

objections to this solution are as follows. (i) In minimal pairs like passz /pas:/ 'pass (in card games') vs. /pɑs:/ 'pass (in football)', haló /hɑlo:/ 'dying' vs. halló /hɑlo:/~/halo:/ 'hullo' vs. háló /ha:lo:/ 'net', this account creates sophisticated homonymy. Alternatively, (ii) all of the (stem) morphemes concerned have to be supplied with a diacritic referring to either stylistic layer or etymology (e.g. /pas:/ ◄—► passz [foreign origin]), a criterion not used for any other phoneme in the language. (iii) We would be forced to posit a sequence of segments in the next-to-phonetic phonemic representation where *i, ..., m contains an 'odd man out', i.e. *n (+ realization rule) -- that is, an item and an operation -- as a non-homogeneous constituent (cf. 1.2 (iii)). All three difficulties can be avoided by admitting (/a/) and retaining /ɑ/. In view of the foregoing, we can state:

L(xix/a) The inventory and system of Hungarian vowels must be allowed to include marginal phonemes whose status is identical with that of all the other elements.

(ii) Unrounded front nonhigh vowels exhibit a special distribution in Hungarian. With a standard normative character, but with regional divisions, one version contains one, the other two, filled positions along the high/low axis: /e/ and /ɛ/ in one version and /ę/ in the other. Although in the normative standard the dominance of what I call S2, i.e. the system with a single /E/-type vowel, is on the increase -- despite long-standing prescriptivist aspirations to the contrary that will not be discussed here --, the two-vowel version, S1, is more heavily represented in regional distribution: Imre (1971, 76) found 81,2% of his data collection sites to include mid /e/ as a constituent of the vowel system and in all these areas the functional load of /e/ is definitely high (ibid. 212ff). This situation gives rise to a dilemma with respect to the vowel system. To resolve it, the following facts are to be crucially considered: (i) the two varieties are distinct inasmuch as the speaker in a given speech situation follows either one or the other of them (the listener's position is immaterial); (ii) the difference between S1 and S2 has morphological repercussions such that certain paradigms turn out to be directly matching but not identical in the two systems, e.g. -hoz/-hez/-höz 'to', -kod/-ked/-köd 'keep doing sg'. This is true even if the two systems can be represented in a single tabular display, as in Deme (1971--2, 93). (iii) Morphemes that are homonymous in S2 are distinct in S1 (cf. John

Lotz's example, mentek 'you-pl. go /they went /I rescue /they are exempt', a four-way ambiguity in S2 but four distinct forms in S1). (iv) The different number of elements in S1 and S2 results in distinct loadedness properties -- an argument marginal to phonology proper. To account for (i) and (iii), the following lemma will be proposed, in accordance with Laziczius (1931--34, esp. 182).

L(xix/b) Present-day standard Hungarian includes two alternative and simultaneous vowel systems.

(iii) Finally, leaving the realm of direct linguistic evidence for a moment, let us consider what are called 'abstract vowels'. Szépe (1969, 417) and Vago (1980, 3) both posit certain abstract elements in their respective systems that are not directly represented on the surface in present-day Hungarian: /i̯ ɪ̯/ and /e̯ ɛ̯/. The reason they give for this is that exceptional harmonic behaviour (as in cél-ul 'as an aim', hid-ak 'bridges', etc.) cannot otherwise be accounted for. A very strong counter-argument is that this solution introduces disparate types of data in a structurally homogeneous system. In addition, the language user never encounters historical facts either during acquisition or later on. Hence, he cannot set out from reconstructed, 'abstract' entities which then would undergo some transformations to yield appropriate portions of the actually pronounced forms. In any case, abstract elements are of little use in accounting for exceptional harmonic behaviour since such exceptions are anyway encoded morpholexemically, i.e. in their lexical paradigms. Therefore:

L(xx) The sytem of vowel phonemes does not include segments that are unrepresented at the surface and are only historically attested.

On the basis of the foregoing, 2.1.5.1 (i--iii), the vowel inventory of Standard Hungarian is defined as follows:

T(x) Two alternative vowel systems of Standard Hungarian:

S1

(/a/)	/ɛ̯/	/e/	/i/	/ɑ/	/o/	/u/	/ø/	/y/
/a:/	(/ɛ:/)	/e:/	/i:/	(/ɑ:/)	/o:/	/u:/	/o:/	/y:/

S2

(/a/)		/ę/	/i/	/ɑ/	/o/	/u/	/o/	/y/
/a:/	(/ę:/)	/ę:/	/i:/	(/ɑ:/)	/o:/	/u:/	/o:/	/y:/

Remarks: (i) Parentheses enclose elements that Lotz refers to as 'marginal'. (ii) :, referring to the 'long/short' distinction, does not (primarily) correspond to duration (cf. Becker Makkai 1968/1972, especially 634). (iii) The difference between S1 and S2 is in the quality and number of elements in the /E/ region, hence also in loadedness properties of the elements concerned.

The identification of individual elements is most appropriately done in a modified distinctive feature notation. The descriptive devices of phonological frameworks of the past two decades, collectively referred to here as post-SPE phonology (cf. 1.1--9) are usually capable of representing systematic patterns but hardly reflect the attributes which add up to a full specification in articulatory/acoustic terms of a next-to-phonetic phonemic representation. In Schane's Particle Phonology (1984, see also 1.7 above), for instance, the subsystems of Hungarian vowels would be represented like this:

[i]	i	[u]	u	[y]	iu		
[e]$_{S1}$	ai	[o]	au	[ø]	aiu		
[ę]$_{S2}$	aai						
[ɛ]$_{S1}$	(a)aai	[ɑ]	aau			[a]	a
[i:]	i i	[u:]	u u	[y:]	iu iu		
[e:]	ai i	[o:]	au u	[ø:]	aiu iu		
[ę:]$_{S2}$	aai i						
[ɛ:]$_{S1}$	(a)aai i	[ɑ:]	aau u			[a:]	a a

I have departed from Schane's notation by using parenthesized particles that are not available in the original but whose inclusion appears necessary for Hungarian. The notation given here is tentative even as an illustration, given that Schane's theory has some unclear aspects. Thus it is inconsistent to let an elementary particle, say a, correspond to a segment, [a]. Furthermore, particles do not contain explicit reference to the phonetic components that are to be included in their definition. Distinctive feature notation, on the other hand, is unambiguous and appropriately exact, provided that the phonetic basis of each feature is sufficiently clear. The modifications of

distinctive feature notation as above are intended to serve this last point. In particular, the elements of next-to-phonetic phonological representation have to include information concerning all tendencies of the implementation of distinctive features that may influence the degree of opposition between pairs of elements. If, for instance, we find that the degree of labiality of [o:] is regularly higher than that of [o], a point that has been supported by measurements (cf. Szende 1969, 371), that degree is part of the distinction, therefore it is to be represented within the notional limits of identificatory quality. This can be expressed by appropriate terminology (labial vs. labialized). On the other hand, the terminology does not have to reflect actual phonetic values if the distinctive feature refers to extremities of a dimension whose articulatory space is not fully utilized. For instance, the phonetic space corresponding to 'front' vs. 'back' does not go beyond the medial zone of the oral cavity (as Bolla's [1982] data clearly indicate). If no element is found to be articulated further back than the medial zone with linguistically distinctive value, perspicuity of notation may make us retain the terms 'front' vs. 'back'. In view of the foregoing, the Hungarian vowels will be described as follows.

T(xi) Definitions of Hungarian vowels

(/a/)	= back,	low,	non-labialized,	short/lax
/a:/	= back,	low,	illabial,	long/tense
/ɛ/	= front,	low,	non-labialized,	short/lax
(/ɛ:/)	= front,	low,	illabial,	long/tense
/ę/	= front,	low/mid,	non-labialized,	short/lax
(/ę:/)	= front,	low/mid,	illabial,	long/tense
/e/	= front,	mid/high,	non-labialized,	short/lax
/e:/	= front,	mid/high,	illabial,	long/tense
/i/	= front,	high,	non-labialized,	short/lax
/i:/	= front,	high,	illabial,	long/tense
/ɑ/	= back,	low,	labialized,	short/lax
(/ɑ:/)	= back,	low,	labial,	long/tense
/o/	= back,	mid,	labialized,	short/lax
/o:/	= back,	mid,	labial,	long/tense

/u/	= back,	high,	labialized,	short/lax
/u:/	= back,	high,	labial,	long/tense
/ø/	= front,	mid,	labialized,	short/lax
/ø:/	= front,	mid,	labial,	long/tense
/y/	= front,	high,	labialized,	short/lax
/y:/	= front,	high,	labial,	long/tense

Notes: (i) The terms labialized vs. labial are meant to suggest degree distinctions, and by no means categorical ones, as it was explained above. (ii) The juxtaposed use of long/tense and short/lax refers to the fact that the articulatory/acoustic equivalent of this attribute is not quite unambiguous: there is no conclusive evidence whether the two factors are completely correlated phonetically, i.e. if they are parallel or complementary to one another. (iii) The double height specifications for /E/-type items expresses the fact that the articulatory/acoustic contents of this feature vary within certain limits in the two alternative vowel systems. (iv) The difference between stressed vs. unstressed versions has not been included in the definitions since this is not phonemic in Hungarian although phonetically there is clear distinction: the occurrence of stress usually entails tensing. (v) The features tense/lax and long/short exhibit full correlation with (il)labial/(non-)labialized. (vi) The use of exclusively articulatory features is justified by the fact that no ambiguity has resulted from this simplification. (vii) Alternative tabulated representation has not been provided since systematic patterns can be easily read off either type of display and in either direction. (viii) 'Purely phonological' binary readings of the above labels can be obtained by using the first of alternative terms (e.g. low/mid → [+low], short/lax → [+short]). (ix) The features are always binary but the phonological properties they express may represent more than two degrees of the same property (thus, in height there are three major degrees which, in their turn, cover four main phonetic positions: high, mid, low, and 'lowest' where the last one -- in the case of /a:/ -- corresponds to a larger angle of jaw opening than in the case of low vowels; and a total of six variable tongue height types -- low, low/mid, mid, mid/high, high, and undefined -- with all surface varieties taken into consideration).

2.1.5.2. The consonant inventory

The class of phonemes defined by systematic presence of some obstruction, i.e. the class of consonants -- as was briefly pointed out in 2.1.5.1 -- is distinct from that of vowels in that there is no intermediate category between the two. However, both the number of the elements of this class and the composition of its subclasses has been disputed uninterruptedly. The two major points of controversy concerning the Hungarian consonant system on the whole are the duplication of the inventory with the 'short/long' opposition as an axis of symmetry and the exact composition of the subclasses of affricates and stops.

In the case of 'short' vs. 'long' consonants, a sharp divergence of opinions has occurred in the eighties. Szende (1982a, 254--6; Beöthy--Szende 1985, 10--3) -- maintaining his earlier view (cf. Szende 1972) -- as well as Kassai (1979, 45, 1982b, 136--7 and 151) and Bańczerowski (1988, 7--9) claim that long consonants are autonomous members of the system of Hungarian phonemes. (To the best of my knowledge, this interpretation first arose in statistical studies by Vértes [1952/1954] and [1953/1954].) Others, however, stick to the view that was quite generally held earlier, including generative accounts as well (cf. Szépe 1969, 402), saying that "long consonants" are products of two adjacent identical elements: Vago (1980, 32), Nádasdy and Siptár (1987, 6--9), Siptár (1989, 123). Finally, there are authors who do not take a definite stand on the matter but at least do not question the separate phonemic status of these items: Vértes O. (esp. 1982, 157) and Bolla (1982, 166).

The major arguments against the monophonematic view are as follows. (i) Long consonants mainly arise across a morpheme boundary; therefore, whoever wanted to posit long consonant phonemes for Hungarian would be making a claim similar to the one that postulates long /n:/ in English merely on the basis of the occurrence of [n:] as in unknown. (ii) Another counterargument is based on articulatory properties of the respective sounds: earlier it was the geminate theory of long consonants, and more recently their ambisyllabicity (i.e. the fact that intervocalic long consonants invariably straddle a syllable boundary) that counted as a point of departure. (iii) If long consonants are derivable from pairs of short consonants, as this can be done by positing a $[C_i:] \leftarrow /C_i+C_i/$ realization rule rather than a statement of

identity like /C_i:/ ≠ /C_i:/, it is the former solution that is to be preferred since otherwise the number of primitives would increase.

Maintaining the Prague School principle of meaning discrimination as an essential function of phonemes, a number of arguments can be adduced in support of the monophonematic interpretation of long consonants. (i) Long consonants are phonotypically self-identical in terms of articulation, acoustic output, and perception alike; this even includes cases of /C_i:/ ⟷ [C_i:] where [C_i:] ← /C_iC_k/, i.e. not only sokk 'shock' -/k:/ but also cases like tokkal 'with a box' -/kk/-. If a low-level phonological representation is required, in addition to reflecting phonological structure, to underlie an articulatory program, the recognition of this fact is unavoidable. (ii) The segmental phonological analysis of forms containing internal boundary markers can only be consistent if we accept the monophonematic interpretation of long consonants. Such instances are not phonotactically unconstrained but not infrequent either. Thus, in a segmental display of sakkal 'with chess', /ʃakkkal/ (←/#ʃakk+kal#/) should be postulated in terms of the biphonematic analysis; i.e. a sequence of three identical consonants should be posited in a word-internal position. This is disallowed in Hungarian by an overall phonotactic constraint. On the other hand, positing /C_i:C_i/, we get a derivation like /#ʃak:+kal#/ →→ [ʃak:al] in which the phonotactic constraint is not violated. (iii) Long consonants are indeed ambisyllabic, i.e. halʃló 'hullo', kapʃpan 'capon', etc., but their ability to serve simultaneously as a coda and as an onset is not crucial for the choice between mono- and biphonematic analyses. Depending on what is called the 'strength hierarchy', short consonants can also be ambisyllabic. Thus, the m̀ of German Amme ⟷ /am̀ə/ 'nurse' is final in the first and initial in the second syllable (cf. Vennemann 1986, 41; for a similar property of r, see ibid. 30). (iv) It is also an argument of some importance that long consonants evolved in Hungarian in a way similar to that of long vowels. (This claim is true with the restriction that we are referring to the separate life of Hungarian. Long consonants posited for Proto-Finno-Ugric, on the other hand, suggest an earlier state of the system in which these are just as primary as short consonants.) Hungarian long consonants are historically secondary -- but then so are long vowels. (For the history of Hungarian consonants, cf. Kálmán 1965, esp.389.) (v) With respect to distribution, the counterargument that morpheme-initial

long consonants are disallowed misses the point. This phonotactic phenomenon belongs to a category of distributional constraints that apply to some other units as well. Hungarian has no word (or morpheme) initial /dz/ or word final /d3/; in the single example with final /ø/, höhöhö 'ha ha!', the phonemic shortness of the last vowel is questionable. Incidentally, a long consonant may also occur before another consonant. Note that, in this case, both menyben 'in a daughter-in-law' and mennyben 'in heaven' can only 'split' between /n/ and /b/, respectively between /n:/ and /b/ (assuming a fortitive pronunciation), similarly halból 'from fish' vs. hallból 'from the lounge'. (vi) Long consonants cannot be unconditionally derived in (phonotactically) arbitrary positions, unlike short ones. Hence it is frequently the case that they serve to discriminate word forms (not morphemes), i.e. their function is mostly morphophonemic (e.g. /ɟ:/ in higgy 'believe-IMP' carries a mood marker). But long vowels are often likewise morphophonemic, like /a:/ in almát 'apple-ACC'. Yet, the autonomous status of /a:/ is not denied even where it is due to Low Vowel Lengthening or indeed where it occurs in an /ɑ/~/a:/ free variation as in ad~ád 'give' (cf. Hajdú 1951, 225). (vii) An additional argument can be derived from a remote borderland of phonology. Statistical investigations of spontaneous speech revealed not only that short vowels outnumber their long cognates but also that the same applies to consonants as well (cf. Szende 1973, 30-1). The parallel regularity of distribution indicates that language users, metaphorically speaking, assign identical profitability indices to the length of both groups, apparently because they see the same type of solution in the 'long/short' opposition in both cases (cf. Szende 1972, 465). Obviously, the utilization of these data in the argumentation is of doubtful validity, depending partly on where the borderline of the discipline is drawn. (viii) The case of two affricates is but seemingly problematic. Surface [dz:], [d3:] may also be combinatory variants of /dz/ and /d3/. In other words, there is no biuniqueness between /dz/, /dz:/ or /d3/, /d3:/ and their respective surface realizations. It is commonly known that /dz/ and /d3/ consistently appear in intervocalic position and word finally as [dz:] and [d3:], respectively (with the notable exception of a few twentieth-century loanwords like fridzsider 'refrigerator', tinédzser 'teenager', and names: Ro[d3]er 'Roger', Madzsar 'family name'). This phenomenon is independent of the fact that /dz:/ or /d3:/ can also occur in these posi-

tions. The verb edz /ędz/ 'train' is pronounced [ędz:] (just like imperative eddz /ędz:/), and bridzsel /bridʒęl/ 'play bridge' is pronounced [bridʒ:ęl] (just like briddzsel /bridʒ:ęl/ 'with bridge'), where the examples are cited in their S2 version for clarity. At any rate, the overlap in pronunciation does not suspend the phonemic difference of long and short affricates as the pairs of forms remain distinct (e.g. in writing); it is only durational values that get blurred. In other words, the same thing happens here as with word final long vowels: durational factors are reprogrammed with respect to the phonotactic circumstances, that is, a postlexical rule is applied (cf. Fónagy 1956, 173--6; Magdics 1966; Kassai 1971). Thus, /dz/ and /dz:/, as well as /dʒ/ and /dʒ:/, are regarded as separate phonemes. Since, however, /dʒ:/ has phonemic value in a single verb vs. noun pair, indeed in only one form of each (bridzsel vs. briddzsel), and nowhere else, this unit will be assigned to the category Twaddell (1935) calls 'microphoneme', and indicated as (/dʒ:/). Finally, (ix) the possible counterargument mentioned under (iii) above can be refuted as follows. Nothing supports the claim that an analysis involving fewer primitives plus more numerous rules should be preferred to an alternative in which more primitives but fewer rule applications are involved. Another point that can be emphasized in this respect, the attribute of phonotypical self-identity, has been mentioned under (i) above. Primarily on the basis of (i--vi), the following lemma can be formulated.

L(xxi) The consonant inventory of present-day Hungarian is divided by the 'short/long' opposition and long consonants are autonomous elements of the consonant system.

(ii) In order to discuss controversies surrounding the classification of some consonants, we have to rely on a lemma that apparently violates the principle of synchronicity and involves certain intrinsic phenomena having a weaker theoretical position than extrinsic evidence. Note that a language can classify the same segment in diverse ways in various periods of its history. (To illustrate in the area of loanword phonology, consider the case of /dʒ/. In terms of Gombocz's (1912) analysis, today's /ɟ/-initial Old Turkic loanwords like gyertya 'candle', gyász 'mourning', gyapjú 'wool' etc. regularly go back to /dʒ/. In the same phonotactic position, however, /dʒ/ is found in Osmanli Turkish loanwords like dzsámi 'jami', dzsida 'lance', in other loans of less clearly attested origin like dzsinn 'jinn', as well as

in more recent English loanwords like dzsem 'jam', dzsessz 'jazz', dzsungel 'jungle', etc.) Furthermore, the categorization of some elements may involve vacillation for some time, even within the same era. (Returning to pre-conquest Turkic loanwords, the substitution /d3-/ —► /ʒ/ is almost exceptionless here. Still, in important cultural vocabulary items whose origin is indisputably traced back to a Chuvas-type Turkic language, /d3-/ has (dialectal) correspondences in /d3-/ as in gyűrű 'ring'; and gyűszű 'thimble', belonging to the same layer of loanwords, has vacillating occurrences in /d-/ and indeed /tʃ-/, in addition to regular /ʒ-/, cf. TESz I, 1140--1. Similar vacillation is repeated for Osmanli loanwords as well, where /3-/ and /tʃ-/-initial correspondences are found, cf. Bárczi 1954, 101.)

The lack of historical constancy in categorization, as well as optional solutions within the same period, lead us to postulate L(xxii).

L(xxii) A segment may be ambivalent with respect to categorization, a property that is expressed in contextual variation in its surface representations.

On the basis of L(xxii) a more realistic characterization of the status of /j/ becomes possible. In view of the arguments presented in 2.1.5(i), /j/ is regarded here as a 'pure' consonant. But its finer categorization is just as much open to controversy. In general, and traditionally, it is taken to be a voiced palatal fricative (as in MMNyR), whereas in Szépe (1969, 409) and Vago (1980, 32) it is a semivowel (glide), with a consonantal character. In Nádasdy and Siptár (1987, 14ff) the issue seems to be settled in favour of the claim that /j/ is of a 'non-obstruent character': a semivowel (ibid. 16). (In a later paper, Siptár [1993, point 3.1] accepts the arguments supporting the consonanthood of /j/ and classifies it as a sonorant consonant: that is, neither a fricative nor the offglide of putative diphthongs.) Lotz (1972a, 10--11) emphasizes its double nature when he refers to /j/ as one of the 'phonemes ... which have predominantly semivocalic (or glide) allophones'. This amounts to saying that /j/ belongs to two categories, fricatives and glides, at the same time (ibid. 11). Its semivocalic character is inherent in its phonetic properties and in the fact that it refuses to trigger or undergo assimilations that are quite definitional for obstruents (as Nádasdy and Siptár [1987, 19] correctly point out, ajtó 'door' does not become *[aʝto:] and fáklya 'torch' is not *[fa:gjɑ]), whereas its fricativity

is shown by the fact that it accommodates to voicing properties of its environment. Thus, postconsonantally in an absolute word final position, it is devoiced to a varying degree: várj 'wait-IMP', especially after a voiceless consonant: kapj 'get-IMP', whereas in a voiced environment it retains full voicing: vajas 'buttered' (ibid. 10 and Lotz 1965). These facts constitute the basis for the correct segmental phonological decision. However, I do not find Lotz's opinion fully convincing since he finds room for the phoneme in question simultaneously in two rather different classes. In formulating my own standpoint by a (partial) resolution of that duality -- following Szépe (1989, 409) --, I attribute some importance to the historical fact that /j/ is of a 'heterogeneous source': in some cases it goes back to the offglide of a diphthong (as in vaj 'butter', cf. Gombocz 1940, 32); in addition, intervocalic consonants can be involved as another type of source (e.g. in nej 'wife') whose next stage of development is a segment corresponding to those deriving from the third source of /j/ as a hiatus filler. If we consider the predominantly [-cons] character of the historical source and recognize that the development of /j/ was governed by a [+cons] character, it turns out to be justified to classify /j/, on the basis of that evolutionary tendency and in view of its increasingly consonantal quality, as an 'approximant with a fricative character'. (Recently, Dressler and Siptár [1988, point 5.1] have also proposed to treat /j/ as an approximant, with reference to its similarity to the German approximant /j/. On the contrary, Siptár [1993, point 3.3] claims that /j/ is best classified as a liquid, essentially with respect to its morphophonological and phonotactic behaviour. However, our final verdict in favour of 'approximant' -- rather than 'liquid' -- is supported partly by the possibility of classifying /h/ as another approximant and further by the morphophonological behaviour of /j/ which clearly indicates that it patterns with sonorants. Consider the behaviour of /-j/ as an imperative marker:

(a) (-)V(:)t + j(V)... → [ʃ:] nyit 'open', üt 'hit', lát 'see' (16th century also: vét 'err', tát 'open wide'), etc.

(b) (-)V[C]t + j(V)... → [s:] oszt 'divide', halaszt 'postpone' szalaszt 'make sy run', etc.
[obstruent]

(c) (-)V(:)[C]t + j(V)... → [tʃ] vált 'change', árt 'harm', bont 'take apart', etc.
[non-obstruent]

(d) (-)Vjt + j(V)... → [tʃ] ejt 'drop', fejt 'undo', lejt 'slope', etc.

where the outputs of (d) and (c) are identical. Note finally that in a loan-word of Latin origin -- via Horger's Law (of two-open-syllable shortening) -- /j/ is the first element in a four-member internal consonant cluster, the only example of such a sequence: lajstrom 'list' (←← regestrum).

(iii) In the subclass of affricates (and accordingly in that of stops) there are controversies around three elements, disregarding their long counterparts. These are /dz/, and the pair /c ɟ/. With respect to the first of these, Nádasdy and Siptár (1987, 22--23) have recently proposed a discussion -- trying to interpret /dz/, following É. Kiss and Papp (1984), as /d/+/z/. (With this proposition, the authors return to Pivár's [1895, 25--9] position who, albeit with no explicit justification, excluded /dz/ from among affricates -- tacitly assuming that it was a consonant cluster.) /c/ and /ɟ/ were originally classified as stops but after the affricate debate (for a historical account, cf. Kázmér 1961, esp. 9ff) they were generally taken to be affricates. This recent tradition was broken by Deme (1953b, esp. 73), whose argumentation started a new tradition. Exponents of the American school(s) -- with the possibly single exception of Hall (1944, 17--8) -- invariably characterized them as (palatal) stops, thus Lotz (1939, 1966, 1972a, 1972b), Austerlitz (1950), Szépe (1969), Vago (1980), etc. The earlier view was resumed, especially on the basis of acoustic properties, by some people in the past few decades. (Notice that Vértes O. had remained faithful to the affricate interpretation throughout, cf. 1950, 39, 79, 83; 1958, 132.) In particular, Szende (1974b) and Kassai (1982b, 126) return to the affricate view -- although in the sixties it was also claimed that both classifications were possible (cf. Fónagy--Szende 1969, 291). Furthermore, it is to be noted that the real question of the debates concerning affricates, the dilemma of single sound vs. cluster, was definitely resolved in the way proposed by Horger (1935): Hungarian affricates are unconditionally taken to be single consonants. It is remarkable, however, that Heġedűs (1958, esp. 20) found /dz/ and /d3/ to be ambiguous with respect to monophonematicity and decided to take them phonetically bipartite, complex segments. This view has its counterpart among phonological accounts, too, especially in É. Kiss and Papp's analysis (1984, esp. 157). Unlike Nádasdy--Siptár (1987) and Siptár (1993),

however, É. Kiss and Papp allow for a phonological interpretation of dz as the phoneme /dz/. At any rate, only Tarnóczy (1987, esp. 268) claims on an acoustic--phonetic basis that in certain particular communicative situations the components of affricates are divided sharply enough for us to be forced to take them, in these situations, to be made up by a stop phase and a fricative phase. However, we would then have to take Hindi breathy voiced stops to be affricates as well since the fricative phase subsequent to the release in them -- depending on the quality of the following vowel -- can be as long as 30--40 ms (cf. Schiefer 1986, 55), thus it forms a quasi-independent component within the stop. Hence, Catford's (1988, 122) definition of an affricate, "a stop released into the homorganic fricative" would hold for these Hindi consonants as well.

The overall attitude and the specific views in terms of which (Hungarian) affricates have been discussed so far are based on two well-established methodological and notional biasses that have to be subjected to criticism. (i) Researchers have invariably studied affricates produced among laboratory circumstances, most frequently in isolated words. In other words: the data got into the analyses from (presumably natural) utterances of a special communicative style in which over-articulation, or rather fortition, is quite expected. This must have meant that the material of investigation has always been stylized data. That fact, as I try to argue below, helped to conceal, rather than throw light on, the real character of affricates. Furthermore, (ii) researchers have throughout sticked to the preconceived idea that looking for articulatory phases of affricates, they have to find a stop(-like) and a fricative(-like) component. Even Belgeri (1929) thought so who was the first to see clearly that affricates are actually produced by a separate articulatory mechanism, unrelated to both stops and fricatives. One of the typological terms proposed for this type of sounds, 'mixed' [= 'combining the two articulatory mechanisms'], is particularly telling in this respect (cf. Laziczius 1944, 81--2). The interpretation of affricates in such a "frozen" notional framework was not abandoned by Buttler (1962), either, even though he sharply contradicted all previous treatments by claiming that in the case of affricates even the medium of articulation is different from those of the stops and fricatives. In particular, Buttler pointed out the role of saliva in the closure being intermittent, making it possible for the stop to be re-

leased slowly. (In this respect, apparently without knowing, Buttler follows an explanation that Avicenna had given in one of his tractates, cf. Pavlova 1989.)

In spite of the fact that the material of investigation was produced as described above, even the earliest studies frequently made reference to the absence of what is called the stop phase of affricates (see in Kázmér 1961, 13--5 and passim). Missing "stop phases" prompted Bakó (1937, 56--7) to define affricates as fricatives (of a special physiological character). Later, even in the case of Hegedűs who worked with rather up-to-date instruments of his day but was an ardent defender of the cluster view, we see illustrations in which the component in question does not at all appear to be a stop (cf. Hegedűs 1958, figures 1, 27, 30, and perhaps 39), similarly in Fónagy--Szende's (1969) displays and in analyses by the latter author on intervocalic affricates (Szende 1974b and 1975). Another remarkable fact is that acoustic displays of affricates are often composed of three or more elements in that prior to the alleged stop phase a short but unmistakable "fricative phase" appears after the vowel (cf. e.g. Fónagy--Szende 1969, 335--7), although in other vowel-consonant transitions similar things never occur. In addition, the burst noise phase of the "stop" cannot be separated from the "fricative phase" (cf. Fónagy--Szende 1969, esp. 289; Szende 1974b and 1975), and the "closure" of a (short) affricate may be almost as short as one-third of a homorganic real stop in the same material (cf. Fónagy and Szende 1969, 289). Both last-mentioned properties, the overflow of "fricativity" to the left of the "stop phase", and the reduction or lack of "stop phase" occur more extensively in natural speech production (cf. Szende 1974b and 1975).

The critical phenomena prompt us to seek some other explanation for the phonotype of affricates. In producing an affricate, a sequence of rapid constriction and protracted alleviation occurs in the appropriate region of the vocal tract, without closure in the paradigmatic case. The constriction period lasts until noise components of the maximal possible frequency are produced. The turbulence noise -- to use Stevens' (1987) term -- of the highest possible frequency is produced with the tightest constriction, whereas average intensity decreases in a quasi-linear manner with the alleviation of the constriction. (Durational proportions are of secondary importance with respect to the essence of the process; the actual value of highest frequency

is likewise immaterial.) The value of maximal constriction, i.e. the minimal distance between the alveolum or hard palate and the corresponding surface of the tongue, obviously approximates 0. This is the critical point of articulation since to "hit" the ideal amount of constriction requires a degree of accuracy in fine controlling that verges on the impossible. Thus, the result can only be an approximate one, due to an extremely complex interplay of factors as follows.

In the production of consonants, the spectrum and intensity of the acoustic result depends on (i) the speed of air flow through the constriction; (ii) the degree of pressure loss in the constriction; (iii) the compression of the mass of air, in connection with the effects in (i) and (ii); (iv) the size of the constriction; and (v) a constant depending on the shape and friction surface of the obstruction (cf. Stevens 1987, esp. 387). In addition, in the case of voiced consonants, the required level of loudness is further influenced by another source, i.e. the glottal orifice, which has to be appropriately regulated. The shape and the amplitude of the glottal voice curve and the acoustic structure and amplitude of the noise components produced in the constriction are interdependent (cf. Tarnóczy 1978, 9). (Note that the degree of interaction can be established experimentally. A resected human larynx has to be attached to an artificial vocal tract of standardized acoustic parameters and excited, as it was done by Laine and Vilkman [1987, esp. 20--1].) It is only by opening the arytenoid cartilages proportionately to the size of constriction that a constant intensity level can be kept up. This, keeping in mind that minimal (or tightest) constriction yields maximal frequency, is the source of another difficulty of fine controlling, in view of the fact that relative intensity of components decreases with increasing frequency. This is the point where the "speaking animal" could not get appropriately adapted to speech, as was pointed out above, quoting Stampe (see 1.3). Given the limited ability for fine controlling, the operation almost necessarily remains below the required level of precision. This inadequacy can take one of two forms. (i) The constriction remains looser than the optimal degree, hence the frequency of noise components remains lower and the noise itself will be more marked, therefore a transition is formed between the two phases and an (ideal) affricate is replaced by what Bakó (1937) referred to as "a fricative with an overtight constriction". The other form is

more frequent: (ii) the constriction goes beyond the optimal value, hence a (pseudo)stop component interrupts the continuity of noise production. Notice that the optimal articulation mechanism requires a sufficient quantity (and perhaps an adequate degree of viscosity) of saliva between the articulator surfaces. Unsatisfied conditions in this respect will further increase the chance of inadequacy. However, it is difficult to answer the question of why (pseudo)stop formation is the more frequent case. First, it has to be emphasized that among short affricates the predominance of "stopped" varieties is not at all certain. All we can say is that in lento styles and, of course, in phoneticians' experimental materials this variety occurs more frequently -- whereas in allegro styles this is not necessarily so. On the other hand, long affricates usually go in the direction of stop formation. The following explanation may be given here. It takes less time to form the constriction than to reach "abatement" after the culmination point. Hence, more differentiated neural commands per unit of time are needed in the beginning. Therefore the increased likelihood of 'overshot' is due to the fact that in the constrictive phase movements have to be faster. As far as long affricates' similar distortion is concerned, this can be traced back to a generally more fortitive pronunciation of long consonants. The most characteristic feature of the articulation procedure, maximal approximation of surfaces in an asymmetric process of constriction, is a point-like event which cannot be lengthened. Therefore, the property [+long] can only be implemented in either the initial or the final phase. And given that the (pseudo)stop component is more likely to be formed in the constrictive phase, lengthening will also be expected to occur in the temporary stoppage caused by the 'clash' of articulators. As is shown, independently of author, by all registered data except a few cases in allegro, this is exactly what happens.

The foregoing are equally valid for all Hungarian affricates, including dz, ty, and gy, i.e. /d͡z/, /c/, and /ɟ/, recently challenged by Nádasdy and Siptár (1987). The conclusion, then, is straightforward as given in lemmata L(xxiii/a) and L(xxiii/b):

L(xxiii/a) Hungarian affricates constitute a phonotypically self-identical class and, in terms of phonetic contrasts, make up a subsystem that is symmetrical with respect to both voicing and length.

L(xxiii/b) /c/ and /ɟ/, also at the level of phonetic contrasts, belong to the class of affricates, thus they are more correctly transcribed as /c͡ɟ/ and /ɟ͡j/, respectively, in narrow transcription.

With respect to the most critical items, /dz/ and /d3/, the validity of the foregoing explanation is supported, in a perceptual aspect, by Kázmér's (1961, 28--30) experiment and conclusions. Those of his subjects who could not rely on orthography, such as pre-school children, syllabified items containing these sounds not by dividing them between the alleged plosive and alleged fricative portion but rather, they either repeated the whole articulatory structure at both sides of the division: madz-dza-got 'string-ACC', pedz-dzik 'they nibble at it', or else they made the whole affricate syllable initial: ma-dza-got, pe-dzik (ibid. 28--9). It is necessary to make the following, partly methodological, remarks here. (i) The phonotypical self-identity of a segment is not crucial in itself as far as its phonemic interpretation is at stake. It is, however, an important argument supporting the monophonematicity of a segment if phonological considerations do not exclude this. Some straightforward facts of language use also point in the same direction: biphonematic [ts:] (as in lá/t+s/at 'appearance') may be divided, due to fortition, into [t]+[s], whereas a [ts:] going back to monophonematic elements (as in lé/ts+ts/el 'with a lath') will never give [t]+[s], not even via fortition. (ii) The above explanation concerning the articulation mechanism of affricates apparently also helps us exclude /ɲ/ and /ʎ/ from that class. The turbulence noise characterizing affricates is only produced under heavy congestion of the air flow. By opening up the way of air flow in other places and in other directions (through the nasal cavity for /ɲ/ and along the sides of the oral cavity for /ʎ/) makes this type of noise impossible, or at least very unnatural, to produce. (/ɲ/ and /ʎ/ are only mentioned here because they are also palatal, hence their relationship with /c/ and /ɟ/ can be supposed in principle. In fact, however, their characterization as affricates has never been suggested, unlike for /tl/ and /dl/, cf. Kázmér [1961], and for /ʎ/ Benkő [1953].) Finally, (iii) since É. Kiss--Papp (1984, 156--7) as well as Nádasdy--Siptár (1987, 20--3) and Siptár (1993, point 2.1) adduce phonotactic data supporting the interpretation of /dz/ as /d/+/z/, it is to be noted that [d͡z] -- although it does not appear word initially in the Hungarian lexicon, except in the name of the Greek letter dzéta 'zeta' -- regu-

larly appears in initial position in foreign words and names like Dzurják or Dzúr and, via sound substitution, in heavily accented renderings of English the. Abaffy (1975, 171) notes that it can also appear in free variation with /z/ after /n/ in word final and prevocalic position as in pén[d͡z] 'money', ben[d͡z]in 'petrol'.

The further arguments of Nádasdy and Siptár (1987) with respect to /c/, /ʧ/, and /d3/ will not be commented on here, with one exception. The data they present, especially those concerning degrees of affricatedness, differ considerably from mine, respectively ours (cf. Fónagy and Szende 1969, Szende 1974a, 1974b, 1975). They do not specify the source of their data, presumably since their paper is an 'interim report'. However, it will be expedient to illustrate my reservations with one example. The realization of vakaró(d)zik 'scratch oneself' (and structurally similar verbs like kergető(d)zik 'chase about') is described by Nádasdy and Siptár and later by Siptár (1993, point 2.1(c)) as three-ways variable, in [-z-], [-d͡z-], and [-d͡z:-], due to the length of the word (ibid. 23--4). I do not see any free variation here. In vakaró[z]ik we have an instance of the suffix -z, whereas vakaró-[d͡z(:)]ik may go back to a form involving a pair of suffixes -d and -z, viz. *vakaródozik, via Horger's Law (cf. Bárczi 1954, 101). The [d͡z] variant can be taken, then, to be the result of a style-dependent pronunciation of [d͡z:] (←/d+z/) preserving the original two-mora character of the syllable. (Provided, of course, that the authors have in fact found a short [d͡z] version.) The aim of the example in this paragraph has been to point out that the exploration of the historical--etymological background of a phonological representation is, in certain round-about cases, an indispensable procedure of correct (segmental) phonological interpretation.

On the basis of the lemmata presented in this paragraph, the inventory of Hungarian consonant phonemes is described in T(xii). The principle followed is identical with that in the case of vowels: each member of the total inventory will be identified using a minimal number of distinctive criteria (cf. notes (i) and (ii) below). An important reason for selecting that principle is that each distinctive criterion thus covers an area of variability around the elements identified in this way. Within the limits of these, articulatory and acoustic consequences of lenition phenomena can be described with the phonemic identity of those segments preserved, inasmuch as they do

not concern the whole, or several segments, of a sequence.

T(xii) The inventory and definitions of Standard Hungarian consonants

/p/ and /p:/ = voiceless bilabial stops, short and long
/b/ and /b:/ = voiced bilabial stops, short and long
/t/ and /t:/ = voiceless dentialveolar stops, short and long
/d/ and /d:/ = voiced dentialveolar stops, short and long
/k/ and /k:/ = voiceless medial/velar stops, short and long
/g/ and /g:/ = voiced medial/velar stops, short and long
/f/ and /f:/ = voiceless labiodental fricatives, short and long
/v/ and /v:/ = voiced labiodental fricatives, short and long
/s/ and /s:/ = voiceless alveolar fricatives, short and long
/z/ and /z:/ = voiced alveolar fricatives, short and long
/ʃ/ and /ʃ:/ = voiceless postalveolar fricatives, short and long
/ʒ/ and /ʒ:/ = voiced postalveolar fricatives, short and long

/ts/ and /ts:/ = voiceless alveolar affricates, short and long
/dz/ and /dz:/ = voiced alveolar affricates, short and long
/tʃ/ and /tʃ:/ = voiceless postalveolar affricates, short and long
/dʒ/ and /dʒ:/ = voiced postalveolar affricates, short and long
/c/ and /c:/ = voiceless palatal affricates, short and long
/ɟ/ and /ɟ:/ = voiced palatal affricates, short and long

/l/ and /l:/ = voiced alveolar laterals, short and long
/r/ and /r:/ = voiced alveolar tremulants, short and long

/m/ and /m:/ = voiced bilabial nasals, short and long
/n/ and /n:/ = voiced dentialveolar nasals, short and long
/ɲ/ and /ɲ:/ = voiced palatal nasals, short and long

/h/ and /h:/ = voiceless laryngeal/(medio)palatal/pharyngeal approximants, short and long
/j/ and /j:/ = voiced palatal approximants, short and long

Notes: (i) The definitions follow the principle of minimal redundancy. (ii) They keep the traditional three dimensions of voicing, place of articulation and manner of articulation as a notional basis for (segmental) phonological identification. (iii) In addition to those three criteria, the opposition 'short/long' represents structural differences of the units of each subclass in a general way. (iv) The term 'approximant' involves an obstruent character.

2.1.6. Junctures as boundary markers and their segmental correlates

Word-level systematic phonological representations cannot be described without the postulation of boundary markers. This necessity follows from the divisional hierarchy of the set of linguistic signs, as a historical consequence of a profound, universal, and aprioristic fact: the human faculty of language. In a trivial sense, that faculty is anthropologically based on the alterability of the homogeneous and undivided flow of speech. Distinct totalities of meaning are related to distinct totalities of vocal sequences, where the latter are made distinct by alterations in the properties of the speech flow. Such alterations segment that flow into relatively homogeneous sections, and the units thus obtained realize linguistic signs in concatenation. The same conclusion follows, in a less trivial manner, from the criteria given for the identification of (morpho)phonological representations (cf. Section 2, introduction, and (i--iii) under L(viii)). But it is at this point that the strictly phonological issue arises. If word boundaries definitively belong to words (word forms) but are not subsegmental constituents, is it not the case that they are elements of the phoneme system, i.e. phonemes whose various realizations constitute the same category as allophones of other phonemes? This theoretical possibility was first raised by Moulton (1947) in a concrete form, illustrating the problem on German; it is still considered by some to be a feasible theoretical solution. Thus, Groundstroem (1989) postulates a 'juncture phoneme' for Finnish where, incidentally, the glottal stop that frequently realizes junctures can be the realization of other segmental phonological constituents as well (as in anna[ʔ] 'give-IMP': the dialectal equivalent and historical source of this glottal stop is [k]).

As is well known, two identical sequences of phonemes may carry different meanings (in Hungarian as well as in any language), depending on whether

each element of the sequence coheres equally to its neighbours or the ambient elements make up distinct groups as in hatalmasok 'the powerful' vs. hat alma sok 'six apples are too many'. Similarly, it is another source of meaning discrimination if, in two sequences of identical composition, delimitation occurs at two different points as in hatalma sok 'he has too much power' vs. hatalmas ok 'a powerful reason'. (This phenomenon was mentioned with reference to sandhi by ancient grammarians; in nineteenth-century phonetics, it was Sweet [1890/1892, 62] who re-described it in non-orthographic terms.) The examples suggest that the issue at hand is discrimination among lexemic meanings. But then, as Prague School phonologists have argued, the semantic discrimination of morphemes occurs at the level of phonemes. However, there are two crucial arguments against juncture as a phoneme-level unit: (i) as a delimitative element, it always appears between two factors (phonemes or sequences of phonemes), and (ii) juncture in itself never occurs as a separate phoneme in distinctive opposition with any other phoneme (cf. Szende 1976a, 121). In other words: juncture does not satisfy the other Prague School criterion, that of distribution. It is also a direct surface observation that, in its realizations, juncture invariably attaches to the syllable structure of morphemes. This is only possible because the syllable structure of each morpheme in itself is independent of neighbouring morphemes. (Otherwise it could not be the case, as it is in Hungarian, that phonotactically distinct versions of the same suffix can be added to the same stem morpheme as in ízletelen 'tasteless' vs. ízetlen 'untasteful'.) This rule is exceptionless. In cases where juncture is indicated in a pair of segmentally identical sequences of morphemes by a phonetic marker that signals word initial position, it is also syllable initiality that is directly indicated even if the syllable boundary happens to coincide with a word boundary or terminal juncture as in English night rate vs. nitrate where /r/ in the first case is realized as a sonorant continuant (as it has to be word initially) and in the second it is fricated (as it has to be following an aspirated stop). The above rule makes it possible for us to define juncture as a 'marked syllable boundary' (cf. Gårding 1967, esp. 33) and state, in accordance with Lass (1984/1985, 36--8) who reaches the same conclusion via another set of arguments, the following lemma:

L(xxiv/a) Juncture is a morphosyntactic entity that regularly has segmental-level implementation. This lemma excludes the possibility of positing a 'juncture phoneme' on the segmental level but makes it possible to handle phrase-internal juncture (hat+alma+sok) and 'terminal juncture' that divides phrases from one another (cf. A királynőt megölni nem kell félnetek jó lesz ha mindenki beleegyezik én nem ellenzem [= Reginam interficere nolite timere bonum est si omnes consenserint ego non contradico], a sentence notoriously ambiguous between 'You don't have to kill the queen; it is advisable for you to be afraid; even if everybody agrees, I don't; I disapprove' and 'Don't be afraid to kill the queen; it will be good; if everybody agrees I don't disapprove') as the same entity as that of primary importance for the description of word-level phonological representation, 'morpheme boundary'.

The above interpretation is additionally supported by the fact that the types of realization of junctures do not observe the general rule of allophone/variant formation inasmuch as the latter invariably retain at least one subsegmental component of the phoneme they stand for. Although this is not strictly relevant to the subject-matter at hand, I find it necessary to demonstrate the validity of this claim as follows. Junctures can be realized in several, partly language specific, ways. (i) A very efficient though not the most frequent signal is a short glottal stop (cf. Lehiste 1962, 180--4); when it occurs, the listener perceives a short break in the speech flow and thus the vocal phenomenon prior to the glottal stop will be taken to be part of the realization of the preceding morpheme and that after the glottal stop as part of the following. (ii) Similar in value and partly in character, the next possibility is the violation of obligatory accommodation rules between the items flanking the boundary as in énje 'his ego' pronounced as [e:njẹ] rather than [e:ɲ:ẹ] in lento style. (iii) Juncture can also be signalled by a word/syllable initial variant of the following phoneme, as noted above for the example of /r/ in night rate vs. nitrate. (iv) Another way of signalling a juncture is a change in intensity pattern as in Swedish bar en stjärna 'to wear a star' vs. baren Stjärna 'Star Nightclub'.

Our definition of juncture as a 'marked syllable boundary' raises the problem of the phonetic relation between the two, i.e. juncture and syllable boundary in general. As a first approximation, phonological repesentations must be supplied with syllable boundaries and internal morpheme boundaries

(junctures) as in ádáz 'fierce' → /ʔa:ʔda:zʔ/ and holdarcú 'moon-faced' → /ʔholdʔɑrʔtsu:ʔ/. The marking of syllable boundaries is redundant (i.e. predictable, on the basis of the fundamental syllable construction rule, in phonetic terms) up to the point where a form contains a morpheme boundary. The latter are also syllable boundaries (in the wrong place, as it were). As opposed to the frequency with which junctures are signalled at the surface, the quite exceptional cases where a mere syllable boundary is signalled are notable for their special entropy. In a phonological perspective, however, the relation between junctures and syllable boundaries is more complex. The transitional categories traditionally referred to as 'opaque compounds' (Boráros 'proper name' from bor + árus 'wine seller', perifrázis 'periphrasis'; less obviously in délután 'afternoon', ugyanis 'since' from ugyan 'thus' + is 'also', legalábbis 'at (the very) least' from legalább 'at least' + is 'also') are closer to (phonetic) syllabification at a lower level of abstraction than they are at a higher level. The same tendency shows up -- in a purely realizational aspect -- in allegro vs. lento.

On the basis of the foregoing, we can state:

L(xxiv/b) Syllable boundaries -- like stress and tonal patterns -- are redundant in Hungarian word-level phonological representations whereas morpheme boundaries are identificatory constituents.

A further issue has remained open. The surface realization of boundaries does not depend on which level the boundary appears at in the phonological structure of the message. A glottal stop can equally represent a juncture at phrase and morpheme boundary; the same applies to other forms of realization. Is it necessary, or indeed possible, to make systematic distinction among the various levels of boundaries, in a way that the distinction remains within the next-to-phonetic phonemic dimension of description? This distinction is possible, on the basis of the following facts. (i) A 'terminal juncture' can signal the beginning and the end of a phrase by inducing initial/final intonation patterns, whereas internal juncture and morpheme boundary cannot. (ii) The boundary marker of syntagm level, somewhat loosely called 'internal boundary' here, blocks accommodation rules, cf. e.g. átjáró 'passage' → *[a:c:a:ro:], whereas a morpheme boundary does not (cf. látjátok 'you-pl. see' → [la:c:a:tok]), except in cases where a bound morpheme in the word form 'skips' a hierarchical level via fortition and appears as a

member of a compound (e.g. énje 'his ego' —fort→ /e:n#ję/ → [e:nję]). (iii) A 'morpheme boundary' constrains the syllable structure (or phonotactic pattern) of a morpheme at both ends, whereas a terminal or syntagm-level (internal) juncture does not.

2.2. Phonological representation in a functional perspective

The description of word-level phonological representation requires more than just the enumeration of the inventory and an appropriate number of sequencing rules. We have to observe further that the description is approach-dependent [approximationsbedingt] in a dual sense:

L(xxv) The description of phonological representation is theory-dependent [theoriebedingt] in terms of the theoretical framework chosen, and also (at the same time) dimension-dependent [dimensionsbedingt] in terms of the criteria for the domain of validity that the segmental phonological description is required to meet.

Theory-dependence is illustrated by our presentation of various frameworks (cf. 1.1--9). As for the second condition (cf. Szende 1989/1990), dimension-dependence means here that a segmental phonological analysis may result in quite different (sub)systems even with respect to the composition of the inventory, depending on whether it encompasses regional varieties, dialects, social substandards -- and, on the other hand, names, loanwords, and foreign words. For instance, if regional and/or dialectal varieties are to fall within the scope of inquiry, at a critical point of the vowel inventory we find the following situation, as compared with the standard:

(standard, S2:) $V_1, V_2, \ldots, e, \ldots, V_n$

(standard, S1+S2, regional/dialectal:) $V_1, V_2, \ldots, E\{e;ę;ɛ;ø\}, \ldots, V_n$

In the second case, the differing number of elements in the /E/ group is not merely a quantitative but also dimensional difference. Namely, as the notation suggests: among the elements of an otherwise homogeneous set, a subset appears at the /E/-th place. (Notice that the homogeneity principle can be restored with respect to the inventories of the two subsystems if the place occupied by a single element in the /E/ group is taken to be a one-element (sub)set, in the general form $V_i\{x;(Ø)\}$.)

This problem will be avoided in this study by the stipulation that the investigations exclusively concern standard material and the vowel inventory

will be restricted to S1 and S2, in accordance with 2.1.5.1. This and similar stipulations, however, still leave the possibility of optionally variable word forms open. In short, the fact that a phonological representation is taken to be a startified abstract object, see 2.2.1 below, makes room for several simultaneous representations, even if the theoretical framework and the linguistic material are both carefully circumscribed.

2.2.1. The stratification of phonological representation

The property called 'stratification' here is based on the fact that two further aspects are taken into account: (i) the place of phonological representation within the hierarchy of linguistic levels, or rather the level to which we wish to attach the phonological representations used in our formal description, and (ii) historical considerations.

2.2.1.1. Stratification and alternations

The notion of phonological representation as a stratified (multilevel) object is rooted in generative phonology. Schane (1973, 74--5 and 80--1) illustrates the stratification characteristic of the standard theory with the following example. (i) The underlying (abstract) representation of the word electricity is #elektrik+iti#. (ii) The representation derived from (i) by the rule k → s is #elektris+iti#. (iii) Finally, we get the derived (phonetic) representation [ɔlektrisitīy] by vowel adjustments (reduction and tensing) and the elimination of boundary symbols. (iv) These versions are contained in derived representations on the basis of which individual realizations or phonetic manifestations come into being. (As an involuntary consequence of this view, phonological representations sometimes coincide with one of the alternants -- in this case, with /elektrik/ -- whereas in other cases they do not, as in /divi:n(-)/ ◄► divine and divinity.) The stratificational character of this description, as shown by the distinction among forms in (i) to (iii), remains a fact even if we had to point out, especially in our discussion of Natural Generative Phonology, a certain inconsistency inherent in this approach. It lies in the fact that units represented directly are intermingled with ones that never appear in surface forms as they do in phonological representation. Such mixing of levels of existence ultimately originates from a notional blur inherent in the fact that no consistent distinction is made between the domains of morphology and phonemics in

the hierarchical levels of phonological representation. That distinction is, however, unavoidable. This is because the validity of statements about either of the two extreme levels of existence does not (necessarily) extend to the other domain. Consequently, as long as the morphological level is not, as a most important move, consistently told apart from the phonological component, a logically clear-cut description of phonological representation, or any kind of representation, is not feasible. By a 'logically clear-cut description' I mean one that is homogeneous, i.e. contains entities of identical existential status. In order to characterize the situation in general terms, let me quote Stephen Anderson's view. As he points out, lexical representation cannot be identical with the stem (as it would be pronounced in isolation) since the latter also undergoes further phonetic modification by word-level rules (cf. Anderson 1974, 31--2). As is done in Natural Generative Phonology, although using another notational device, Anderson indicates the common underlier of alternating elements between □ □. For instance, in the case of f ~ v stem alternation as in knife vs. knives, the final segment is written as an (actually archisegmental) □F□, where □F□ = /f/ ~ /v/. However, the same device is inappropriate to represent the final consonant in belief/beliefs, although it would be necessary for the corresponding verbal stem, cf. belief vs. believe. In another framework, this could be solved by positing a neutralization rule. Problems of this type, i.e. the lack of possibility of full phonemic identification, make the author accept a model of phonological structure incorporating the levels of morphophonemic and phonetic representation but assume "a single set of statements to relate the two" (ibid. 38). The error in Anderson's view is exactly this assumption. The "single set of statements" relating the two levels to one another does not exist, indeed cannot exist, since (i) the morphophonemic level involves a different set of elements (including e.g. boundary markers) and (ii) the phonetic representation undergoes a set of rules (e.g. those of accommodation) that are inapplicable at the morphophonemic level. Therefore, statements concerning the two levels must constitute separate sets. This is true even if the two sets exhibit (perhaps not even small) overlap, such as the part of sequence building rules that dictate the direction of accommodation. However, (partial) homology of statements applying to distinct categories is not a sufficient condition for these statements to be identical.

The picture becomes clearer if we consider the issue from the point of view of alternating morphemes. Post-SPE phonologies in general take alternations to be changes at a particular phonemic position within a morpheme or, in other words, the alternative occurrence of two or more competing phonemes in a position (cf. e.g. the Natural Generative Phonology view as put forward by Hooper 1976, see 1.2). Thus, an alternating morpheme contains unchanging or self-identical and changing or variant phonemic components alike (for my criticism, see section 1). If we want to draw a consistent picture of alternations (where 'alternation' is meant to be the diversity of two or more variants of a morpheme occurring among diverse circumstances), we have to consider the following.

(i) (Stem) alternants are united by a semantic relationship. This criterion has to be accepted, otherwise we would be forced to take a /me:$\{^{s}_{z}\}$-/ alternating stem morpheme to be valid on the basis of /me:zben/ ◄—► mészben 'in lime' ∼ ◄—► mézben 'in honey'. This possibility has to be excluded, of course, on the basis of the criterion of meaning discrimination.

(ii) We also acknowledge the fact that alternating (stem) morphemes exhibit a relatively constant part and a strictly alternating part, where the latter is realized in one or another of (two or more) disjunctively related units.

(iii) A word (form) may have alternants that exhibit corresponding elements in a given phonemic position of the stem that, unlike fel/föl 'up' or tő(-)/töv- 'stem', etc., cannot be synchronically related on the surface but are phonetically unrelated elements [going back to distinct historical antecedents], e.g. /s/ and /l/ as in keressz/keresel 'you seek'. In addition, there are alternations that involve non-matching morphemic structures (amely /amelyik 'which', used indiscriminately in everyday speech, cf. ÉrtSz. 39).

(iv) The speaker uses stem alternations with identical denotation (fent /fenn/fönt/fönn 'on top', also ló(-)/lov- 'horse', sző(-)/szöv- 'weave', and so on), hence stem alternants correspond to the same unit of meaning even if in distinct (grammatical--semantic) structures their occurrence is non-arbitrary (cf. nője 'his girlfriend' vs. neje 'his wife', borjúja 'his (e.g. a farmer's) calf' vs. borja 'its (i.e. the cow's) calf', etc.). Note in this respect that wherever such 'semantic splits' (cf. Grétsy 1962 for Hungarian cases) become definitive, the denotational identity of what used to be stem

alternants comes to an end (as in cseléd 'servant' vs. család 'family', derivatives of the same Slavic čel'adь [cf. TESz I, 493]), and these pairs of items turn into unrelated lexemes within the lexicon.

In view of the foregoing, the phenomenon of alternation concerns a morpheme as a whole, rather than one or several phonemic positions therein (cf. Baudouin de Courtenay 1895, esp. 11), therefore the domain of alternation is 'the linguistic sign as a semantic unit' [bedeutungseinheitliches sprachliches Zeichen] (cf. Wierżchowska--Wierżchowski 1981, 410). These facts lead us to postulate L(xxvi).

L(xxvi) Alternating portions of word forms have to be uniform at the next-to-phonetic level of an articulatory program; it is a higher level of a stratified phonological representation where non-uniformity is located.

2.2.1.2. Stratification in a formal logical aspect of systematic phonological/phonetic levels

Turning to word forms as a subject-matter for closer inspection within the broad spectrum between individual realization and systematic linguistic sign, it is clear that we are faced with a logically well-definable complex object. The sketchy analysis that follows has once more to start from rather remote historical antecedents.

The classical Saussurean distinction between a 'modèle collectif' and 'combinaisons individuelles + actes de phonation' (cf. Saussure 1916/1968, 38ff) that has survived mostly in this form throughout the history of twentieth-century linguistics, essentially divides the facts of langage into an opposition of 'concrete/abstract'. This is primarily a logical distinction whose historical antecedent is the teaching of scholastics of the late Middle Ages, especially Abélard, about the classification of concepts. It is ultimately in the spirit of that logical distinction that phonological analysis follows the procedure of assigning realization to phonetics and whatever underlies it to phonology, displaying what is heard between square brackets and the pattern behind it between slants, e.g. for the form mintául 'as a pattern': [mĩnta·ul] and /minta:ul/, respectively. I would like to argue that this crude distinction is insufficient and -- as will be shown below -- does not even make use of all possibilities of finer distinctions offered by a logical theory for the classification of concepts. The logical framework concerned is essential to the reasoning to follow.

Concepts, in traditional logic, can be classified on the basis of their ontological differences as concrete vs. abstract. If they are ontologically independent, i.e. objectively demarcable (like 'a house'), they are 'concrete concepts'; if they are ontologically non-independent, i.e. only mentally distinguishable from some ontologically independent entity (like 'the properties of a house'), they are 'abstract concepts'. The above distinction (based on an ontological criterion) is cross-cut by a purely logical criterion: that of 'individual' vs. 'general'. Individual entities are self-identical and distinct from everything else. "Individual concepts' are instances of these. On the other hand, every property that is common to individuals or groups of individuals is 'general'. 'Individual concepts are ones that are self-identical and distinct from all others. General concepts are ones that distinguish and, where they are common [to several 'individual concepts'], also express what is identical across distinctions" (von Freytag-Löringhoff 1955/1961, 26). Concrete and abstract concepts can both be either individual or general. (The above categories are 'not divided by strict boundaries', as Vojsvillo [1967/1978, 362] points out.)

Depending on their degree of diversity vs. identity, general concepts may be loosely or closely interrelated in terms of the number of their limitative negations of one another. General concepts expressing more diversity (i.e. consisting of a larger number of conceptual features) may cover fewer individual concepts and vice versa: those expressing less diversity (involving less distinctive entities) may cover more numerous individual concepts. The individual concepts covered by some general concept constitute groups. A group of individual concepts under a general concept of lesser diversity is called a 'genus', whereas a group under a general concept of more diversity and included in the former group is called a 'species'. Concepts form a pyramid-type hierarchy on the basis of their "generality" (degree of diversity) such that the pair genus/species is repeated along a number of hierarchically ordered groups of concepts (what is a genus in one relation is a species in another, more general relation, and so on).

Modern logic handles this problem in a quite different manner. Quine's (1950/1963, esp. 203--6) representative theory, for instance, departs from traditional logic (first of all) in terminology. He replaces 'concept' by 'term', i.e. an expression denoting a common noun, and also classifies terms

in a novel way, as follows. There are 'absolute terms', ones that do not depend on the description of other things; 'relative terms' on the other hand describe things in relation to other things, specified later (for example, the father of Isaac); relative terms constitute 'pairs of terms'. Terms that can be used attributively are 'general terms', those that refer to one (and only one) thing are 'singular terms' (e.g. Socrates). With respect to the latter distinction, note that generality is not the same as vagueness since a vague term like I or Mr Jones may refer to varying persons -- but only one person at a time. A further distinction is made between 'concrete' terms, referring to individuals, physical objects or events, and 'abstract' terms, referring to abstract objects like numbers, classes, or attributes. A common feature of both the traditional and the modern approach is the shared category of 'general' whose opposite is 'individual' and 'singular', respectively. Two further remarks are to be added here. (i) The ontological status of 'general' as such will not be explored at this point in any detail. We will restrict ourselves to the observation that the manner of existence of general terms, the only relevant point with respect to the use of their linguistic correlates, is validness (Gültig-Sein) (cf. Husserl 1947/1972, 93--105). Validness is what accounts for their linguistic role. (ii) Whenever 'general' is mentioned, it is always taken in sensu composito, to use Abélard's original distinction.

From the point of view of phonological representation, the logical framework of interpretation is more than a remote analogy. First, as far as the domain of relevance of phonological formulae of word forms is concerned, the classificatory criterion 'concrete/abstract' will necessarily remain valid in the sense of Quine (as cited above), in order to keep linguistic signs and signals apart. (The two types of bracketing are meant to express this distinction.) In addition, however, further distinctions are needed on both sides of this boundary. Thus, within the concrete category, self-identical cases are to be distinguished from those practically taken to be identical in their realizations. In particular, (i) the case of [⌈nɐ̨m:⌋] in the utterance Szóval nem! 'So you won't' (in sample IV/10) as defined by spatial and temporal coordinates -- but disregarding irrelevant minutiae of the mere physical level -- belongs to the category of 'concrete individual', whereas (ii) the generalized version of the same constituent, [nɐ̨m], represents that

of 'concrete general'. Similarly, (iii) a systematic phonological representation in the strict sense, /nem/ as a linguistic sign (an abstract entity), is a member of the category of 'abstract individual' with respect to the individual realization [[nɛ̨m:]] and the concrete general [nɛ̨m]. (iv) Finally, /nɛ̨m/ occurs as //nɛ̨m// and further interpreted as //#nɛ̨m#// in the category of 'abstract general' as a member of the full inventory of a linguistic system. Prior to stating L(xxvii), however, we have to find some justification for all these distinctions. All we must see at this point is that the concrete general level -- case (ii), [nɛ̨m] in the example, as opposed to the concrete individual form [[nɛ̨m:]] -- is not assigned spatial/temporal parameters. On the other hand, abstract individual (/nɛ̨m/) and abstract general (//nɛ̨m// etc.) are of different composition. For instance, the constitution of morphophonological units [= abstract general] includes syllable structure constraints, boundary markers of various strength, etc., properties that are previously given (in a particular version) in abstract individual items.

L(xxvii) In terms of occurrence and interpretation, diverse versions of phonological representation can be assigned to one of four classes. These are concrete individual, concrete general, abstract individual, and abstract general, respectively.

It follows from L(xxvii) that in realistic formulae of phonological representation it is a natural requirement that the version in question is to be definitely attributed to one of these four categories. (This requirement is straightforward. If, for instance, we want to determine speech rate in an utterance of a given length, we get rather different figures for element per unit of time depending on which of the three 'lower' levels are taken into account: the concrete individual level of Szóval nem!, [[sa'nɛ̨m:]], contains five segments, the concrete general [so·val'nɛ̨m] contains eight; abstract individual /so:val nɛ̨m/ contains the same number of segments but a different number of morae. Some important concrete questions and the implications of the answers will be discussed in the following section.)

2.2.1.3. Levels of phonological representations and practical implications

The formal logical distinction in L(xxvii) above referred to four distinct groups of the heterogeneous data set of langage in a general form. The present section discusses the mapping of those distinctions onto linguistic

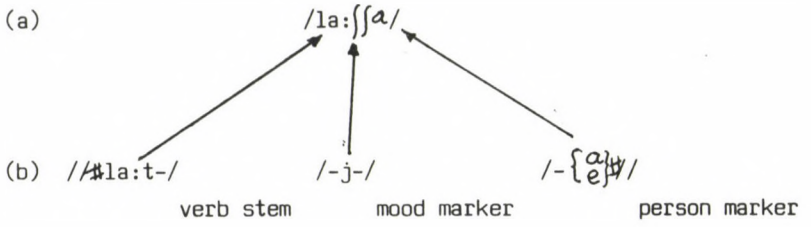
levels, first by stating T(xiii), then by supplying an interpretation of the theorem, and finally by mentioning a few practical implications concerning the investigation of lenition processes.

(i) On the basis of the formal logical distinctions given in L(xxvii) and the motivation presented in 2.2.1.2, we can state the following theorem.

T(xiii) Word forms are hierarchical (stratified) linguistic objects whose strata are (i) lexemic morphosyntactic structure as abstract general, (ii) phonological structure as abstract individual, (iii) idealized phonetic structure, also called 'systematic phonetic', as concrete general, as well as (iv) realized phonetic structure as concrete individual.

(ii) The central problem of practical analysis is the treatment of the interfaces between pairs of levels, especially 'upper' (abstract) ones.

A representation may assume different forms on lower vs. higher levels of abstraction, depending both on the actual perspective we take and on the functioning of language in the broadest sense. If the Hungarian word form lássa 'he should see' is submitted to analyses [= segmentations and structural parsings] of varying depth both in a syntactico-morphophonological and a phonemic perspective, different but equally valid results are obtained in terms of the set of primitives as well as their arrangement. These results will be interrelated and derivable from one another. In the instance of lássa [ImplPSg], the high level stratified phonological representation can be approximately illustrated as follows.



where (b) is supplemented by its historical antecedent (c), with which it is in a coordinate relation and at the same level of abstraction:

$$(c)\quad ///\#\,\mathrm{lat}\begin{bmatrix} V \\ +\mathrm{back} \end{bmatrix}\#// = //\#\,sV\#/ - /\#\,lCl\begin{Bmatrix} a \\ e \end{Bmatrix}\#///$$

(b) and (a) are related via morpheme structure rules and phonological rules; the same obtains for (c) and (b) with the proviso that this latter relation may involve non-productive morpheme structure and phonological rules (along with productive ones). Whereas (c) obviously has no role in speech production, i.e. it is 'extra-conscious' with respect to both speaker and listener, (b) is an active component of the speaker's mental processes at a 'preconscious' [vorbewusst] level, i.e. as a piece of tacit knowledge that can be elevated to a conscious status and, as such, may acquire surface realization in special communicative situations (e.g. in spelling or in syllabification). With this, however, we have not specified how phonological representations of type (a) set speech production in motion.

Level (a) of a phonological representation -- in the present example, /la:ʃʃa/ for lássa -- is invariant, i.e. discrete and of a constant form, as are all (abstract) signs of langue. Since the corresponding word form in actual speech production is not invariant (but an analogous signal exhibiting all kinds of variability), an abstract phonological representation cannot be identical with the commands of the speech production program responsible for the acoustic results of individual pronunciation. Hence, a set of interface rules must be assumed that mediate between phonological representations and ordered sets of implementational instructions. (Their number is language-dependent: in what are called 'orthophonic' languages -- such as, originally, Hungarian -- it is smaller, whereas in languages having a more conservative orthography -- and, accordingly, 'deeper' phonological representations -- it is relatively high, cf. Ács 1990, 7--8; for the notion cited and a documentation of this relation on Scandinavian languages, cf. Ács 1988.) In particular, I will assume two types of interface rules, viz. (i) 'levelling' rules and (ii) 'gestalt' rules, to mediate between phonological and phonetic representations.

'Levelling' rules will effect transformations like /la:ʃʃa/ ==> la:ʃ:a (where ==> indicates level shift and the omission of / / is meant to reflect the fact that the form right of the arrow is neither phonological nor phonetic; rather, as a realization program, it is an independent category constituting an intermediate level between those two). Inasmuch as we have invariants on the left and 'subroutines' of realization programs on the right,

we have to accept the assumption that morphemes are psychologically real -- even if we cannot actually specify to what extent linguistic elements can be taken to be isomorphic with psychological facts (cf. e.g. Linell 1979, for further problems see below). In the above example, levelling rules turned a type (a) pre-implementational, intermediate phonological representation into the corresponding next-to-phonemic phonetic representation (usually labelled as 'systematic phonetic', a term that sheds light on one of the Janus-faces of this notion: that turning towards realizations) by removing the morpheme boundary feature from between /ʃ/ + /ʃ/ and replacing /ʃʃ/ by ʃː via a pronunciation subroutine, in a way corresponding to the mechanism involved in Kiparsky's (1982) notion of Bracket Erasure.

However, the form lässa → laːʃːa will also undergo further operations including e.g. the relativization of the [+long] component of /aː/. This is due to one of the gestalt rules (that of temporal organization), i.e. a set of rules whose common property is that they involve (a portion of) an utterance as a whole. A correspondence like /aː/ → [a·]~[a], in fact, cannot be interpreted in terms of isolated segments if the criterion of biuniqueness is maintained. The motivation for such a derivation can only be found in the structural effect of a word form as a whole, in the present case most immediately in the pattern -V:C:-, in particular, the occurrence of ː after aː, i.e. a (temporal) foot organization factor. Similarly, if [ɑ] is more labialized than usual in this example, the consequent non-distinctive labialization of [ʃː] that unavoidably occurs in the course of speech production will produce the acoustic effect of a frontally open atrium of resonance (essentially, the enhancement of low-frequency components).

The main properties of gestalt rules (omitting details) are as follows. Gestalt rules determine the utterance unit in terms of speech production in a global way. This is unambiguously shown by experimental results involving 'sequence reduction' and 'sequence size truncation' (cf. 3.4.4 and 3.4.5). Another type of evidence comes from the stage of a child's first language acquisition where non-adult, 'crude' programming with respect to a given word form results in a disorderly arrangement of the articulatory components involved, one that does not match the order imposed by the underlying phonological representation. For instance, Smith's (1973) data included squat surfacing as [ɡɔp], queen as [ɡiːm], etc. by transposition of the bilabial

component (cf. also Wilbur's [1981, 411] somewhat different, or at least differently formulated, explanation).

The units undergoing gestalt rules may be of various sizes. In particular, they may involve single morphemes, but -- in 'discourse modifiers' -- several, semantically connected word forms as well (the latter case is observable primarily in sequence size truncation, see point 4.8).

In lenition processes, gestalt rules may exhibit varying effectiveness in modifying individual properties of articulation within a global articulatory program. For instance, of several units within a single word form, all of which are phonologically specified as the same phoneme, e.g. $\underline{k}_{1--3}$ in the form gyerekeknek 'for children', some will, and others will not, give up the property involved in the lenition process, in this case the stop component. This depends on the phonotactic position of the unit in question, the degree of lenition, the articulatory--acoustic complexity of the segment, and so forth. In addition, it depends on the feature/component itself. In vowel substitution errors, according to Shattuck-Hufnagel's data (1986, esp. 124), the standard deviation of the feature [+tense] in erroneously substituted items exceeds the expected probability values several times more than that of the feature [+back].

(iii) The foregoing have not provided us with any guidelines with respect to practical problems of analysis or with a clarification of tasks in a methodological perspective. The goal is, indeed, to describe and classify the regular processes of articulation that take place in utterance chunks of various sizes. The input of those processes is an initial phonological representation formulated in terms of an appropriately chosen framework and the output falls within a tolerance band regarded as 'normative' with respect to standard spoken Hungarian. The range and partly the nature of the investigations (reported in detail in Chapter 3 below) can be illustrated in the following example.

In a communicative situation $\underline{s}_i$ in which four interlocutors conduct a conversation on a previously given topic, one of the participants contributes, as a passionate rejection of some argumentation, the emphatic sentence Szóval nem! 'So you won't!' as a self-contained, complete utterance. The analysis will be restricted to a macroscopic segmental phonological description of that utterance. Thus, we will disregard several aspects of content

(contextual, semantic, pragmatic), as well as grammatical, (suprasegmental) phonological, and phonetic factors that are all involved in the communicative situation. The utterance Szóval nem! thus appears in the (abstract individual) form in (1).

(1) /#so:vɑl# #nɛm#/

Note that by assigning the representation in (1) to this utterance, we have introduced further implicit constraints in the description. (i) On the basis of what was discussed in 2.1, we presupposed that there is a finite set of segmental phonological units and relations among them that can be defined, and that it is exactly the segments appearing in (1) that adequately reflect the utterance concerned. In other words, it is presupposed that Hungarian has short and long vowels and at least two phonemic nasal consonants, that this sequence contains only word boundaries and no further types of morpheme boundary features, and so on. Also, it is implied that the segmentation in the example is authentic, although this is merely one possible and widely used variant of phonological analysis and its exclusive adequacy is strongly debated (cf. Griffen 1981). (ii) It is further assumed that the form in (1) can underlie its pronounced equivalent rather than (only) serve as the final stage of a derivation -- in the opposite direction -- that is based on the surface pronunciation. (This assumption is made possible by what was discussed in 2.2.1.1--2.) Derivations in which the starting-point and direction are chosen in two opposite ways do not necessarily involve identical steps (cf. Upside-down Phonology: Leben--Robinson 1977, and Eliasson 1981). Finally, (iii) note that I exclude from this analysis all those phonetic rules and processes (like the nasalization of [l] or of the sequence [ɑl] and, in general, all instances of accommodation) that, either universally or in a language specific manner, influence the pronunciation of this utterance by automatic regularity even in ordinary lento style. This is because accommodation rules are, metaphorically speaking, encoded in a (sub)segmental programming automaton (cf. Vértes O. 1958, Elekfi 1968) and do not have a role in meaning discrimination.

The description in (1), although phonologically quite revealing, does not in itself directly say almost anything about the phonetics of the utterance in question. In particular, the pronunciation that follows the phonological representation (1) of this utterance as closely as possible -- i.e.

the "upper concrete" (concrete general) version -- is this:

(2) [so·vɑl nɛ̃m]

In the recording this pronunciation can be recognized in traces at best, and only by a native speaker of Hungarian. What is actually heard, or rather, what a foreign listener who does not speak Hungarian at all would hear, is a distorted variant of (2) that can be represented, in broad transcription, as (3) (cf. sample IV/10, I: Szóval nem!):

(3) [[sa'nɛ̃m:]]

It is easy to see that (2) and (3) are interrelated in that both forms are, in set-theoretical terms, in a one-one correspondence (mutual direct mapping relation) with (and only with) (1); on the other hand, (2) and (3) follow from one another in a particular way. Their difference is that of their respective pronunciation programs. It appears that [[a]] in (3) stands for a four-member, non-independent sequence of (2):

(4) [o·vɑl] ⟷ [[a]]

and, similarly,

(5) [m] ⟷ [[m:]]

Whereas the correspondence indicated in (4) shows 'articulation surplus' in the [ ] form, that in (5) does the same on the [[ ]] side, without cancelling the identical nature of (1) ⟷ (2) and (1) ⟷ (3) on account of the differences. It is nevertheless true that (1) is more difficult to trace back from (3) than from (2), given that [[a]] -- as can be seen in (4) -- is an articulatory event comprising four phonemic segments and requires, in principle, 2^4 = 16 binary decisions in order to be identified, while the identification of [o·vɑl] in (2) follows directly, on the basis of a single binary decision. In accordance with the stipulation that (2) is closer to the phonological representation, we have to derive (3) from (2), i.e. ((1) →) (2) → (3); from the point of view of the listener, this derivation is the reverse, (3) →→ (1).

(3) will be derived from (2) iff certain specific conditions hold, via the application of certain rules that express these conditions. Therefore, we must state (i) what exactly happens to (2) as it assumes the articulatory variant in (3), and -- if we can tell -- (ii) what gives rise to that modification.

Borrowing the term from Fónagy's (1971) theory of 'double (en)coding',

the derivation of (3) from (2) -- itself going back to (1) -- involves a set of distortion rules. In the case at hand, bearing in mind the factors noted so far, the realization of the sentence Szóval nem! 'So you won't!' will be described as in (6) and (7):

(6) (i) [s(o·val)] ←-- <ę; 'discourse modifier' position>
↓ LEN(sequence size truncation)
(ii) [[sa]]

(7) (i) ['nę̃(m)] ←-- <phrase boundary + pause; stress>
↓ FORT(lengthening)
(ii) [['nę̃m:]]

Key to symbols and abbreviations:

// //, / / denote that the units appearing between (double or single) slants belong to a phonological category and the enclosed letters are symbols of phonemic units;

[ ] denote a 'first-order' (that is, next-to-phonemic) phonetic representation that is pronounceable (usual in isolation but not appearing in every style of pronunciation), normative, 'lento', distortion-free, context-independent and deprived of suprasegmental features, representing an independent phrasal unit, and directly determined by phonological representation;

[[ ]] denote a directly real, potentially distorted, phonetic representation;

( ) enclose the section of a pronounced form that is directly affected by a distortion process;

<> enclose the factor(s) responsible for distortion;

___ (= italics): the orthographic representation of a form;

→ represents the fact and direction of derivation: the entity on the left of the arrow turns into that on the right;

→→ denotes that the derivation involves one (or more) intermediate stage(s);

←-- indicates the cause of some change: the arrow points from the source to the entity undergoing the change;

←--←-- the causation involves several steps;

LEN, FORT are the two basic types of distortion: lenition and fortition, respectively; the subtypes of LEN and FORT are indicated in parentheses, e.g. FORT(lengthening) = a fortition type realized in a relatively longer duration of one or several segments;

'lento' and 'allegro'
are metaphors for complete, undistorted vs. incomplete, distorted utterances, with indirect reference to tempo effects.

Thus, <ę> in (6i) expresses that the 'illabial' feature of the vowel in [[sa]] is due to the effect of illabial [['ę]] occurring, in a heavily stressed syllable, later in the same utterance. In the same item, 'discourse modifier position' means that the word szóval 'so' as an adverb -- as opposed to the phonemically identical case-marked noun szóval 'with (a) word' -- does not structurally belong to the single-word sentence it introduces, Nem! 'No!', but rather refers to it as a communicative connective element. In (7i) the sources of distortion are phrase structure markers, as well as the intensive presence of a suprasegmental constituent.

2.2.1.4. Rule categories belonging to the various strata of phonological representations and the status of gestalt rules

As we have seen, 'levelling rules' perform shifts between the strata of phonological representation, with two particular functions. They are (i) the homogenization of a lower-level form by eliminating components that are restricted to higher levels, and (ii) the arrangement of components in that homogeneous structure. (All this essentially amounts to the simplification of a complex phonological structure, cf. the relation between components of levels (b) vs. (a) in 2.2.1.3(ii).) Consequently, the domain of application of levelling rules is the set of abstract strata within a phonological representation. On the other hand, gestalt rules operate on homogeneous sequences consisting of linear concatenations of phonemic components, hence their domain is the level of concrete categories. Depending on which of those two categories they apply to, they are classified into two groups. (i) Phonological rules of the 'concrete general' level constitute the set of accommodation rules. Their nature, types, and domain of application are outside the purview of this study (for their principled description and classification, cf. once again Vértes O. 1958). (ii) The other group of gestalt rules oper-

ates in the stratum of concrete individual, and since its systematic analysis, indeed reference to it, is rather meagre in the literature (though cf. Kerek 1977 for certain types of elision, Vogel 1987, Vogel--Kenesei 1987 for interdependences between phrase structure and the blocking of certain accommodation rules, and Szende 1989 with respect to distortion phenomena in general), we have to discuss the relation between gestalt rules and phonological rules in the classical sense, obviously with constant reference to those phenomena in speech, distortion processes, in which their operation can be documented.

The set of phenomena concerned can be characterized in general as follows. The repeated occurrence of distortion phenomena classifies these types of processes on the basis of associated phonological and other conditions. For instance, vowel devoicing invariably occurs at morpheme boundaries (and usually at a phrase boundary) with the latter, as it were, conditioning this case of reduction; the factor that gives rise to sequence size truncation is normally the semantic depreciation of that sequence; and so on.

Direct observation thus raises the theoretical problem of the relationship between (the types of) distortion phenomena and (phonological) rules in a natural manner. The rules of phonology, especially those of a morphosyntactic character, are absolute. Accusative -t has a constant shape as [t], and conjugation paradigms have prelexically determined vowel-harmony properties that are likewise exceptionless, otherwise the opposition látnák 'they would see' vs. látnék 'I would see' would not be possible. On the contrary, in sequence reduction, e.g. in a pronunciation broadly transcribed as ötkör (with [œ] in the second syllable) for ötkor 'at five o'clock', the application of vowel harmony to regular -kor 'at' is an occasional phenomenon, and the categorization of the regularity that is responsible for this individual form is uncertain. In particular, we could assume that the surface form is due to centralization resulting in /o/ → [œ], or else to a morphophonemic alternation of the temporal suffix -kor 'at' under the analogical influence [Systemzwang] of vowel harmony alternations in other case suffixes like -ból /-ből 'from inside', -tól/-től 'from', -hoz/-hez/-höz 'to', etc. "Rules" resulting in distortion phenomena are, then, relative. Wanting to avoid trivial statements like the segments occurring in distortion are not arbitrary phonetic patterns ("it is not the case that anything can replace anything"),

we characterize the relationship between distortion regularities and (systematic) linguistic rules in a concise manner in the following two lemmas.

L(xxviii) Within the domain of gestalt rules, (the above) phonological and other (e.g. semantic) conditions do not constitute absolute motivation for distortion processes.

In other words, these are necessary but not sufficient conditions. For instance, phrase-initial position does not necessarily entail devoicing for a vowel, a process that would be described in a general form by a rule like

$$V \rightarrow \underset{\circ}{V} \; / \; [\#\# \_\_ (C_1^3)V_i \ldots$$

Consequently, gestalt rules keep distorted/undistorted pairs of forms (like phrase-initial voiced/devoiced vowels in this example) in a state of variation that is, historically, a necessary precondition for a sound change (as exemplified in Fónagy 1956), but does not necessarily result in a new phonological rule or a new output representation. Given that they lack automatic applicability, gestalt rules can be called 'rules' in a restricted sense -- or under the assumption that, in producing an attested form, the application of one rule can be blocked by another. In the case of the example ötkor 'at five' ⟷ [øtkor]$_1$ ~ [otkœr]$_2$, this would mean that the rule producing ötkor$_2$ (by neutralizing the backness contrast within the sequence via shifting the place of articulation of the second vowel and of k) will seldom gain the upper hand over the rule producing ötkor$_1$ (by requiring that the actual surface form should be as close to the phonological input as possible).

L(xxix) Depending on the level of linguistic system at which the corresponding phenomena (regular modifications and alternations) concerning segments or sequences of segments are located, the rules of phonology/phonetics fall into hierarchically arranged classes.

(i) A phonetic rule exclusively refers to phonological features/components and/or boundary markers (from word boundary upwards), and does not change feature values [i.e., + or - specifications indicating the presence vs. absence of a phonologically significant property] but rather leaves them as specified in the appropriate segment of the phonological representation

(cf. Sommerstein 1977, 206; where, however, the definition is not in the affirmative and is said to be a paraphrase of Anderson's [1975] formulation). Accordingly, if we find that the relative duration of a vowel increases before rolled r, then the rule stating this is a phonetic rule since it is of universal validity, refers to a single feature, and does not invalidate the short/long opposition in that it does not change the [-long] feature specification of the vowel into [+long]. To take a lenition example: if the reduction of a labialized vowel (e.g. that of [aɾ] in változása 'its change' when it occurs phrase-finally before a pause) results in the feature 'labial' being realized one degree weaker, the modification [2 lab] → [1 lab] will be a purely phonetic phenomenon.

(ii) A phonological or morphophonemic rule relates phonologically similar forms (e.g. ones deriving from the same root morpheme), and it involves purely phonological conditions or refers to phonetically motivated phenomena, to phonologically determined environments of alternation, or to natural neutralization (Sommerstein 1977, 209). For instance, the change in the final vowel of kapát 'hoe-ACC' (from nominative kapa) is described by a phonological or morphophonemic rule of the following shape (where the rule is formulated for this particular case):

$$\begin{bmatrix} \text{V} \\ \text{labial} \\ \text{low} \end{bmatrix} \rightarrow \begin{bmatrix} \text{V:} \\ \text{illabial} \\ \text{low} \end{bmatrix} \Big/ \underline{\quad} + \begin{bmatrix} \text{C} \\ \text{noncontinuant} \\ \text{voiceless} \\ \text{dentialveolar} \end{bmatrix}$$

(where the + outside the bracket stands for a morpheme boundary). Generalizing the rule to reflect all parallel cases:

$$\begin{bmatrix} \text{V} \\ \text{+low} \end{bmatrix} \longrightarrow \begin{bmatrix} \text{+long} \\ \text{-round} \end{bmatrix} \; / \; \underline{\quad} + [\text{+segment}]$$

(iii) All other rules are morpholexemic rules; thus, for instance, the (suppletive) rule of Hungarian that supplies the lexical stem variant vol-

for past tense forms of 'to be' and the variant le(sz)- for present/future tense forms.

The changes observable in lenition processes (i.e. the various lenition process types) do not fit into this traditional classification. The pertinent facts are as follows.

One particular lenition type, covering a set of essentially identical changes, may embody rules of diverse categories. 'Reduction', for instance, may (a) simply be a change that we normally classify as a phonetic rule: the delabialization of [a] in változása 'its change', as quoted above, calls for this label. In other cases (b), reduction results in a change that can be characterized as a phonological rule with respect to its domain of application in that, by deleting a phonologically relevant feature, it alters the phonological status (e.g., class membership) of a segment as in [m] → [ŵ] (sample IV/97, I: mondták 'they said') where the labial nasal loses its stop component. Finally, (c) by eliminating a major classificatory feature, the realization may turn into that of the phonological representation of another lexical alternant: by devoicing the u in azután 'then' we get a result like az[V̥]tán which appears to be the 'fortitive' version of aztán 'id.' (cf. Szende 1988, 182); the phenomenon is of a morpholexemic nature here.

However, there is no complete and mutual overlap such that all types of lenition permit the occurrence of all possible categories of rules. 'Truncation', for instance, is by definition a phonological category, not a phonetic one; indeed, there are clear examples (e.g. szóval 'in other words' [so]) to show that truncated forms may fail to exhibit any further phonetic change (the omission of suffix is obviously not an instance of reduction). In other cases, it must be admitted, truncation and phonetic change may simultaneously occur within a single sequence, e.g. in sample IV/167 (Z: valami ilyesmi 'something like that') from the same speaker: [və̂mĩjẹʃmɪ] where final i undergoes reduction by centralization and also changes in height and degree of illabiality. (Needless to say, this is not a matter of occurrence -- or lack -- of reduction at the truncation site itself; in both cases an independent phonetic rule applies or fails to apply at a remote point of the (same) sequence.) Consequently, truncation and phonetic rules are mutually exclusive. The situation is quite similar with respect to 'deletion' and 'loss'. Both of these lenition process types destroy a complete segment at a given point

in phonological representation. The rules effecting these processes are, in view of the definitions by Sommerstein cited above, clearly of a non-phonological character; but they may either be phonological like t-elision in ezt 'this-ACC' in sample III/52. (Z: + Ezt azért, mert + 'And this because...'), or result in morpholexemic switch as in the various versions of miért 'why' (cf. Szende 1988, 182).

Scope properties are also non-relevant for the classification of lenition rules. Larger-scope processes, i.e. those involving a sequence of adjacent segments, can be realised by phonetic rules (as in sequence reduction) as well as by morphophonemic or morpholexemic ones (as detailed above for cases of truncation). On the other hand, lenition phenomena involving single segments can also qualify as instances of any of these three rule types; see once more the discussion of reduction earlier in this section, in L(xxviii).

Finally, the rules responsible for lenition processes may also lead to results that do not lend themselves to a neat interpretation in terms of a linguistic system-oriented classification. Whenever sequence size truncation yields a realization that further undergoes elimination of backness contrast in a vowel -- as discussed above --, the speaker in fact (over)applies vowel harmony in a way that, in terms of various lines of reasoning, can be taken to be of a phonetic, or morphophonemic, or (potentially) morpholexemic character. This can be observed e.g. in sample II/280 (Z: szóval ez 'so this') where the vowel in szóval is realized as front.

The lack of correspondence between phonetic, morphophonemic, and morpholexemic rules on the one hand and the set of gestalt rules on the other is conspicuous enough to make one wonder if those two sets of rules actually occupy different levels within the total system. However, the source of that mismatch is not that their structural descriptions reveal rule-governed phenomena of different depth: it is not the case that the former set of rules refer to phenomena restricted to phonological representation and the latter account for events at some level intermediate between underlying and surface representation. (Aphasiacs' errors, as was mentioned earlier, in particular cases of syllable elision as in catholicize → /kə$\overset{1}{\text{θ}}$ələ̄yz/, solidification → /sə$\overset{3}{\text{l}}$ələfə$\overset{1}{\text{k}}$ē$^{\text{x}}$šən/, demonstrate that syncope applies to phonological representation, not (some level of) surface form, cf. Schnitzler 1972.) Rather, the difference actually lies in the fact that the rules categorized by Som-

merstein (1977) as above and gestalt rules have different domains of application: the latter can be stated for (a typologically diverse range of) allegro phenomena, whereas the former cover lento forms only. -- All that this distinction entails in itself, however, is that the number of gestalt rules is larger. But the (lack of) correspondence is exactly non-quantitative, as we have seen. The punctum saliens of the comparison is that gestalt rules -- as instances of interface rules -- refer to sequences (utterance units) as wholes, whereas traditional rule types refer to segments or clusters of linearly ordered segments between a pair of boundaries, even if their structural descriptions involve boundary features themselves as well.

These considerations lead to the conclusion in T(xiv) in a straightforward manner:

T(xiv) Gestalt rules (i) represent an independent category of rules; (ii) cover a set of phenomena exhibiting higher variability; and consequently, (iii) the typology of phonetic/phonological/morpholexemic rules can, to a significant extent, be logically subordinated to them.

2.2.2. The architectonics of phonological representation

In the previous section (2.2.1) we attributed vertical stratification to phonological representation in the broadest sense, claiming further that each layer has an associated category of rules: the abstract general stratum has lexemic--morphosyntactic rules, lower-level phonological representation (abstract individual) has phonological rules, the concrete general level of realizations has accommodation rules, and finally the stratum of individual realizations has all the gestalt rules associated with it. Furthermore, we claimed that rules of the various categories may be partly identical in content but definitely distinct in scope (of application). Thus, at the morphosyntactic level of root morphemes, the architectonics is influenced by syllable structure constraints (rules constraining the number of onset segments and the sonority pattern of maximal onsets), and rules of a similar content govern syllable structure modifications (resyllabifications) in distorted, concrete-individual realizations as well. However, even if rules of similar structural descriptions state similar tendencies in the two cases, such as N(labial) $\rightarrow$ N(dentialveolar) / ___ + C(dentialveolar, stop) occurring both in morpholexemic correspondences (as in ront 'damage' vs. rombol 'destroy',

cf. TESz III, 438) and in realizational patterns (as in [sɛ̃ⁿtɛlɛ̃ɲkɛdix] ← szemtelenkedik), they do not operate on sets of identical size and composition. (The m of teremt 'create' as a root morpheme retains its bilabiality, whereas in allegro m → n / ___ t can apply anywhere, as is also historically attested in terëntëtte 'He created', see TESz III, 897.) The straightforward explanation is that two rules of the same structural description but located at distinct levels constitute elementary points of two different networks of rules whose application or non-application is determined by distinct precedence principles in any given case. Since a mapping relation between corresponding units of the various levels of phonological representation is nevertheless maintained, the differences in rule systems must not exclude compatibility between those units. Proceeding from abstract general towards concrete individual, each pair of units remains compatible: throughout the derivation, compatibility is transitive. Irrespective of the causes of disparity between rule systems, phonological considerations also support the methodological conclusion that next-to-phonetic phonemic representation must be accounted for in an autonomous manner, detached from its equivalent of a 'higher' level of abstraction. The present section discusses next-to-phonetic complex phonological representations in these terms.

2.2.2.1. The matrix of phonological representation

In view of the principle of inter-level compatibility, it is possible to construct, in a general form, a model of phonological representation that simultaneously includes the two medial strata: the corresponding levels of abstract individual and concrete general sequences. This move is completely justified. For everyday communication, these two levels have a central role, especially in terms of their interrelatedness. (The more abstract component is not, or not necessarily, accessible for the speaker; the same applies to concrete individual forms that neither speakers nor listeners recognize as they are. The representation //la:t-/+/j/+/{a ɛ}// [for lássa 'he should see'] can be made conscious or recognized [it is 'vorbewusst' but not conscious in the normal case], similarly for valami ilyesmi → [vɔ̃mĩjɛʃmɪ] 'something like that' (IV/167), except that in the latter case speakers tend to be more reluctant to admit that they ever use such forms.)

The model of representation that we propose is, then, directly accessible and is most fully implemented in word forms pronounced in isolation, al-

though the two are obviously not identical. Word forms embedded in larger utterances exhibit regular variabilities that are characteristic of those larger units and do not influence the self-identity of the word forms. Accordingly, they are obviously to be separated from the abstract pattern of the latter. The first step in defining the matrix of phonological representation is the exclusion of such redundancies.

(i) The general phonological approach to the 'orchestration' of word form sized units has been essentially unchanged for at least half a century. Within Hungarian tradition, the three dimensions of what Laziczius (1944) referred to as 'sound properties': duration, pitch, and intensity, have only changed their notional content in that, as it turned out, none of them is responsible for a particular linguistic role in itself. In fact, as Fónagy (1963) pointed out -- as it happens, in his Epilogue to the new edition of Laziczius' monograph --, their implementations are mutually overlapping. In the domain of phonology, the three dimensions of implementation are mapped into discrete planes of a linguistic--phonological nature. In Dogil's (1988, 138) formulation, these are:

-- the plane of 'prominence (rhythmic) features', out of which rhythmic structure is built;

-- the plane of 'tonal features', containing the components of melodic patterns; and

-- the plane of 'segmental features', with the components of segmental structure.

Any word form realized in isolation will necessarily include some given value of each of the three phonetic dimensions. On the contrary, phonological representation as an abstract object will only assume some value of these phonological planes if it has a distinctive role, in the sense of Saussurean '<u>différence</u>'. Hence, in Hungarian, it will always include values from the segmental plane but never from the other two since the latter do not differentiate units between word boundaries. Thus, all tonality and prominence components included in a realized word form will be neutral with respect to phonological representation. The conclusion that follows for our algorithm is this:

L(xxx/a) Isolated word forms are restricted to normal values of tonality and prominence factors in Hungarian.

L(xxx/b) Phonological representations of Hungarian words do not include tonality and prominence features.

(ii) On the basis of the consideration in the previous paragraph, next-to-phonetic phonological representation as a general abstract object will be a matrix whose rows are filled in with a set ($n \geq 1$) of elementary components (phonemes and boundary markers) and whose columns are filled in with articulatory--acoustic correlates of those components or, as formulated by Gibbon and Richter (1984, esp. 6), with results of operations over adjacent 'temporal sampling points'. (The authors cited do not define those points in terms of phonemic units; but this is, at least initially, unavoidable if we keep the correspondence between the two adjacent levels in mind.) In this notional framework, the general form of the matrix can be given as follows.

L(xxxi) The general form of a PR matrix, first approximation

f_0	f_1	f_2	...	f_n	f_{n+1}
AO_1	$A1_1$	$A2_1$	...	AN_1	$AN+1_1$
AO_2	$A1_2$	$A2_2$	...	AN_2	$AN+1_2$
.	.	.	.	.	.
.	.	.	.	.	.
AO_n	$A1_n$	$A2_n$	...	AN_n	$AN+1_n$

where $\underline{f}_0$, $\underline{f}_{n+1}$ = boundary markers, $\underline{f}_1$--$\underline{f}_n$ = phonemes, $\underline{AO}_1$--$\underline{AN}_n$ = correlates of $\underline{f}$'s. (As can be seen immediately, it is only in notation that the formula so far differs from "systematic phonological representation" as posited in Generative Phonology, cf. Szépe 1969, 368.) However, the matrix in this general form is inapplicable to word forms, for the following reasons. (i) Although the manifestations of $\underline{f}_0$ and $\underline{f}_{n+1}$ may be unspecified for $\underline{AO}_1$, $\underline{AO}_2$, ..., $\underline{AO}_n$ and for $\underline{AN+1}_1$, $\underline{AN+1}_2$, ..., $\underline{AN+1}_n$, respectively, i.e. all possible correlates may be missing in terms of articulation, but they may also be filled in with appropriate components (e.g. a glottal stop for vowel-initial words), the $\underline{A}$ slots of phonemes are always filled, in accordance with the principle of full specification (cf. Section 2, introduction, esp. L(viii)). Therefore, the $\underline{A}$'s in slots $\underline{f}_0$ and $\underline{f}_{n+1}$, corresponding to the slants in (ab-

stract individual) /la:ʃɑ/ (lássa 'he should see'), do not constitute a homogeneous set with those of other f's. Thus, the dimension of boundary markers will be differentiated (by parentheses). (ii) If the antecedent of the abstract individual form contained an internal boundary marker (e.g. kapuőr 'gate-keeper' ⟷ //kɑpu/+/ɑ:r//), then a potential (f_i) will be inserted in the appropriate place in the uppermost horizontal row of the matrix that is equivalent, in terms of A values, with f_0. However, in this case, it is (f_i) that has to be parenthesized, not the A values, since whenever f_i is realized, A invariably assumes parameters corresponding to those of f_0. For instance, if //me:s/+/bɐn// → /me:sben/ → [me:zbɐ̃n]~[me·zbɐ̃n] 'in lime' is alternatively realized as [me:s|bɐ̃n·], as it may indeed be the case in fortition, the matrix will only be an adequate representation if its f_3 is followed by an (f_i). (Realizations differ across languages. In French, one type of boundary markers may happen to be realized as a glottal stop (as in les halles 'the halls'), similarly in German (beinhalten 'to contain'); in American English, as a reprogrammed version of the initial element of the second member of the compound (night rate vs. nitrate); in Hungarian it may be represented by 0, and so forth.) (iii) The sequence of phonemic elements does not include any overlap. On the other hand, the network of $A1_{1\text{-}n}$--$AN_{1\text{-}n}$ exhibits overlaps at almost all adjacent positions. For instance, in the /ɐ/ slot of mészben 'in lime', the $A5_4$ value belonging to f_5 will be [nasal], as in the adjacent A column:

f_0	...	f_5[=ɐ],	f_6[=n]
($A0_1$	...	$A5_1$	$A6_1$
.	.	.	. .
.	.	.	. .
		$A5_4$[nas]	$A6_4$[nas]
$A0_k$)	.	.	. .
	.	.	. .

(iv) The parameters $\underline{AI}_i$, $\underline{AI}_j$, ..., $\underline{AI}_n$ assigned to a column $\underline{f}_i$ will not necessarily fill in that column completely. In the example at hand, it may be the case that the component referred to as $\underline{A}_4$ does not extend all the way back to the beginning of its temporal niche. In a realization like [me:zbę̃n] it is possible that only the second part of [ę] will be nasal, whereas one of the articulatory properties identifying the [n] (alveolo-coronal closure) may extend beyond the nasal domain. The latter case may occur, for instance, phrase finally as the nasal resonator is prematurely shut down by the uvula and/or the back part of the velum. Hence, the principle of 'one column--one undivided temporal niche' cannot be maintained; rather, the interval $\underline{I}$ of each column has to be replaced by $\underline{I}_{1--n}$. The above case will be represented in the matrix as follows:

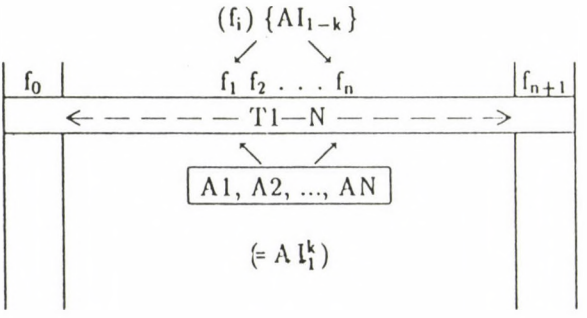
(f_0)	... f_5 [= ę]	f_6 [= n]
T_0	$T5_1$, ..., $T5_{n-1,n}$	$T6_1$, ..., $T6_{n-1,n}$
$A0_1$	... $A5_1$	$A6_1$
.	. . . . .	.
.	. . . . .	.
	- - $A5_4$[nas]	$A6_4$[nas] - -
$A0_n$	. . . . .	.
.	. . . . .	.

The phonological consequences are serious: given that such phenomena do occur, biuniqueness -- i.e. one-one correspondence -- between phonemic units and phonetic units cannot be maintained in a pure form (cf. the definition in 1.3, based on Dressler [1985]). In view of the fact that -- due to their well-known biological, especially innervational, properties (cf. e.g. Sigurd 1968, 1973) -- the coordination of speech organs can only be partial, a phoneme-by-phoneme, unique and discrete separation of $\underline{A}$ properties is theoretically impossible. In phonetic terms: the non-homogeneous set of $\underline{A}$ components includes units of non-identical sizes. This problem, however, does not at all entail the collapse of PR matrices. All speakers will detect a relation of identity between the word form internal phoneme sequence and the totality

of parameters $\underline{A1}_1$--$\underline{AN}_n$. But it is only with respect to word forms as wholes and the corresponding articulatory--acoustic data as totalities that one-one correspondence is actually found. For individual segments, this relation can merely be (some degree of) quasi-identity, i.e. partial correspondence practically taken to be identity. (Cf. further below the discussion of 'diverse degrees of individuality'.) (v) The matrix conspicuously lacks reference to the fact that the saturation of columns with respect to A components is unequal across the positions of the matrix. In an absolute word initial position within a short phrase any vowel (V_i) will exhibit different parameters for the same matrix heading from those in an unstressed final position of a longer phrase. However, as the illustrative example itself shows, such differences are due to factors external to the word form. Therefore, no saturation marker is called for within the matrix. At the concrete general level, a uniform degree of saturation is to be posited for all f positions within a word form, and all divergences will be accounted for by a theorem of 'highlighted positions' (cf. below). (vi) The matrix does not include symbols for syllabification, either. The reason is straightforward: within a domain defined by realized boundary markers, syllable boundaries are predictable -- syllable structure being a specific organization of A components along the horizontal axis of the matrix, both in the phonological and phonetic dimensions of syllables. (In actual fact, obviously, a number of dilemmas arise with respect to individual problems of Hungarian syllabification, cf. Vértes O. 1978, esp. 77ff. These dilemmas, however, either arise "above" the level of PR matrix like the possible alternatives for kalauz 'conductor' vs. kalóz 'pirate', or "below" that level as with occurrences of [ə] after C(:)[stop], e.g. in meg [perfective verbal prefix] → [megə], cf. Vértes O. 1978, 77.) However, PR matrices will contain syllable boundaries in all cases where, in a pair of segmentally identical stems, syllable structure differentiates the categories of words and word constituents, cf. autó 'car' vs. auto- 'self-', where the latter may also be a[ʃ]uto- in lento style. In such cases, ʃ is a special case of f_i(AI) in which no manifest ligature occurs between the A1A2 values of f_1f_2 in the appropriate rows of the matrix; that is, the domains T1 and T2 (of f_1 and f_2) are completely separated by a vertical line for all A components (in the example, no overlap is permitted between parameters of tongue height and labiality). (vii) Tonality and prominence components -- as

theoretically possible A components -- have already been excluded earlier in this section (in paragraph (i)). On the basis of the foregoing, the final form of the general formula of a PR matrix is as given in T(xv).

T(xv) The general form of the PR matrix of words



(Note: the identification of ($\underline{f}_i$) as a set of A components is only formally different from the solution referred to above; arrows point towards possible ($\underline{f}_i$) positions within the PR matrix.)

(iii) The main task of 2.1 was to argue convincingly for the postulation of an abstract elementary unit, the phoneme, as an (epistemologically) necessary prerequisite of the description of word forms. The line of argumentation followed early traditions of phonological theory and ended up with a principle of 'minimal redundancy' for the identification of ontologically well-supported abstract units in a natural manner -- actually following tradition in that respect as well. Accordingly, in this chapter we have defined the Hungarian phonemic system as a minimal inventory which is just as large as to keep each unit distinct from all the others. Although the discussion under 2.1.5 included some reference to identificatory properties of distinctive phonological components, indeed we mentioned the arbitrariness of their phonetic inherencies in some cases (thus, with respect to vowel length, an optional choice between 'short/lax' and 'long/tense', respectively), a phonetic discussion of distinctive criteria could not be undertaken. The particular manner of existence of the entities concerned did actually not allow

for attribution to go beyond a mere denomination of 'distinctive value' even if the denomination of individual attributes unambiguously referred to certain minutiae of phonetic content. Since PR matrix is taken to be non-homogeneous in terms of its ontic structure, some additional effort is needed to define A components of phonological representation in a dimension where they properly belong (as part of a complex structure). This ontological--logical argument can be supplemented with a more practical one: in language -- or rather in the operation of a linguistic system -- the state of pure entropy cannot exist; the formulation of linguistic messages is unthinkable without the use of redundant elements and, to paraphrase Tarnóczy (1990, esp. 39), the role of redundancy in decoding linguistic messages is likewise obvious and significant.

Nevertheless, now that we redefine our inventory (that has enough elements for differentiation but too few for identification) in phonetic terms, we still follow the principle of economy: by excluding contingencies. Individual variables that are scattered in a phonetically broad spectrum cannot belong to the PR matrix since, as was mentioned above, the non-abstract layer of the PR matrix is a general one.

We begin the enumeration of identificational phonetic 'building blocks' with a few preliminary remarks. (i) Since the inventory of segments is quite different across languages, the whole make-up of A components is necessarily language specific. (ii) Phonetic components refer to full realizations of individual phonemes. (iii) Each component constitutes part of intrasegmental structure with at least one further component. (iv) The components will be interpreted mainly in terms of articulatory properties since these are primary and easier to access (than acoustic ones).

The components are as follows:

-- a 'voicing' component with two major identificational values, full voice and a minimum or lack of vocal cord vibration;

-- a 'resonance' component with two values, oral and oral + nasal resonance;

-- 'position of tongue body', with the degrees high, mid, and low/lowest in terms of vertical tongue movement and front and back in terms of horizontal tongue movement, where these positions are taken to be discrete rather than continuous;

-- a 'labiality' component with three degrees: full (labial closure), medium

(simply: 'labial'), and zero (illabial);
-- an 'obstruction' component with the values of closure (stops), frication (fricatives), affrication (affricates), approximation (approximants), and the lack of all these (vowels);
-- a 'medium of obstruction' component in terms of the surfaces participating in obstruction, with the possible values glottal, laryngeal, (medio)-palatodorsal, ..., bilabial;
-- an 'inherent duration' component with three major values: instantaneous ("short"), repetitive, and protracted ("long").
In data descriptions and analyses of Chapter 3, this inventory will be used, following the terminology usual in the literature. (A strict phonetic characterization of these components will not be provided here; these are widely known and the controversial issues -- such as the exact mechanism of glottal voice production -- are almost immaterial for lenition processes. Wherever this is not the case -- as with the interdependence of lenition and fundamental frequency -- a more detailed description will be given.)

It followed from T(xiii) stating the stratificational character of word level phonological representation that the set of interface rules located at the abstract--concrete boundaries between strata must include some levelling rules whose output will be a sequence of programmable patterns for articulation (cf. 2.2.1.3(ii)). Programmability, in the sequence of elements interpreted as a set of operations, involves the definition of a novel phonetic configuration on the basis of a new piece of information changing the previous configuration. (For instance, a rule stating '+round --► -round' can only be conceived of as 'round --► delabialized' at this level of interpretation.) Also, the repetition in $\underline{t}_{i+1}$ of an earlier configuration as realized in $\underline{t}_i$ is not done by stepping back but, rather, by reproducing a configuration that replicates the earlier one in its components but which is created anew on the basis of new information. Therefore, components are necessarily represented in PR by exclusively positive values of elements of each phonetic dimension utilized. Taking the principle of full specification into consideration again, see L(viii), this conclusion is to be extended to all components of all phonemes of all phonological representations -- as stated in the following theorem:

T(xvi) Distinctive--identificative components always have positive val-

ues with respect to phonemes, and hence to all phonemic constituents of PRs.

2.2.2.2. The inhomogeneity of phonological representation

The categorical description of PR has so far referred in a single case to the fact that the matrix is not of a homogeneous composition: in particular, with respect to sequences of elements within phonological constituents. $\underline{f}_0$, $\underline{f}_{n+1}$, as well as $(\underline{f}_i)$, are filled with elements of a virtually different (sub)set of A components, even if it equally holds for $(\underline{A0}_{1--k})$, $(\underline{AN+1}_{1--k})$, and $\underline{AI}_{1--k}$ that their total set is a subset of $\underline{A1--N}_{1--n}$ or, expressed in a simplified form, $\{\underline{A0}_{1--k};\underline{AN+1}_{1--k};\underline{AI}_{1--k}\} \subset \{\underline{A1--N}_{1--n}\}$ (cf. 2.2.2.1(ii)). In a verbal form, this means the following. The indication of (for instance) the beginning of a word -- in addition to $\underline{f}_0 \rightarrow \underline{A0} = 0$ -- can be a glottal stop, hence $\underline{f}_0$ -- $\underline{A0} = \underline{C}_0$ where the medium of obstruction for $\underline{C}_0$ is glottal closure as in [ˈaˑtok] (átok 'curse'), but also -- as in some child language data -- it can be indicated by h-prothesis as well: új cipő 'new shoes' → [hujt͡sipøː], hence $\underline{f}_0 \rightarrow \underline{A0} = \underline{C}_0$ where $\underline{C}_0$ = [h], i.e. a laryngeal approximant. (The term h-prothesis is not quite accurate here. Actually, we have a phonetically motivated alternation between glottal stop and [h], cf. Merlingen 1977, 183--8.) It is needless to add that the inhomogeneity of the phoneme level referred to here is totally different from that criticized above (1.2) with respect to certain phonological frameworks, especially to Natural Generative Phonology.

(i) The real problem of matrix-internal inhomogeneity, however, arises in the area of interdependence between f and A components. The facts, partly referred to earlier, are as follows. (i) The extension of the A components corresponding to the respective phonemes is not equally delimited in terms of T structure. Namely, (some of the) A components, posited by definition in a $\underline{t}_i$ section of T structure, may spread over to the adjacent $\underline{t}_h$ and/or $\underline{t}_j$ sections, e.g. in voice assimilation processes where the 'voice' component spreads from the /b/ column to the appropriate row of the /t/ column in hátból 'from back' → [haˑdboˑl]. (ii) Under strict phonological conditions a compression of (some) A components of certain f's takes place in T structure as in lapptól 'from a Lapp' → [lɑptoˑl]. (iii) Both phenomena can occur simultaneously as in lappból 'from Lappish' → [lɑbːoˑl]. And, finally, at least superficially, (iv) under certain phonological conditions some columns of A components appear to be 'incomplete' in the sense that a given A compo-

nent occurring at the $\underline{f}_{j+1}$ point of phonemic events will be identical to an A component in the same row of $\underline{f}_j$, resulting in an apparent gap with respect to the original phonemic pattern, cf. hadtól 'from the army' → [hɑt:o˙l]. In actual fact, however, what happens here is that the appropriate A component of $\underline{f}_{j+1}$ ('voicing') is pre-programmed and appears in row $\underline{A}_j$ of the $\underline{f}_j$ slot, in the sense of T(xvi). That is, (iv) amounts to the same case as (i). Similar interpretation is available for the 'override' in the program of an articulatory event that could potentially fill an independent temporal niche as in nem merem 'I don't dare' → [nęm⁺męręm] where the final part of $[m]_1$ is overriden by the manifestation of the (pre)programmed bilabial closure of $[m]_2$.

The foregoing lead to the conclusion that a full, mutually unique mapping relation between a category f and its A components is only possible in cases where the word form consists of a single phoneme and is an independent phonological phrase that constitutes an utterance in itself, as in Ő. 'He (is)' → $[[\#\phi\text{:}\#]]_P$. Strictly speaking, no other case meets the criterion of one-one correspondence [biuniqueness].

As can be seen, the problem shows a quite different face here from that traditionally discussed in phonetics. For a right-minded phonetician, this is simply a matter of interaction between adjacent segments in a word form, traditionally accounted for in the discipline -- initially restricted to articulary factors -- by the notion of 'coarticulation'. This view is represented by Ladefoged's definition. Ladefoged (1967, 63) claims that coarticulation is "partial overlapping of adjacent phonemes" creating intrinsic allophones among the realizations of a phoneme. This is a physicalist view, a rather unsophisticated and eventually untenable way of handling the problem. Phoneticians had to realize very soon that coarticulation cannot be properly accounted for within the notional space of sterile physicalism and attempted another interpretation rooted in mentalism. In the latter view, coarticulation -- hence also correspondences between entities located along perpendicular axes of the matrix -- can only be described in a satisfactory manner if we do that in terms of a general opposition, that of 'type' vs. 'token'. Without assuming that the elements participating in coarticulation are mentally given in advance, the phenomenon of anticipation cannot be accounted for (cf. Hammarberg 1982, 125). If, at the basic level of speech production,

the articulation of a unit embedded in the successive order within a segmental string is influenced by that of a forthcoming unit that, however, cannot be physically present at the given point, as in the [k̟] of can → [k̟ʰæn] exhibiting the influence of the subsequent front vowel, this can only be due to a specific 'presence' of a non-physically existent unit. If both perception and interpretation are categorical, we cannot help positing 'type' as a specific entity (cf. Hammarberg 1982, 136). However, there are other problems with mentalism. This train of thought makes us unable to tell assimilation products from allophones. If both are taken to be members of the same mental category, as follows from mentalism, we involuntarily gloss over the critical difference between (phonological) regularities like vowel harmony and the physiological necessity of assimilatory effects that are due to coarticulation (cf. Fowler 1983, 314). The new approach departs from the fact -- revealed by experimental studies of the perception of coarticulation -- that listeners invariably take the coarticulatory modification to be part of the modifier, not the unit that undergoes modification. Thus the fronting of [k̟] in can is recognized as an identifying feature of the forthcoming vowel; the supplementary information is ascribed, as it were, to [æ] (see Fowler 1983, 319). Thus, actual changes in physical components are interpreted on the basis of mental units. In other words, physical and mental factors both contribute to the phenomenon. Within phonetics, as we can see, the problem is solved via a Hegelian mechanism of thesis, antithesis, and synthesis.

With respect to coarticulation in a phonological perspective, however, we have to differentiate individual f's in the PR matrix such that not all of them are represented by equally homogeneous subsets of A components in the appropriate column of the matrix. The A columns whose individual (A,I) sectors contain several values coming from other columns, are less suitable for the identification of the corresponding phoneme than columns in which such borrowed values occur in a smaller number or not at all. Accepting the experimentally supported observational fact, cited above, that supplementary information coming from coarticulation is invariably attributed to the modifying unit, then it automatically follows that any (A,I) matrix points that are filled by alien vectors necessarily weaken the self-identity of the phoneme concerned. This observation will be called the theorem of 'diverse degrees of identity', formulated as follows:

T(xvii) Phonemic units making up a word form are represented in the PR matrix with diverse degrees of identity.

The significance of T(xvii) for the analysis of lenition processes lies in the fact that it helps us formulate the generalization that lenition as a kind of distortion phenomena always entails a lesser identifiability of the linguistic sign concerned.

(ii) The foregoing might tempt us to conclude that the areas of the matrix identified by the position coordinates (A,f) are distributed with respect to I such that somewhere in the middle A factors accumulate at distinguished points of wave profiles in the flow of articulation, thus constituting singular points at which the phoneme concerned is represented in a pure form. The acoustic pattern indeed shows something of the sort. But -- as we know -- human perception of an acoustic signal does not arrange information according to the visual topography of a spectrogram but rather assigns transitions to the modifying unit. Therefore, the roughly mirror-image signals become asymmetrical. Secondly, it is a fairly common phenomenon in a matrix affected by gestalt rules belonging to the phonological representation that homogeneous A components can be found in two adjacent columns, f_i and f_j. These components hold on throughout the time span t_i, t_j of the two phonemes or at least a significant part of it (as was the case with the example nem merem 'I do not dare'). What is more, similar things may happen to two adjacent but non-identical phonemes (cf. the intervocalic cluster in e.g. honvéd 'soldier'). The distinction between such monophonic and polyphonic portions as phoneme realizations is thus better characterized as stronger vs. weaker identity of phonemic components and fuller vs. less full distinctness -- or, as it is called in theoretical physics (cf. Schrödinger 1946--47/1962) the degree of individuality -- of their representations. In reality, the production of a linguistic sequence is also based on differences in this sense as certain elements of the matrix are 'highlighted' with respect to the others.

'Highlighting' is a metaphor here which is not restricted to phonetic aspects. A well-defined group of exceptions to vowel harmony shows that such highlightedness is not confined either to extralinguistic or suprasegmental factors. Proper names that originate in, or correspond to, a common noun, fail to undergo most common phonological rules involving their common-noun equivalents: e.g. the alternant bokro- of bokor 'shrub' is eliminated where

the root is used as a family name (cf. Szende 1976b). Apparently, certain vowel harmony phenomena can also be interpreted in these terms. To introduce this digression, recall that a constant neuralgic point of the relevant literature, quoted earlier, is the issue of 'exceptions'. One set of these used to contain high back unrounded vowels (ír 'write', Csík 'geographical name' [homonymous with csík 'stripe'], etc.). Their back-harmonic behaviour can therefore be historically explained although such an explanation is only acceptable as specifying the origin of the phenomenon. As a synchronic rule of phonology, however, it is not applicable -- or only at the price of a 'false step'. Originally front-harmonic roots that have subsequently turned back-harmonic (e.g. sír 'grave') remain unexplainable even on historical grounds. The back-harmonic behaviour of words like gründol 'found (a firm)' from German gründen 'id.' is also a puzzle in this perspective. Further items whose harmonic vacillation can be said to be irregular, like fotel 'armchair' or farmer 'blue jeans', and which are claimed by Kontra and Ringen to prefer back vs. front-harmonic suffixation depending on the harmonic setting they occur in (cf. Kontra--Ringen 1987, Ringen--Kontra 1989), resist all attempts at a phonological explanation. On the analogy of proper name/common noun homonyms (cf. sík 'flat', back-harmonic vs. Sík 'family name', front harmonic) it is possible that such types of exceptions can be explained by the 'quotation mark effect': language users will remove such roots from their lexically natural categories and signal their specific origin or meaning by disharmonic suffixation. Vacillating stems would occupy an in-between position in this respect. Such rationalization intended to go beyond mere phonological facts could only be taken seriously, however, if an undoubtedly 'foreign' nature could be proved for all such items, or else that there is some sharp meaning component to set them apart (for sír 'grave', this would be the sacral character of its reference to death). On this point, it is advisable to return to firm phonological ground.

The phonological property corresponding to highlighting is 'prominence' -- a term that collectively refers to marked values of suprasegmental factors in the text (cf. Lehiste 1970, 2; Hyman 1975, 203). Prominence peaks of a word form cannot be predicted by exclusively grammatical or, in general, by communicative factors. Their primary task, however, is exactly to implement such properties (cf. the role of Nuclear Stress Rule in English com-

pounds or that of stress in Hungarian in the differentiation between adjective + noun phrases and compounds of an identical composition). On the other hand, in a number of cases they have only what is called a communicative role, such as contrastive emphasis on a larger textual unit -- aptly termed 'phrase level stress' by Wacha (1980) -- as well as cases of fortition in everyday speech implemented by lengthening. In terms of phonetic implementation, the main difference lies in the fact that grammatical/identificatory prominence has to rely on pre-determined combinations of patterns (e.g. certain melody patterns -- especially some of the rising tunes -- can only cooccur with certain stress patterns, cf. Varga 1989, esp. 67--72), whereas prominence used with a communicative function is less limited in implementation, in some cases totally unlimited (like 'phrase level stress' that can occur in the form of increased intensity with any of the melody patterns). Finally, prominence has a variety that has no linguistic or communicative role whatsoever: it is simply due to the physiological mechanism of speech production, in particular, the pulsing distribution of intensity over a sequence of syllables. The latter, possibly the most ancient type in a phylogenetic sense, results in even-numbered syllables of the sequence being uttered with lesser intensity (cf. Lehiste 1970, 163; for a general discussion see Allen 1973, 38ff). The hierarchy of these three kinds of prominence is as follows. The last type is completely overridden by grammatical prominence: boundary markers may eliminate regular pulsation (cf. Szende 1976a, 155). On the other hand, wherever communicative emphasis clashes with grammatically determined prominence, the latter will give in.

In a strictly phonetic sense, highlighting in a word form may be embodied in two major factors. (i) In the phonotactic structure of a word form, a striking property of 'token' distributions is that the entropy of initial or final phoneme combinations is less than that of medial combinations. Hence, a syncope-like alternation of 'bound--free--bound' shows up in the sequence of elements making up a word form (cf. Szende 1973, 46; 1976a, 154). Statistical surveys of the root inventory have given similar results. A study by Hell (1983, 70--76, esp. 75) revealed that possible initial and final consonant clusters come in 112 types, whereas the total number of medial types is 228, more than twice as much as in the other two positions. Irrespective of

the reasons for such asymmetry, these data imply that the extreme positions with their more redundant distribution (more limited variability) are also more stable, especially for perception. They play a distinguished role in processing data during communication. (ii) Within word boundaries, the real domain of prominence is the syllable. Both stress and (linguistically relevant) intonation patterns are produced over syllables, or rather over units of word-internal continuous voiced portions as split up by syllable boundaries. (For the role syllables play in constituting the suprasegmental system see also the critical survey of Autosegmental Phonology in 1.4.) Whereas tonal peaks are dominantly implemented by increased fundamental frequency, and the structure of A components in the vowel or syllable nucleus carrying that peak is altered at most by optional concomitant lengthening, i.e. in a secondary manner, the nucleus of a stress-bearing syllable will invariably contain reinforced realizations of A components. (The issue of how stress is realized is a well understood chapter of Hungarian phonology. Suffice it to refer to Iván Fónagy's studies. On the other hand, the occurrence of reinforced articulatory patterns can also be documented in other areas of phonetic properties, such as in lip articulation, cf. Szende 1969, esp. 373. Given that in the present context we are focussing on macrostructural aspects of the word form as a dynamic structure, issues pertaining to either the definition of syllables or details of phonetic implementation, however intriguing they might be, will be ignored here.) On the basis of the foregoing, and bearing the fundamental phonotactic regularity of Hungarian stress in mind, we can state the following theorem.

T(xviii) Phonological representation is a structurally non-homogeneous network of components in which syllable-size morpheme initial sequences are relatively prominent.

(Note: T(xviii) is based on the premise that phonological representations do have syllable structure. This is not in contradiction with our earlier claim in 2.2.2.1 that PR matrices do not include syllable boundary markers. Recall that the lack of these markers only reflects the fact that their overt specification would be redundant.)

2.2.2.3. The principle of 'global programming'

Given our theorems concerning the 'diverse degrees of identity/individuality' and 'highlighted positions', the question arises whether the factors

disrupting the homogeneity of phonological representation (noted in 2.2.2.2 (i--ii)) do not indeed result in a complete disorganization of PR's. In other words: can we find any criteria that still make it possible to maintain the notion of PR matrix as a unitary object? (That is, any criteria beyond a few very general observations like (i) prominence peaks are located at lexically-determined phonotactic positions or (ii) phonetic properties implementing prominence can only occur once in an isolated word form.) The organizing principle that maintains the integrity of phonological representation is inherent in the notion of 'global programming'. In addition, 'global programming' may cover lenition phenomena whose occurrence requires the two extreme columns of a PR matrix, $\underline{f}_0$ and $\underline{f}_{n+1}$, to be eliminated in a sequence of several word forms. (An instance of this type is the case where an adverb in unstressed position drops its original harmonic quality, cf. further below.)

The term 'global programming', in a strict sense, is a metaphorical expression of the idea that the components between extreme boundary markers of a word form (or a sequence of word forms, in a somewhat looser sense) in a PR matrix are contained in a network of mutual dependencies. In this respect the direct results of our investigations (notably, in a pure form, sequence size truncation), the data gained from a comparison with equivalent normative forms as in lento style, as well as results of other disciplines that are in overlap with phonology concerning these issues, collectively reveal the following facts. (The preliminary claims put forward as premises will, as before, be presented as lemmas.)

L(xxxii) A phonological representation is a structure bounded by word boundary markers (at $\underline{f}_0$ and $\underline{f}_{n+1}$). This means that there are postlexical accommodation rules that, in normative lento speech production, apply word internally but not across a word boundary. For instance, -n, -t, -l are commonly palatalized by a following -j(-) if what is between them is a morpheme boundary: ($\underline{f}_i$). But if the input segment is separated from the trigger by a word boundary, palatalization fails to apply in the first cycle. Thus: bánja 'he regrets it' → [ba·ɲ:ɑ], látja 'he sees it' → [la·c:ɑ], bálja 'his ball' → [ba·j:ɑ] but also [ba·ljɑ]; in contradistinction to cases like Az utcá[nʲʲj]árkál 'She walks in the street', hato[tʲʲj]avít 'he corrects six (of them)', balla[lʲʲj]átszik 'he plays with left (hand)', etc. The proviso 'in the first cycle' refers to the rather complex restriction that the rule

fails to apply until the full construction (usually, a phrase) within which word forms are separated by word boundaries enters a new cycle of rule application in which case an interface rule eliminates word boundaries (and thus opens the way for lenition processes to apply). It is only in this way, for instance, that vowel harmony can be triggered by a subsequent word form within the phrase as in sample III/369 (I: + Szóval ők 'So it was them'). Here, a monosyllabic truncated version of bisyllabic szóval 'so' appears as a diphthong with a front offglide, even though the original PR was back-harmonic.

Another across-word-boundary phrase-level articulatory organizing principle is found in Italian: the reduction of a stressed vowel, if at all, occurs in phrase-final position, whereas word finally it does not (cf. Farnetani--Vayra 1991, esp. 15). Note that at the other end of the communicative chain, in perception, an exact mirror image of this integrative principle, known as 'top-down' identification, helps decode -- especially fragmentary -- acoustic information on the basis of word size patterns (cf. e.g. Repp 1987, esp. 29).

However, the characterization of the situation as above can easily give rise to misunderstandings. The phenomena referred to are merely typical instances of a central character. In reality, the occurrence and phonetic form (full or partial application) of accommodations of the above type are determined by internal dominance relations of simultaneously triggered rules. The source of error of rigid and theoretically unsophisticated solutions is usually found at this point. What is ignored in such solutions is that articulatory events result from the interaction of a number of simultaneously applicable rules of varying degrees of strength. Nádasdy and Siptár (1987), in trying to account for the fate of l + j clusters (cf. angol[lj]áték and angol[j:]áték 'English game'), appear to recognize the particular articulatory components involved as the factor responsible for accommodation in a phonological position where n+j clusters refuse to undergo it. Vogel and Kenesei (cf. Vogel 1990, Vogel--Kenesei 1987) claim that the alternative outputs for l+j are due to a lower or higher degree of integration within phrase structure. The real situation is as follows. (i) In fortition, [lʲ~ʎ] remains as it is. (ii) If all factors inducing accommodation (a high degree of integration within the phrase, a sequence of similar or identical articulatory

factors in the cluster, a sudden speeding-up of speech production, etc.) work in a conspiracy, [j:] is pronounced. (iii) In case of a conflict, the actual dominance relations will decide in favour of one solution over another, or rather with respect to the degree of accommodation. (Some major phonetic details of these issues will be discussed in 3.4.1, the section on reduction.)

L(xxxiii) The set of elements in a phonological representation (hence, in a word form) is an ordered set. (i) The number of elements permitted to occur between a pair of word boundaries is limited (with respect to Hungarian, cf. e.g. Szende 1976a, 159). On the other hand, the size of a phrase or an utterance in terms of number of concatenated elements is only practically limited, in principle it is not. (ii) The choice of the order of elements is primarily determined by phonotactic constraints defined by syllable structure: in terms of the general rule of syllable structure and in terms of the rule of possible sequences of elements within a syllable. (The first rule is well known, whereas segment sequence constraints for Hungarian are a rather unelaborated chapter of Hungarian phonology, though cf. Siptár 1980, Kassai 1981, Hell 1987, Törkenczy 1987.) (iii) Phonological representations are characterized by 'supersegmental' ordering constraints. The most widespread of these is vowel harmony. (As it was revealed by earlier references, vowel harmony was an extremely popular issue in phonology in the eighties. A general reference is therefore sufficient here: with respect to the classification, grading, and a geographical survey of vowel harmony constraints in the languages concerned cf. the summary sketch in Wiik 1988.)

L(xxxiv) Except for lento--normative utterances, the PR matrix (as a bounded structure of ordered elements) surfaces with structural distortions of definite types. Distortions 'in the first cycle' apply within the bounds of a PR matrix, keeping the original vocal pattern (or, to use a German term introduced into English discourse by Schnitzler 1972, the Schallgestalt) of the word form. (For the interpretation of 'in the first cycle', cf. the discussion under L(xxxii).) The validity of this lemma can be documented in a number of areas.

(i) In slips of the tongue where a distorted form surfaces -- as in contaminations or spoonerisms -- the output remains bounded and ordered but, compared to the initial PR, will involve losses in either the number of ele-

ments or in their degree of being ordered. Such losses are obviously kept within certain limits -- for example, syllable structure will remain regular (cf. Shattuck-Hufnagel 1986, esp. 133) -- but they are nevertheless grave. (Slips of the tongue are considered here in terms of 'stochaistic causality' as formulated in the late nineteenth century, cf. Meringer--Mayer 1895, Meringer 1908, where only surface observables are noted and explained at the level of sequences of elementary units. Thus, we will exclude the dimension of content-bound causality in which Freud [1904/1958] considered linguistic errors in terms of his category of Fehlhandlungen since the latter are supposed to take place where 'syntactic and lexical operations are conducted' (Boomer--Laver 1968/1973, 130). The difference between the two approaches is therefore an important one. The latter, dynamic approach makes the psychological background of errors actually explorable. In the infinitive of Darf ich Sie begleitigen? 'May I escort/offend you?' in which begleiten 'escort' and beleidigen 'offend' are contaminated [as in the Hungarian 'translation' Hazakísérthetem? 'May I tempt you home?' where the contaminated elements are kísér 'escort' and kísért 'tempt'] we find a giveaway lexical error which, however, is not distorted either phonologically or phonotactically, it merely refers simultaneously to two verb stems; on the other hand, stochaistic errors refer to only one -- but erroneously. In an explication of 'global programming' it is only the latter type that is interesting.)

In terms of Laver's (1969/1973, 135) explanation, the phenomenon is due to an incomplete 'neurolinguistic program-planning'. Thus, the contamination slightest x least = sleast in the phrase didn't bother me in the sleast can be attributed to the omission of the last binary decision in the set of lexical choices needed for that phrase; that is, to the fact that program-planning was one step less accurate than would have been necessary. In the type of cases at hand, then, the program can only result in a partly well-formed word form since, on the one hand, it retains the generally correct outlines of the word form but, on the other, involves the lexically specified full structure in a coarser approximation, in accordance with its 'global' character. The similarly less fine-grained (or more global) program responsible for spoonerisms gives the same result, except that the number of elements is retained but in highlighted positions of the members of the construction the degree of ordering does not reach the normative level. The situation is even

more obvious if a non-initial element erroneously copies a word initial segment as in al[ʃ]o share, cf. Fromkin (1971/1973, 218). In these position-independent copying cases the responsibility of defective programming is quite transparent. The mispronounced item -- like [ʃ] for [s] in this example -- is not assigned the appropriate distinctive specification for its articulation subroutine (in the case at hand, [(pre)palatal--dorsal]). Instead, the 'global' program of the whole construction refers to some of the elements to be utilized in a generalized or 'low-resolution' manner. In the example this appears as an underdifferentiated specification of the obstruents, with the highlighted, hence dominant obstruent, [ʃ], appearing in both positions. Therefore, the phenomenon only apparently involves 'copying'. The repetition of elements is superficial, resulting from a simplified planning of implementation, the 'global' character of programming.

(ii) Phonological observations concerning first language acquisition offer similar conclusions. Children's 'sound substitutions' commonly result in a restricted inventory of phonemes, relative to the full system. However, where two or more units apparently collapse in the same segment, the latter actually covers two (or more) significantly different classes of representations. Inasmuch as the distinction is present in the phonemic row of the PR matrix, the quasi-identical representation of a pair of phonemes may signal some difference in another primary feature. (According to Gósy's [1984, 23] subtle observation, /y ø/ → [u o] outputs exhibit clear durational surplus over /u o/ → [u o] outputs. In other cases the acoustic pattern reveals no distinction among realizations, even though the child demonstrably does make a difference among /j/, /l/, and /r/ while pronouncing them all as [j], cf. Asztalos--Szende 1975.) With respect to the issue of 'global programming' as a principle of sequence organization, however, it is not the phoneme inventory in itself but rather the child's primitive organizational patterns that are of primary interest. For the child, a word form as a whole is defined in terms of its 'ambient' phonological representation. He can depart from that model in various ways and degrees during language acquisition The differences primarily consist in a (possibly quite drastic) reduction of his phonetic inventory (or both his phonetic and phonological inventories). The relation between those two inventories gives various types of 'misarticulation systems' (cf. Dinnsen--Elbert--Weismer 1981). However, the point is

that, even in a type where the strongest simplificatory constraints apply in both components, the child consistently retains the structural frame of the word form. On the other hand, although he preserves the number of syllables on a subliminal level, as the authors point out (ibid. 85), he may collapse the second and third open syllables in a diphthong but give an accurate rendering of the first syllable. He likewise preserves the distinction between vowels and consonants as an opposition in terms of major classificatory features, as well as the front/back contrast in vowels (as in [dai̯] ← doggy, [ʌmbʌi̯] ← somebody, [wio̯] ← little. Ingram (1974) actually claims that children's restricted underlying representations are restricted in the sense that they include elements embodying sonority differences (or, in his terms: 'noise markers') substituted for the elementary constituents of full representations, nevertheless assigning vocalic elements to syllable nuclear positions. Smith's (1973) data also suggest that children's non-explicit word forms are organized in terms of global programs, cf. Wilbur (1981, esp. 411) for an interpretation of those data in the aspects relevant here. Items like squat → [g̈ɔp], twice → [dai̯f], queen → [g̈i:m] unambiguously exhibit the assimilation of the final consonant to /w/ by a rule of consonant harmony -- with a simultaneous deletion of /w/ itself.

An important aspect of these data is that the bilabial component occurs at another point of the sequence, not where it is in the source string. But this is only possible if the program simultaneously excites all articulatory components (i.e. all distinctive features) involved in the word. Wilbur's interpretation suggests a further point as well: the defective ordering of word internal constituents. This points towards the same kind of low resolution in the program as was seen with respect to slips of the tongue. In this way the existence and operation of 'global programming' can be demonstrated in this second area of language use, independent of the former one.

(iii) No data or references were found showing a [ɲ:] result (i.e. one that is obligatory with word internal /nj/) for a subsequence [nʲʲj] either in a lento--normative or in an allegro style. In cases of lenition, even extremely distorted versions retain nasality, naturally spreading on the preceding vowel(s), with occasional recession of the surfaces involved in the approximation gesture and/or a temporal distortion of [j]. This in itself is sufficient proof that a word form is a bounded phonological structure in al-

legro as well (cf. L(xxxii), in accordance with L(v/b, c) and L(vii)). We could, nevertheless, explain this as due to the peculiar phonetic nature of the nasal gesture that is ultimately derivable from the great inertia of the velum and the uvula. The lack of accommodation between obstruents across a word boundary (as opposed to its obligatoriness word internally), however, makes the situation unambiguous. Voice assimilation is an extremely powerful and natural rule of Hungarian. Yet, in a subsequence like [-V(:)t#b-] we find no change or at most incomplete closure, and in [-Ct#$_{\text{b}}$-] we often find t-elision instead (for the latter, cf. Kerek 1977), offering further proof of the fact that lenition processes observe and demonstrate the holistic nature of word forms. (Also, such holistic nature has been recently supported by an investigation exploring the time span needed for the access of a unitary 'image' (le groupe rythmique comme signe structurel de langue) in what is called 'feed-forward', cf. Kojima 1991, esp. 333.) The global realization program of a word form, then -- again in the first cycle -- extends no further than the nearest word boundaries. Of the effects of global programming, external delimitation vs. internal integration and simplification, however, it is the latter type that is dominant in producing lenition processes.

The word-internal effects of global programming are spectacularly demonstrated, in the domain of surface observables, by non-segment-size errors. In terms of an earlier interpretation (cf. Fromkin 1973, esp. 225), slips of the tongue support the claim that distinctive features can also be "correlates of independent performance units". Independent in the sense that they may overarch segment boundaries, i.e. spread in a transsegmental manner. An instance of such transsegmental feature is labiality in the anticipatory error links abbiegen 'turn to the left' → [limb$_{\text{o}}$s'ab:i:g$_{\text{ŋ}}$] (cf. Kettemann 1981, 238), which, as it were, slides onto the peripheral (velar) stop of the preceding syllable. A parallel case is reported by Kettemann (ibid. 242) among perseveratory errors: sing for the man → [sig] ... [mæ$_{\text{ŋ}}$], suggesting that nasality is a transsegmental feature whose domain is not a single segment but a sequence of segments (ibid. 243). But Kettemann's explanation involves the assumption of complex feature copying rules applying in a successive order in both cases, with the following steps for the latter:

UR	/sing/	/mæn/
copying	--	mæng
n-deletion	sig	--
assimilation	--	mæŋg
g-deletion	--	mæŋ
surface	[sig]	[mæŋ] (see ibid. 242).

The principle of 'global programming' offers another explanation. Here also, we start by assuming that all relevant features, including [nas], are excited for the whole duration of the sequence. The corresponding articulatory components are in the program but -- due to some extralinguistic reason -- lack the necessary accuracy of ordering. The program prescribes the locus of that feature in a global or rough manner such that, as the data suggest, all that is specified is that a morpheme boundary must follow. In addition, the program must specify whether the component is adjacent to an articulatorily compatible segment or otherwise (in the above derivation, this is the case in the line 'assimilation: mæŋg'), where accordingly coarticulation or full substitution may take place. On the other hand, in [limbs'ab:i:gŋ] the peripheral (velar) place of articulation of [k] is excluded by the peripheral (labial) place of articulation of [b], hence [k] must disappear from the sequence once the program generalizes the labial component from a strong position (on both sides of a morpheme boundary) to the other position as well. This explanation has the advantage that it does not imply multiple access to identical features, accounting for simultaneous accommodation (like [n] → [m] in links abbiegen) in the same step. On the whole, it meets the descriptive maxim of 'shortest path' better than the other explanation.

The idea of transsegmental features raises a theoretical issue that is crucial for a notional analysis of phonological representation. In particular, the question is whether PR can be segmentally organized at all if its phonological units (the phonemes) cannot be consistently linked up with phonetic segments. In other words: if it is the case that phonetic facts -- as seen e.g. on a spectrogram -- are not 'segmentalized', perhaps an authentic phonological description should not be segmentally organized, either (cf. Griffen 1981, 618--21), or indeed it may have to be nonsegmental (cf. Mohanan 1986, esp. 166). This idea, however, is based on a misunderstanding. If

we accept the claims that word forms are made up by phonemes and that PR matrices contain phonemic constituents whose predicates are A components (cf. 2.2.2.1(ii), L(xxxi), T(xv)), segmental organization as a property of phonological representation must be maintained. The source of misunderstanding is an unjustified shift of levels. Phonological representation is a category whose abstraction level is different from that of phonetic representation. The latter is indeed of a quasi-segmental nature in that segments blend into one another (are adjoined with no clear segment boundaries between them). Nevertheless, the extent of their explicitness, their degree of individuality/identity, is always arranged around certain maximum values. Their word-internal blendedness only means that the niches of the matrix are opened up to adjacent niches. Instances of that phenomenon can be observed in several types of lenition processes (see chapter 3 for details). Consider two examples here, a frequently occurring case and an extreme one.

In present-day Hungarian allegro speech, syllable elision in content words (i.e. words that are virtual predicates) requires, in addition to certain properties of the larger context and extralinguistic factors, a simultaneous fulfilment of the following conditions: (i) the matrix to undergo syllable elision must include more than two syllables; (ii) the syllable to be elided must repeat one or more distinctive components of the previous or subsequent syllable (this may be a full segment); (iii) the syllable to be elided cannot be in a phonotactically extreme position, i.e. cannot be first or last in the PR matrix; for instance, [va:l:at] ← vállalat '(industrial) company'. According to condition (iii), syllable elision does not apply in highlighted positions. This fact proves that the phenomenon is unseparable from the architectonics of a word form as a whole; another fact that proves this is that syllable elision cannot apply to sequences including an active word boundary, even if they otherwise meet all the above conditions. Hence, the restructuring of a word form will take place strictly within word boundaries, with the fundamental structure of the word form as a whole being maintained. Although they do not strictly belong to the argumentation, two remarks are in order here concerning this phenomenon. (i) The rule of syllable elision is not a synchronic replica of Horger's Law (or 'two-open-syllable tendency', Horger 1911): as its name suggests, the latter requires a sequence of two open syllables (cf. szerelem 'love' → szerelmet 'love-ACC'),

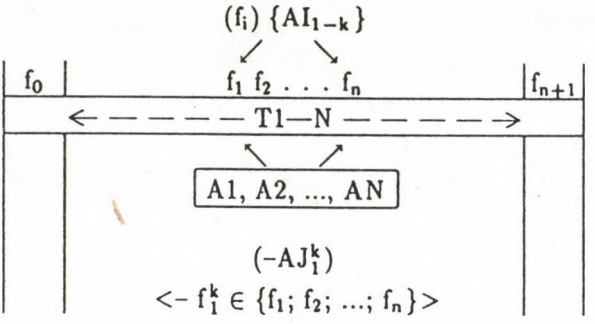
whereas our rule does not require this (it simply prefers cases where this condition is met): szakszervezet 'trade union' → [saksę(·)zęt]. (ii) The rule is not restricted to syllables that contain exclusively voiced constituents, cf. társaság 'company' -- [ta:(r)ʃ(·/:)a:g] (but cf. Kálmán 1988, 10 for a different view).

The extreme case is exemplified in Stampe (1973/1979, 8) by the reduction of I don't know into [ãõr̃õũ̯]. We can add an even more reduced version here: [(')m̩ˈm̩ˈm̩·ˈ], corresponding to Hungarian (non-attested but acceptable) Nem tudom 'id.' → [ˈm̩:ˈm̩ˈm̩·ˈ]. In the latter two forms, the bilabial closure makes it impossible for regular vowel formants to be produced as the formation of oral resonators is inhibited due to the fact that the tongue is not allowed to move freely and the oral resonator remains inactive. All distinctive features of the three vowels therefore disappear from the sequence. What remains, however, maintains the structure as a whole, in a way that no phonotactically impossible clusters arise, and the original number of syllables is preserved as well as, occasionally, even boundary markers (in the Hungarian example, by an extra prominence on the first syllable and a lengthening of the last). The latter is made possible in terms of the physiology of articulation by the fact that the nasal cavity is kept open and the way of the air pulses imitating syllables is not blocked. All that suggests that in the above forms the whole A1--N_{1--n} pattern collapses as it were with the single exception of the nasality component. Therefore distinctive values are largely transposed outside the word form (to context in the broadest sense). The elimination of features entails a wholesale loss of information originally transmitted by the sequence: identification is made possible from outside the sequence only. In the spirit of T(xvii), we could say that extreme distortion may eliminate the identity of all (but one) A-level (concrete general) components of (abstract individual) elements in the phonemic sequence of phonological representation, with the consequence that the original amount of linguistic information is significantly reduced over the given sequence.

In accordance with (i--iii), then, the planning of speech production takes place, in an elementary sense, in terms of an invariant word form -- Hörmann's (1970/1971, 248ff) term is Impulsfigur or Plan, Linell's (1979,48) is (phonetic) plan, Dressler's (1985, passim) corresponding term is frame.

This view completely matches the biological notion with respect to the physiology of articulation that articulatory movements are synergetic, i.e. the production of speech units is based on pre-programmed muscular activity (cf. Craik 1947--48; the same idea was partly expounded in Stetson's [1928] motor theory as well, and has been supported by a number of more recent contributions, including Bergmann's [1987, esp. 106] theorem of word form internal time compression [Isochronie-Tendenz]). In the present study we cannot go into further details in this respect (but cf. 2.2.3). What is important for lenition processes can be summarized like this. Phonological representation as used in natural speech production has been defined by three 'operational attributes' that interfere with the ideal form of a full PR matrix. (i) The columns of A components defined by individual phonemes and collectively making up PR have been claimed to have 'permeable' dividing lines between them; (ii) the relative constancy of forms has been eliminated to a large extent; and (iii) the inventory of A components has been significantly reduced. The last point includes the claim that remaining components of phonetic identifying features do not necessarily fill in the temporal niche assigned to the corresponding phonological unit but may be transposed to those of other phonological units, leaving their own niche empty. This phenomenon will be referred to as 'deletion'. On the other hand, the reduction of components can become complete. In this case, no phonetic traces are found in the temporal niches of adjacent constituents, either. The evident corollary for the word form is that nothing but the overall gestalt shows that the unit was present in the PR matrix in the first place. This is the essence of 'dropping' and 'truncation' (see 3.4.3 for details).

(iv) Two types of summary are possible here, an algebraic display and formulation in a theorem. The first of these is based on T(xv) and presents the PR matrix in a context $U_i[[P_1, P_2, \ldots, P_k\ [W_1, W_2, \ldots, W_n], \ldots, P_n]]$ -- where U = utterance, P = phrase, W = word form -- as follows:



(Note: the expression in ⟨ ⟩, referring to the elimination of a phoneme -- similarly to the insertion of $\underline{f_i}$ into the matrix --, is a precondition for the conclusive formulation of a PR matrix. If $\underline{f_j}$ disappears from an original matrix, as was exemplified on miért 'why', the PR matrix is reorganized, and turns into a modified PR matrix of a novel morphophonological alternant.)

The verbal summary is the following. The principle of 'global programming' states that

T(xix) a 'global program' (i) operates in the phonological/phonetic organization of a word form in the framework and at the level of sequence size units as wholes (in the first cycle the unit is the word form itself, in the second cycle a sequence of integrated word forms); (ii) results in a decomposition of an abstract general linguistic object serving as a model for -- and contained in -- a word form, i.e. a PR matrix, in natural but partially language specific processes within boundary markers of the word form (or the sequence of word forms); and (iii) reduces the entropy of a word form that is derived from a PR matrix and serves as a unit of communication: an elaborated (fine-grained) program does so to a lesser extent, whereas a rough (or low-resolution) version may do so in a radical manner.

(Note: even a most drastic decomposition of a PR matrix does not automatically result in modification of the phonological formula in the strict sense. Realizations like [me:r] or [mie·] for miért 'why' will only represent inde-

pendent word form alternants (like /me:r/ and /mie:/) under definite morpho-phonological conditions; in particular, having gone through a (phonological) restructuring cycle, cf. 4.11.)

2.2.3. A problem swept under the rug: cortical representation

In the analysis of PR matrix I must omit detailed discussion of an important problem area, that of cortical representation. That topic lies outside the purview of phonetics and phonology; the disciplines whose task it would be to present uncontrovertible information about it, brain physiology and psychology, fail to do so. All I intend to exemplify below is that whatever can be stated with more or less certainty on the basis of recent overviews of the special areas concerned does not contradict the theorems of the present chapter.

Within the stratal organization of mental functions, speech activity -- like all symbolic activities -- is stratified with respect to cortical representations and control operations. The strata concerned are those of sensory input (sensation), percepts (perception), and notions (thinking) on the one hand, and thinking, motor commands, and motor coordination on the other. Linguistic signs and processes are still considered to be best described, in terms of the functional hierarchy of the operation of language, by the model first proposed by Wernicke (1894/1906). In essence (as well as with respect to the details) psycholinguistics also traditionally accepts this three-step mediation model (as opposed to the behaviourist view) as one that confirms the authenticity of gestalt theories exactly 'in the realm of perceptual organization' (cf. e.g. Osgood 1963/1980, esp. 146). In Wernicke's model, the levels wedged in between sensorium and cognitive representation are a bilaterally-connected "representation of specific gestalt elements" and, on the speech production side, a "representation of motor commands (concepts of movements)" (cf. Creutzfeldt 1987, 5). However, the available explanations of cortical processes -- like the handling of symbolic components (including linguistic signs), in particular, their concatenation, ordering, and blocking -- are nothing more than sets of mere hypotheses.

In general, brain physiological theories of mental activity appear to agree only in that all of them assume the complex and holistic character of mental events on the basis of cortical and cerebral physiological processes. The linguistic study of aphasia also seems to support that point. As Fromkin

(1991, 139--40) put it, "the speaker must first, prior to articulatory processes, generate a string of phonological units, properly inflected according to phrase structures determined by the grammar, which string is then mapped onto the proper motor commands to move the articulators to produce sounds" [italics added]. In terms of the most recent view I am aware of, the most important sites of cortical processes are presynaptic vesicular grids, located at the ends of axons of neurons, in which -- due to some presynaptic stimulus -- a set of ever changing states of probabilities of arrangement is created by the emission of single vesicles. Mental activity (the working of the mind, the process of thinking) takes place in the modification of such probabilities (cf. Eccles 1987, esp. 53--7).

A linguist should obviously refrain from engaging in unfounded speculations about which or what types of "states of probabilities" correspond to individual linguistic signs and what (types of) modifications result from a phonological operation. Two points can, nevertheless, be taken for granted: (i) the necessary presence of given organizational patterns (or gestalts) as operational frames of linguistic units and (ii) the holistic character of dynamic structures (including configurations of linguistic signs); in Szentágothai's (1987, 76--7) words, the "result of the self-organisation of random spontaneous activity in individual neurons".

These two, actually complementary, theorems are sufficiently in keeping with phonological and phonetic observations concerning the character of linguistic signs and the operations performed on (groups of) them, i.e. signal transmission and signal processing. A set of subsegmental components constitutes a unit: an identified segment as a whole; where the segment is a whole in the sense that ordered analog signals are the nodes of a pattern in realization (including acoustic output), collectively making up a gestalt, some components of which may remain undefined. On supraphonemic levels of speech, the gestalts of word forms, phrases, as well as -- with some constraints -- whole utterances also permit diversity among their own elementary constituents. However, the hierarchical architectonics of constituents of various sizes does not reveal itself in such a sterile form in speech communication. In terms of the principle of 'global programming' (cf. 2.2.2.3 again), some subordinate gestalts may be completely destroyed (e.g. the segmental gestalt of [t] in the frequently occurring apocope mert 'because' → [mer]), rear-

ranged (e.g. labiality as an 'analog signal' in [[sa 'nɐm:]] ← Szóval nem! 'So you won't'), or -- on the other hand -- they may fill out the gestalt of a higher-order constituent on their own (as in the fortitive single-word response És? 'So what?'). Whichever case obtains, however, holistic character and a structural regularity referred to here by the metaphor of gestalt are invariably present as criteria of the self-identity of units.

3. LENITION PROCESSES

Lenition, as a process, changes the intercategorical identity of the low-level phonological component and the next-to-phonemic phonetic component in the PR matrix into a relation of equivalence including systematically recurring deviations of the latter from the former (as represented by idealized -- systematic phonetic -- forms, cf. chapter 1, introduction). Lenition is exclusively characteristic of spontaneous everyday speech; in declamation or singing, it can only occur in a stylized form with a phonologically restructured PR. Chapter 3 of the present study will discuss lenition in the former, original, sense.

Like 'spontaneous speech', the notion of 'lenition' has not been given a definition of satisfactory profundity as yet. Generally speaking, lenition -- as opposed to fortition -- is a tendency, in phonetic realization, to restrict the amplitude of articulatory movements -- as projected into individual units of a sequence -- at the expense of discrimination among linguistic signs. Formulated in a lemma:

L(xxxv) A lenition process increases the distance between the phonemic plane of a PR and the plane of realizational components across the axis of symmetry between f and A components of phonological representations. If that axis is interpreted as the operator of a mapping relation, lenition reduces the unambiguity of correlation in that mapping to the right of the operator. In a formalized manner, this can be stated as follows: $\underline{f}_{1--n} \dashleftarrow\!\!\rightarrow \underline{A1--N}_{1--n}$. (Note that this is not a matter of decreased iconicity in Dressler's [1984] sense. Iconicity in phonology, if at all, is only applicable with respect to morphophonological alternations.)

A more precise discussion of the idea briefly indicated in L(xxxv) is the first major topic of the present chapter. The second part will present a typology of lenition processes and characterize them primarily in terms of acoustic properties that are specific to each individual type. Lenition processes will be documented and their interrelationship explored. (Their systematic correlations within the network of linguistic devices will, however, constitute the subject-matter of a separate chapter.)

3.1. The delimitation of 'lenition'

In the sense intended here, 'lenition' is derived from the traditional phonetic term 'lenis'. (In current phonological parlance, the term lenition and its verbal form lenite [coined by Stampe 1973/1979] do not appear to be as closely related to their phonetic equivalent, given that for the latter lax is more commonly used. In view of the fact that lenition is essentially a shrinking of articulatory patterns, the traditional terminology appears to be more appropriate.) Nevertheless, lenition is not unrelated to other definitional properties of the process of articulation, either. The most important of these is speech rate; but the interrelation between speech rate and lenition may give rise to some misunderstanding. ("Casual" speech is often perceived by the listener as "fast", cf. 4.2 for details.) Furthermore, lenition is also not unrelated to communicative genres in the broadest sense. In particular, there are genres that almost totally exclude lenition (like slow reading aloud, stage declamation) and others that promote the frequency of occurrence of lenition phenomena (e.g. informal conversation). In accordance with Dressler's (1972, 15--6) usage, the former will be referred to as 'lento', and the latter (in a somewhat generalized sense) as 'allegro'; two terms that come from the area of music (where they originally did not refer directly to tempo). The adjectives 'distinct' vs. 'indistinct' will also be used in a similar sense. (Note that the use of the above terms has been defended against Siptár's [1988b] criticism in Szende 1989.)

The clarification of the notion of 'lenition' requires its delimitation in three particular directions: with respect to phonetic devices reflecting additional semantic content (or attitudinal meaning, to use Uldall's [1960] term), properties of regional standards as pre-programmed in PR, and -- naturally -- fortition, the opposite of lenition.

(i) The various types of distortion of sequences in normal everyday speech production, including lenition, are conceptually distinct from emphasis. The latter is a contentive component of communication (the expression of the relation that actually holds between the speaker and the message, the listener, and/or the communicative situation). On the other hand, lenition belongs to the level of realizations. As distortion in general, lenition involves a content-independent deviation of the whole process of articulation or some part thereof from the conventionalized normative form of phonologic-

al representation, cf. L(xxxv), where content-independence means that lenition is possible irrespective of the actual content of the message. Whether or not lenition applies does not bear on notional/contentive aspects of the utterance (cf. Fónagy 1977, esp. 113--4), although -- obviously -- contentual aspects may motivate distortion parameters (cf. 4.8).

(ii) Distortion in general is distinct from accommodation phenomena as well. (ii/a) Accommodations are pre-programmed in the organization of PR, that is why some of them may be language specific (for instance, in Hungarian -[V]nf[V]- → -[Vm̩·V]-; in German, Polish, or English, a homologous nf subsequence never yields a labiodental nasal in normative utterances; if it occurs, it is only due to lenition). (ii/b) Accommodation rules (cf. Vértes O. 1958, Elekfi 1968 for Hungarian) refer to distinct subsequences of a PR, whereas lenition -- in accordance with the character of 'global programming' (cf. 2.2.2.3) -- applies to the whole of a sequence. (ii/c) Organizational phenomena that belong under some type of distortion in standard speech may be normative accommodation patterns in regional varieties of the same language. In some Transdanubian dialects of Hungarian, stops regularly exhibit a vocalized release in a configuration -VC(:)#, especially phrase finally (cf. 2.2.2.1(iv)); in Standard Hungarian this only happens under fortition. Similarly, voice assimilation that regularly applies across word boundary in the North-West-Transdanubian area, can only apply via lenition in a similar context in standard spontaneous speech.

(iii) The third type of delimitation takes the form of an opposition: that of the two opposite poles of distortion with respect to the normative use of language, lenition and fortition. The dividing line between those two types of distortion is an idealized normative (systematic phonetic) variant of speech production, with respect to which the actual form of articulation is assessed. Idealized speech production is defined by generalization but there are actually realized "ideal" utterances that happen to cover it, no matter which or how many of a given set of realized forms are considered to be exactly normative. In such decisions, practical analysis has to give up uncompromising theoretical rigour and proceed by enlarging the line of normative utterances into a range; given the actually observed distribution of articulatory phenomena, all contingencies falling between some ill-defined limits are ignored and the variation within those limits is taken to be non-

existent. The decision is based on convention. Just like the problem of the 'ideal speaker' with respect to the criticism of transformational generative grammar, the details of the foregoing considerations are not of prime importance for the purposes of the present study. In accordance with my basic assumptions (cf. Szende 1969 and 1976a, 161--72), idealized forms are henceforth treated on a practical and speaker-specific level. In particular, normative versions of the sequences found in the spontaneous material in a distorted form were reconstructed by experiment: the sequences were embedded in test sentences, written on cards, and the speaker was asked to read those cards in a formal recording session. In that way, an 'individual norm' could be established for the speaker.

Distortion, be it fortition or lenition, interpreted as deviation from a norm, may emerge in speech production at individual points of the articulation process, but it can also range over a communicative genre or at least over the articulation of the whole text of a turn (in a dialogue). In certain genres of speech, such as a conference lecture, in certain speech situations, such as spelling a name in a telephone conversation, or on special, essentially semantic levels, such as the metalinguistic use of a linguistic item, speech production can be fortitive on the whole. Similarly, in an informal dialogue the articulation program of the utterance is usually lenited all the way through. The quality of the whole of a speech production in this sense is naturally based on the frequency of the individual distortions defined by the actual genre. To put it simply, "fortitive speech" will have a lot of instances of fortition, and "lenited speech" will abound in lenition phenomena. Yet on the two opposite sides of distortion: any process of fortition or lenition can appear in any genre in order to ensure the possibility of providing contrasts at individual places. For example, the first longer section of the third cycle of the collected material is in general an utterance of "lenited articulation". In spite of this, in the lengthy sample III/99 (M: Azt hiszem, hogy nemcsak... 'I think, not only...') and in the similarly long sample III/101 (M: + mert akkor ugyanott vagyunk. + 'since we are where we were') the speaker -- arguing resolutely -- shifts the global program of her allegro (this is, exceptionally, to be understood as 'fast') articulation to the genre of "fortitive articulation". She refrains from applying lenition rules here and she even avoids t-elision in the sequence Azt

hiszem 'I think' of sample III/99 which is very common in other portions of the material. However, she applies t-elision twice in the word most 'now' when it is in a weak semantic position functioning as a "pleonastic" word. In III/101 we can observe the lenited form mert 'because' → [mẹr] (discussed under morphophonemic alternation in 4.10) exhibiting t-elision in a genre of fortitive articulation, but we can also see secondary fortition in the same word such that the articulation [[mẹrᵊ]] represents a hypercorrect realization of /mẹr/, where the latter is a (morphophonemic) alternant for mert 'because'.

The joint appearance of fortition and lenition, crossing the boundaries of genres, can also be observed within a single word form. In sample IV/530 (Z: 'pontosan azért 'just because of that') the speaker produces fortition on the [[o]] of the first, heavily stressed syllable by increasing the degree of labialization on that vowel (thereby reinforcing the accommodational effect of [[p]] and the labial gesture in subsequent parts of the sequence). At the same time, the [[a]] in the last syllable of the word is reduced and the [[n]] undergoes closure laxing. In sample III/354 (I: + Tehát, mit tudom én 'So, let me say') lenition by coalescence with syllable elision takes place in phrase initial Tehát, but also fortition via schwa-epenthesis, giving the output [['tᵉa:tᵊ]]. Note here the normative representation of [[a·]] which is obviously the phonetic trace of h-deletion. This phenomenon is a clear document of the conceptual dialectics of distortion that fortition plays an indirect role in shaping a given type of lenition.

The actual value of normative pronunciation alternants, as viewed from the two opposite sides of distortion, is context-dependent. In a lento realization, normative portions of sequences distorted by fortition appear to be relatively lenitive. Conversely, in lenited sequences of allegro speech production, the elements unaffected by lenition processes seem to be relatively fortitive. This form of relativity and contrast is so striking that one type of lenition, 'deletion', is exactly told apart from another kind of elision, i.e. 'loss', by assuming the form of hypercorrection.

3.2. Distortion processes in Hungarian casual speech

The definition of spontaneous, unguarded, informal or 'casual' speech will be limited to a handful of restrictive conditions that are important in

the perspective of the present study and that are sufficient to delimit the communicative type of 'casual speech' from other varieties of linguistic behaviour, as follows. (i) The communicative situation is personal, i.e. communication takes place in the simultaneous presence of at least two interlocutors. (ii) The communication is sociocentric and topic-oriented, i.e. its addressee(s) is/are one or more interlocutor(s) (rather than the speaker himself) and it refers to a topic that is taken to be identical for all participants. (iii) The language used is "on familiar terms with the linguistic system": it tends to select morphosyntactically simple, semantically neutral, syntactically unelaborated and, with respect to content organization, redundant patterns. (iv) Casual speech is partially rate-dependent, i.e. it tends to actualize a given amount of phonological information by a smaller number of articulatory movements per time unit (than in non-casual speech). Casual or informal speech is not the same as fast speech. As opposed to formal communicative genres, in casual speech the increase of tempo corresponds to reduction phenomena gaining ground, as has been demonstrated for several languages, cf. Bolozky 1977 for Modern Hebrew, Hasegawa 1979 for Japanese, Zwicky 1972 and Kaisse 1985, 25--34 for English, etc. In phonological terms, the likelihood of occurrence of optional processes and the phonetic naturalness of the occurring processes increases in casual speech (cf. Zwicky 1972, 608). A process of this type is the one (in English) that extends nasality to vowels preceding a nonnasal consonant if there is a nasal consonant elsewhere in the word (cf. Stampe 1973/1979, 64).

Actually, the above list of restrictions does not satisfy the criteria of a logically regular definition. Condition (ii) is not sufficiently exact, and (iv) may easily lead to tautology. It is, however, an open question if a regular definition can be formulated at all. Or rather, whether it is absolutely necessary to give one, in view of the fact that the concept at issue is not an operational term of the discussion of the topic but rather serves a more precise delimitation of the set of phenomena to be explored. Nevertheless, the author's apologies in this respect are no better than those of a schoolboy in dire straits: Kant said it was a scandal of philosophy that it could not give satisfactory proof of the existence of the world, and indeed it cannot; similarly, physics is unable to provide an uncontroversial definition of what matter is; medicine of what health is; information theory

of what information is; psychology of what the soul is; and so forth. Still, each of those disciplines somehow manages to come to grips with its own subject-matter. We can likewise come closer to an understanding of the concept of casual speech by trying to throw light on it via considering distortion phenomena than by giving some strained definition. In particular, we are going to give an overview of the conditions that induce the occurrence of distortion phenomena in spontaneous speech.

(i) The two types of distortion, fortition and lenition -- as was indicated above in 3.1(iii) -- assume their values with respect to each other as opposites in the genre of spontaneous casual speech. The same realization, falling within the range of normativity, may be indexed as 'lenited', 'fortitive', or 'neutral', depending on the overall lenition program of its environment. It is taken to be given that the textual type of a spoken utterance does not make room for an arbitrary degree of distortion. (For example, reading out a text in public, like setting forth a decree via the media of mass communication, minimalizes or excludes the application of lenition processes; on the other hand, in the communicative genre of everyday conversation it is only sporadically that the various types of fortition may occur, since their accumulated occurrence would make the communication unnatural or genre-incompatible.) Beyond their genre-dependence, however, the conditions of occurrence for lenition and fortition are sharply divergent, as follows.

(ii) Since the communicative purpose of applying fortition is invariably to increase the (primarily phonological) transparence of (part of) an utterance by processes "of a dissimilatory nature, called [...] foregrounding/clarification processes" (Dressler 1984, 30), its occurrence is bound to specific points within the utterance. Such specific points may be defined by pragmatic/semantic considerations or by phonological rule: a highly emphatic imperative sentence/clause or a word/syllable bearing contrastive stress on the one hand, and a natural prominence peak of phonological structure on the other. The latter may be a stressed syllable in general or the strong domain of the head of a phrase that cannot be modified by any prosodic transformation (for the latter, cf. Kager--Visch 1988, esp. 42). Fortition can only occur in other parts of the sequence if it simultaneously applies at those specific points. Apart from this, there are no further constraints on fortition.

(iii) As the experimental material shows, a general restriction on the occurrence of lenition processes is that subsequences highlighted by fortition must remain unaffected by them. As has been demonstrated on a number of languages, additional syntactic constraints may also block lenition processes. Thus, in Gilyak, lenition (in the form of assimilation) can only apply to the head of a phrase, provided that it is preceded by another word in the same phrase (cf. Kenstowicz--Kisseberth 1979, 436--7). Certain types of lenition are syntactically determined in English, too. The weak forms of auxiliaries, for instance, are not derived by ordinary phonological rules since there is no [w]-deletion elsewhere in English. Rather, weak forms are due to a sequence of two rules: (a) the cliticization of the auxiliary onto a host and (b) morphophonological alternant selection. For example, in the case of I'd: I would → I+would, followed by the selection of postvocalic +d from among would~+əd~+d. A similar phenomenon can be observed in Modern Greek as well. In a clitic + host combination vowel elision applies: /tu## éxi/ → [túxi] 'he has' but no contraction takes place if neither element is a clitic: /kimísu## ékso/ → *[kimisúkso] 'sleep outside' (cf. Kaisse 1985, 97). Hungarian also exhibits similar contrasts. v-initial case endings assimilate to consonant-final nominal stems as in (láb+val →) lábbal 'with foot', in (lép+vé →) léppé '(turn) into spleen', etc. That is, lenition takes place in a broad sense, but only in structures dating back to pre-Old-Hungarian times. v- in the more recent verbal suffix -va/-ve/-ván/-vén '-ing' resists assimilation in -C+v- sequences (lépve 'stepping', látva 'seeing', etc.), and in morpheme-internal -Cv- there is no assimilation, either (as in lekvár 'jam', probably a seventeenth-century loanword from Slovak, cf. TESz II, 747). Reflexes of historical lenition processes that are part of systematic phonological representation today throw light on the fact that a higher degree of syntactic coherence -- always understood within the same historical period -- induces lenition whereas loose syntactic connection blocks it.

The historical examples above show the general--concrete → individual--abstract range of the PR of word forms. However, similar regularity can be found in the set of individual concrete cases of casual speech, too. In the lenition of valami ilyesmi 'something like this' (in sample IV/167, cf. 2.2.2.1, introduction) we can clearly see the tendency that strong syntactic coherence makes the subordinate constituent vulnerable with respect to leni-

tion. In this example, the construction has two members. One, the predicative ilyesmi 'like this' is the host constituent. The other, the attributive valami 'something' modifies the predicate's reference in a non-specific direction and is attached to the host as a quasi-clitic. Consequently, it is almost inevitably more reduced than the main constituent. The foregoing examples are evidently based on the presupposition that the phonological rules concerned are phonologized reflexes of originally articulatory processes in Gilyak, English, and Hungarian alike. This is beacuse, very similarly to the Aristotelian epistemological principle, Nihil est in historia, quod prius non fuerit in praxi articulationis. This principle is taken to be justified on the basis of theorems deduced from concrete data of individual languages, primarily by Dressler (1972: Allegroregeln rechtfertigen Lentoregeln) and Fónagy (1966, 1975, 1977).

The strength of syntactic cohesion as one prerequisite of the lenition of the subordinate constituent is connected with the hierarchy of semantic roles in the sequence. Constituents of low semantic value are more prone to undergoing lenition and conversely, stronger (more specifically referring) semantic constituents are more resistent. (Some details of this issue will be discussed in 4.8 with respect to discourse modifiers.)

Finally, within certain limits, the occurrence of lenition has phonetic -- promoting or hindering -- conditions as well. (i) One of these is phonotactic position: medial (open) syllables are the most likely lenition sites of a word. On the other hand, (ii) certain A components of a PR matrix are more resistent to lenition than others are. Vowel lenition processes rarely result in a backness shift. (This is physiologically motivated: such shifts would involve moving the whole tongue body whereas tongue height shifts that are more frequent cases of lenition do not. The relative stability of backness is reinforced by a sequence organizational regularity, too. That regularity is vowel harmony which, as Natural Phonology would claim, is itself a historical outcome of the same general principles that motivate lenition in synchronic actualization.) Conversely, the labiality component of vowels is very unstable. For consonants, the gesture of closure is weak in Hungarian. There is also an almost unprecedented case of a component that never undergoes lenition: nasality. Regardless of its position in phonotactic or hierarchical terms, or indeed of other distortions (reduction or even deletion)

applied to the segment carrying the component [+nas], it is nasality alone that is invariably retained in other parts or the whole of the remaining sequence. (A genetic explanation of this phenomenon involves the high degree of inertia, comparatively large mass, and relatively coarse innervation of the uvula and partly of the velum, as well as their location in the vocal tract; the latter in the sense that the force of gravity is conducive to the open position of the choanae.)

The foregoing are summarized in the following theorem:

T(xx) In casual speech (sub)sequences, the occurrence of lenition processes is induced by (i) the communicative genre; (ii) the subordinate or neutralized pragmatic role of a unit; (iii) its relatively low (less specific) semantic value; (iv) its subordinate position in the syntactic construction; (v) the increase of speech rate (measured in terms of the number of phonemic units per unit of time); (vi) a less restricted phonotactic position; and (vii) the phonetic constitution of A components involved.

3.3. The devices of 'fortition'

This study deals with the notion and processes of 'fortition' only inasmuch as it is unavoidable for an unambiguous delimitation of the notion and processes of lenition within the overall category of distortion. The motivation for listing the devices of fortition and illustrating them in a few examples below is that fortition involves the mirror images of lenition processes in a significant number of cases. Given that distortion is the common genus proximum of the two opposite types of processes in casual speech, the notional delimitation of fortition will be the reverse of L(xxxv) (cf. chapter 3, introduction):

L(xxxvi) A fortition process decreases the distance between the phonemic plane of a PR and the plane of realizational components across the axis of symmetry between f and A components of phonological representations in a mapping relation where one-one correspondence between the two sides is maximal. This can be formalized as $\underline{f}_{1--n} \longleftrightarrow \underline{A1--N}_{1--n}$ such that (i) A1--N are fully specified; (ii) A1, A2, ..., AN can be supplemented by redundant components; (iii) $\underline{A1}_{1--n}$, $\underline{A2}_{1--n}$, ..., $\underline{AN}_{1--n}$ can be supplemented by redundant components; and (iv) A0 and AN+1 may be fully specified.

This lemma contains an apparent contradiction in one respect. The main

tendency of fortition is to establish full consonance between a phonological pattern and its realization. Nevertheless, this is sometimes done in a way that the surface form is "distanced", e.g. in szín[ę]művészet 'dramatic art' (e-epenthesis) or in [hoʃɔ] for hogy 'that' in sample IV/724 (Z: Azt hiszem, hogy 'I think that...'). In such cases, belonging to the category of 'foregrounding', decreased distance is attained by a type of fortition in which the elements -- phoneme-level segments -- are referred to by name; 'phonemic quotations' can be observed. Thus, the speaker increases the transparence of a PR by overcompensation. However, in general, it is only in 'intrusion' (epenthesis) that any of the devices of fortition diverges from a clear type of $\underline{f}_i \longleftrightarrow \underline{AI}_{1--n}$ correspondence.

The list of these devices will begin with the effect of genre determinacy that was mentioned above for lenition. (i) Shifting the articulation towards a normative/lento variant in a speech genre in which lenition is dominant is hypercorrection, a type of fortition in itself. An extreme case of fortition in the strict sense is (ii) 'intrusion': intervocalic j-, h-, or (less frequently) v-epenthesis; schwa-insertion between consonants or following a word final consonant. (iii) 'Lengthening': the extension of the I plane for a segment or a (sub)sequence. (iv) 'Intensification': increasing the intensity of acoustic components, (additionally) raising the fundamental frequency (especially at prominence peaks). (v) 'Juncture fortification': marking a morpheme boundary by a phonetic device of its own (see below for details). (vi) 'Fission' (dismemberment): breaking up a sequence into syllables or even phoneme realizations. (vii) 'Pause insertion' (only at a morpheme boundary). (viii) The repression of assimilation rules (only at an active morpheme boundary). These devices can be used in combination, as is illustrated here on juncture production. The marking of a morpheme boundary by a separate articulatory/acoustic unit is possible in several different forms (cf. Szende 1976a, 121). Unlike some conventional solutions, fortitive articulation of an adjacent speech unit exclusively occurs in allegro speech. In sample IV/256 (I: És olvasásóra nuku + 'And no reading practice, no way') the compound boundary in olvasás[+]óra 'reading practice' is marked by simultaneously increasing the duration of [ʃ] and the intensity of its noise bands. As is evident, fortition is realized here by the joint application of two procedures to accomplish a single goal. The first of these, lengthening

(as a "bigger than life-size" representation of the feature [+continuant]) emphasizes the perceived experience by making it more enduring; whereas the enhanced acoustic representation of the primary identifying features of [ʃ] carries the boundary marker itself. The distinctive value and effect is increased in the example by the fact that in the first member of the compound lenition: l-deletion takes place which makes the fortition of the final consonant of that first member more prominent within the whole sequence.

3.4. The phonetic types of lenition processes

Lenition processes will be considered over articulation events that take place in allegro speech and evidently belong to the category of concrete individual. Mapping the notional structure of PR matrix (cf. 2.2.2.1, T(xv)) as a criterion onto each member of the set of lenition phenomena, an identifying and a distinguishing attribute of lenition will be found in the lemma on increasing the distance between the planes of PR (cf. 3.2, L(xxxv)).
(i) In accordance with the lower degree of identity of ($\underline{f}_j \rightarrow$) $\underline{AJ}_{1--n}$ components, the matrix columns of $\underline{AJ}_{1--n}$ -- assigned to $\underline{f}_j$ via a mutual mapping relation -- will break down (i/a) at the boundaries of temporal niches and (i/b) by narrowing the set of $\underline{AJ}$ components: $\underline{AJ}_{1--n} \rightarrow \underline{AJ}_{1--k}$ (where $\underline{k} < \underline{n}$). Secondly, (ii) the sequence may undergo a chain of processes, i.e. the same distortion operations (may) take place on constituents of identical or partly identical phonemic background in distinct parts of the sequence, in keeping with the principle of global programming (cf. 2.2.2.3(iv) and T(xix)). All types of lenition exemplify (i/a); for (i/b) and (ii) I mention the uniform disaffrication of both /ʃ/s in sample II/355 (M: hogy úgy mondjam 'so to speak') by the elimination of their turbulence noise. The foregoing lead us to the following lemma.

L(xxxvii) With respect to the realization of a PR matrix as an articulatory unit, lenition is defined in a general form -- as a common feature of all typological varieties -- by the instability of realization.
Lento forms are characterized by relative stability practically in three organizational aspects of articulation: space, time, and scaling. In space by the coherence of the operation of all muscles involved, in time by sequencing all articulatory events in an absolute or a phase order, and in terms of scaling by the fact that all elements are activated above a threshold value

(cf. Löfquist 1986, definition on p. 139). These properties make it possible for categorical perception to identify the message unambiguously (cf. Fox 1985, esp. 216). Instability, then, characterizes allegro in terms of the lack or lower level of the above properties, creating the general articulatory setting of lenition. In sum, it is the destabilization of the PR matrix with respect to its A components that, as opposed to the corresponding lento forms, results in the new gestalts of allegro speech. This is the background against which the identifying features of individual lenition processes can be interpreted as practical tools of classification. (The principal expectations that a classification has to meet are based on Whitehead's [1927--28/1979, 3] criteria requiring that the system should be (i) 'applicable', i.e. the facts of reality must be interpretable in its terms; (ii) 'adequate', i.e. there should be no items incapable of interpretation within the system; as well as (iii) 'coherent and logical', i.e. the fundamental ideas in terms of which the scheme is developed must themselves bear a consistent and systematic relation to one another within the scheme.)

The typology will be put forward as follows. All lenition process types will be listed first, then each will be briefly characterized primarily in terms of its acoustic properties. One process type, reduction, will be discussed in more detail in order for the proposed analytical procedure to be exemplified on a specific phenomenon.

T(xxi) The types of lenition processes

(i) reduction (see below);

(ii) deletion: the elimination of the primary and secondary articulation components of a segment, leaving behind phonetic traces in other parts, mostly in adjacent sections, of the sequence;

(iii) dropping and truncation: the complete elimination of a segment from the sequence, with the exclusion of further lenitive gestalt rules in the given part of the sequence;

(iv) reduction over the sequence: the cumulative occurrence of some subtype of reduction over several constituents of a sequence that are similar in some respect;

(v) sequence size truncation: the truncation of several constituents of a sequence identifiable as a (set of) unit(s) that is closed (delimited) in a grammatical and/or semantic and/or pragmatic sense, sometimes supple-

mented by a segment not present in the phonemic stratum of PR;

(vi) coalescence and fusion: adjacent segments of a sequence make up a unified section in an articulatory/acoustic respect which differs from the usual realization of the original segments ("full passive assimilation").

3.4.1. Reduction

Reduction is the most generally used type of lenition in casual speech. Unlike that of other processes of lenition, such as truncation or reduction over the sequence, the application of reduction is not excluded by the presence or modification of any communicative--pragmatic factor of speech. This can be explained by the fact that reduction is the lenition process involving the smallest increase of distance between f and A planes of PR. Hence, losses of intelligibility are also the slightest in this type of lenition.

3.4.1.1. Distinguishing criteria

Assume that all lenition types have identifying criteria that make up a unified system with characteristics (i) in the acoustic aspects of realization and (ii) in the structure of the full sequence.

(i) As a result of reduction, phoneme realization is incomplete in the sense that one or more articulatory gesture(s) and the corresponding acoustic feature(s) do not reflect the character of the full phoneme realization. As a general example, consider the realization of /z/ in ezeket 'these' in sample IV/5 (Z: Az első napokban ez, ez, tudtam csak alkalmazni ezeket a módszereket 'It was in the first days only that, er, er, I was able to make use of these methods'). In this case the front of the tongue -- its (apico-) dorsal part -- gets into a loose, partial contact with a smaller surface of the dentialveolar region of the palate. As a result, the noise components characteristic of the acoustic pattern of [z] will show up for a shorter period of time and in a narrower range of the acoustic spectrum.

(ii) The original syllable structure of a word form is retained through reduction. In the above example of ezeket, the three [ę]s distinctly represent the three syllable nuclei in the sequence even after z-reduction, since the reduced [z] continues to mark the syllable boundary.

3.4.1.2. Reduction as the elimination of identificatory A components in general

In reduction at least one primary and one or more secondary articulato-

ry components of the affected segment are retained. If this component is the realization of a distinctive feature, the following constraint applies. The primary feature that is retained after reduction has to be able to separate the affected segment from members of other phoneme classes. This means that the remaining feature cannot be a single major classificatory feature. Thus e.g. [+voc] cannot be an exclusively remaining primary feature. The deletion of a feature in reduction, however, does not offer any indication of whether the feature dropped in reduction is primary or secondary. The omitted feature may be primary, as is the case when in a phrase intitial syllable there is no voicing in the vowel, or in k-spirantization where the stop component is dropped. It can also be secondary though, e.g. in the case of the feature [+per] ("peripheral articulation"), also in k-spirantization.

If a component remains unaffected by reduction (it may be some arbitrary articulatory gesture, say regular closure formation, and its acoustic effect), a state of affairs that can only be attested in complex consonants (stops and affricates), reduction is restricted to the elimination of one of the components in a temporal niche in the sequence. It seems to be the case that both in v-reduction and in k-reduction articulation undergoes the same kind of distortion in that we have an imperfect narrowing in the first case and an imperfect closure in the second. Even if this is so, the interpretation of reduction must not run short at that point. Imperfect narrowing, as opposed to the optimal degree of obstruction, merely results in a realization with less intensive noise components that makes the identification of the given segment more difficult. For instance, the acoustic spectrum of the [v] in sample IV/136 (M: annak is a következménye, hogy 'it partly follows from the fact that') clearly shows that labiodental contact, although one of a rather low intensity, was in fact made, and the arrangement of the noise components also exhibits a pattern characteristic of labiodental fricatives. Contrary to this, a [k] (involving complex articulation in the sense that a closure and a release are physically different in character) actually loses one of its constituents, closure phase, when it undergoes reduction between front vowels. In sample IV/662 (G: meg nekik, hogy '[tell] them that') the two [k] segments exhibit two different degrees of spirantization. A similar effect is shown in a back-vowel context in sample IV/548 (Z: szakmák 'professions') and for a voiced stop in the [g] of sample IV/557 (Z: + Igen +

'Yes'). Affricates provide even more striking examples in this respect. In sample IV/531 (Z: nagyon 'very much') the turbulence noise component of [ʧ] is missing; in sample IV/706--7 (Z: Szóval, hogy nem egyetérteni + 'That is, not to agree') there is no friction -- before and due to [n] -- in the release phase of the [ʧ] of hogy 'that'.

3.4.1.3. The major phonetic categories of reduction

Reduction is a homogeneous type of lenition of both vowels and consonants. Conceptual uniformity of interpretation is ensured by the fact that reduction -- whichever phoneme class is affected -- involves the common component of lenition that decreased articulation potential is at work in it as compared to normative speech production, especially at the level of oral articulators. In this respect, the functioning of the larynx is partially independent of that of the rest of the vocal tract from the pharyngeal cavity up to the lips. By 'partial independence' I mean that an overactivated state of the larynx in the course of articulation is usually incompatible with the lower articulation potential of other speech organs, even though there is no direct correlation between the two. On the other hand, articulatory activity resulting in a reduced F_0 is compatible with lento speech or even fortition (as in sample IV/376--7 where egyáltalán 'at all' is fortitive; for details cf. the introductory passage of 4.1).

However, since different sets of speech organs may play a dominant role in the production of vowels vs. consonants, the individual instances of reduction may include different variants as well. In view of both the diversity and the common bases of the variants, similarities and differences are as follows (where reduction is considered from the point of view of vowels).

(i) 'Decrease of duration' primarily involves the shortening of what is called the pure phase of articulation, generally in the middle of the speech sound. In a strictly acoustic sense, it corresponds to the deterioration of 'shape constancy'. (The term 'shape constancy' refers to a relative identity of acoustic patterns of adjacent glottal vibrations, represented by the repetition of identical curves in the visual displays. The more vibrations of identical shape are contained in a segment, the higher the degree of 'shape constancy'.) In other words, the essence of the alteration is that the part of transitional phases belonging to the vowel constitutes a relatively longer portion of its total duration than in the lento equivalent. Most of our

sample data are like that for vowels. The same phenomenon occurs in the case of consonants involving the feature [+cont] (except for [r] that can be said to be [+cont] with some reservations but that requires a quite different interpretation of reduction) such as [s], [z], etc. But if reduction involves a stop, and its degree reaches the stop → fricative stage, the duration of the output (the derived fricative) will be longer than that postulated for the underlying stop. Significant increase of duration can be seen in consonant reductions like [k] → [ç] as in tekintélye 'his prestige' in sample IV/19 (Z: + és neki nagyon nagy tekintélye van + 'he is a man of importance, indeed') or like [k:] → [x:] as in akkor 'then' in sample IV/20 (Z: + Na most 'akkor, amikor 'Now then, just when').

The different and yet common character of reduction as applied to vowels and consonants can be supported by an argument pursuing another, rather theoretical, route. Given that the consonants whose length increases in the course of reduction gain surplus duration as an inherent fricative property, the adequate description is that a phonemic class shift has taken place: the plosive has gone over to the class of fricatives. A similar class shift can occur in the case of vowels as well, e.g. the change of labial → illabial; but in the description of the "long → short" lenition process, as discussed above for vowels, the use of the feature [+long] is almost metaphorical for Hungarian as physical duration may be the factor that plays the least important role in it.

(ii) The changes that reduction produces in cavity configurations and in the operation of speech organs all derive from the decrease of muscular tension. The contraction of the muscles of lips, tongue, and resonator walls will be weaker but that does not result in a decrease of volume (cubic capacity); rather, it takes place at the expense of the stability of configuration and articulatory activity in general. This has two consequences. On the one hand, the fine-grained but characteristic acoustic pattern of sound types formed in resonators with stiffer walls becomes loose (both for vowels and consonants). On the other hand, the realizations of speech sounds standing for the same phoneme exhibit more variation in their acoustic properties (for labiality, cf. Szende 1969).

The nature of this lenition process is well reflected by the parallel, essentially identical, case of the contradistinction of Hungarian vowels in

terms of stress. In general the increase of intensity that carries stress -- as was pointed out decades ago -- is brought about by stronger muscular activity (cf. e.g. von Essen 1953, 119; Fónagy 1958, Ladefoged 1962, 73--91 and 1963). In comparing stressed and unstressed Hungarian vowels in terms of their degree of labiality, this was documented by measurements (cf. Szende 1969, 369--70). The stressed/unstressed distinction is assumed to correspond to normative/reduced in lento vs. allegro. Their common denominator can be expressed in the Maddieson--Ladefoged principle: the production of stressed/fortitive segments requires the speech organs to assume more extreme positions in the resonators whereas that of unstressed/lenitive segments is done by a shift towards the centre in order to make the passage of the air flow less impeded by resistance (cf. Maddieson--Ladefoged 1985).

The low-intensity activity of the speech organs, as was mentioned earlier, may result in a shift of phoneme class between the input and output of the reduction process. Yet, the relation between them is to some extent different depending on whether the segment undergoing reduction is a vowel or a consonant. The articulatory structure of consonants is such that the effect of reduction is not limited to acoustic filtering (in the supraglottal resonators) with the appropriate modification of the acoustic properties of the cavities involved, primarily their echoing properties that fundamentally determine the acoustic quality of the complex sound being produced. Rather, in the articulation of consonants type shifts may take place if, for instance, noise production goes on between larger vs. smaller surfaces of contact or approximation. This is even more so if obstruction is formed with lower vs. higher intensity. Reduction effects the latter property in the sense that it turns high-intensity obstruction into one of less intensity. (Thus, the common component between the reduction of vowels and consonants is lower intensity of production, and the difference lies in the location of that decrease in intensity.)

In the light of data taken from Hungarian allegro speech, however, it turns out that the point we made about the intensity of obstruction is still too cursory. The category shift resulting from the reduction of consonants is of several diverse types in the first place. It is generally noted that stops spirantize -- by closure loosening -- as in [k] → [ç] or [k] → [x], [m] → [w̃], etc. But affricates also quite often undergo category shift as

in intervocalic [tʃ] --→ [ʃ], or in the case of the [ɟ] of the conjunction hogy 'that' which, depending on context, occasionally surfaces as either [d] or [j]. It is to be emphasized that this is not a case of fission since the distorted phonetic representation of [ɟ] is either [d] or [j] but not both. Nevertheless, in a single item of the collected material we actually find a [d] and [j] together. The [ɟ] of hogy 'that' in sample III/222 (M: ez olyan volt, hogy + az órát 'it was like this: the lesson'), in what is called a pause of thinking, is split into components that are otherwise organically unified or non-autonomous (consitute a single elementary speech event) even in lento speech, followed by a devoicing of the palatal approximant, resulting in a reduced realization [ᶜʝ]. The output [dᶜʝ] represents the same type of distortion, with respect to the character of the process, as the distorted versions of tehát 'thus' or hát 'well' with final [tə]. The reductions of stops and affricates undoubtedly exhibit two distinct categories of decrease of intensity. Closure loosening (for stops) involves the restructuring of a single elementary speech event whereas the change of affricates involves the elimination of one of the components of the respective (special) elementary speech event. That elimination of either the turbulence phase or the release noise phase requires decreased articulatory energy as one of the successive articulatory factors is omitted, whereas in a stop —→ fricative change an articulatory event of higher energy demand is replaced by one of a lower energy demand at the given point of the process of articulation. (Notice that all this concerns a single point of articulation. To talk about decrease of energy in speech production as a whole is obviously nonsensical.)

Apparently, this type of lenition must be regarded as involving a loss of information. Whenever the discrepancy between a phonemic representation and its realization increases, success rate in speech perception performance is necessarily expected to decrease. This kind of argumentation would, however, be rather short-sighted for it is based on a false premise. In particular, it involves the tacit assumption that speech comprehension has to rely on the identification of each elementary speech event. However, there is no separate strategy in the (ap)perception of speech looking for phonemic counterparts of individual phonetic events: speech comprehension is a complex process of identification that goes forward in a global manner, based on a cooperation among all levels of perception. If the set of data to be identi-

fied is scattered over a smaller domain, the identification task is simpler and its solution is more reliable as the number of the necessary elementary decisions is smaller. Albeit a stop → fricative reduction involves a category shift, another aspect of the phenomenon that makes the listener's task easier is that the articulation of the output segments (the fricatives) is more stable. The fluctuation in the production of fricatives is considerably smaller (in Hungarian) than it is for stops. Palatographic experiments show that the average fluctuation of plosives is related to that of fricatives as 10.5:6.3 in terms of the area of the surfaces between which the obstructions are made (cf. Szende 1974a, 350). The type of reduction under discussion may even serve the retention of a state of balance between the two contrary effects. Note that historical changes like [k] → [χ] and [g] → [ɣ] (cf. Bárczi 1958, 111 with respect to Hungarian) can be interpreted as a consolidation of that process type.

(iii) Finally, the reduction types discussed in (i) and (ii) above may apply simultaneously. The sum of parts equals the total in this exceptional case. In this mixed type of reduction the two modifying factors reinforce each other in the lenition process. This is very common among [+cont] units (especially vowels and liquids).

3.4.1.4. Articulatory--acoustic specification of the types of reduction

The reduction of individual units of articulation, as was pointed out earlier, is not the same as 'looseness' of the total articulation process or a reduction of overall speech production potential. This holds true even if we can establish correlations between the reduction of single speech sounds and other items of the full set of devices employed in speech (for the relation between fundamental frequency and segmental reduction, see 4.1). In the first part of sample I/66 (M: Nem tudom + I: Nem tudom 'I don't know' -- 'I don't know') F_0 is reduced, yet we can only observe a single segmental reduction in the sequence, d-closure loosening; the slight degree of release of the [d] in the second Nem tudom is also compensated for by an intensive noise after the explosion. For a correct interpretation of this phenomenon, notice that the sequence nem tudom -- in a discourse modifier position -- is usually affected by much more intensive variants of lenition without a documented relative decrease in the volume of fundamental frequency. This is the case in sample IV/62 (M: értékelték vagy nem tudom, de 'they appreciated it

or I don't know but') where it appears in a form [t$^{u}_{\sim}$om] via d-elision; similarly, even in a sample of the most conservative speaker, IV/825 (G: nem tudom 'I don't know') where d-flapping occurs at a normal average volume in a sequence of primary pragmatic value (i.e. not as a discourse modifier).

In overview, in terms of the input unit, the following types of reduction were found in the material:

(i) delabialization (of both vowels and consonants); (ii) delateralization; (iii) depalatalization; (iv) closure loosening; (v) fissure loosening; (vi) intermittent closure loosening (turning a trill into an approximant). Of these, the last type will be discussed in some more detail, as it is the most difficult to interpret.

This lenition (reduction) phenomenon -- by definition, in Hungarian -- exclusively concerns [r]. In addition to keeping the feature [+cont] in [r], or rather reinforcing the implementation of that feature, this process loosens the alveolar contact (as a tremulant involves short and partial closure period(s), this is similar to closure loosening). On the other hand, given that the production of [r] involves a mechanical factor: the mechanistic release of the closure (where 'mechanistic' means physically, rather than physiologically, controlled), that is replaced via loosening by the articulatory procedure of a more usual type of obstruction, the allegro realization of [r] is on the way to becoming a member of the class of obstruents. This is shown by the elimination of a regular alternation of noise and pause phases of approximately .02 s, a pattern that is observable in the spectrogram of a lento tremulant (for the duration figure, cf. Kassai 1979, 65; for the spectrographic data, Bolla 1982: Plate 46; for a discussion of this type of articulation, Szende 1982, 263).

3.4.1.5. The reduction of lip articulation

The description of the various types of reduction is based on one crucial articulatory property of the type to be described from which the acoustic result can be derived. E.g. for k-spirantization, the method of description is that -- given the absence of closure component in the acoustic spectrum -- the case is taken to be an instance of replacing the eliminated closure formation by that of a narrowing. Furthermore, since the speech apparatus is the same for both vowels and consonants, these two classes are not considered separately -- even though some types of reduction can only apply

to one, and some others to the other, class of phonemes. As regards lip articulation, delabialization involves identical changes in the operation of the same articulators, whether the actual change at hand is [o] → [a] or [m] → [m̃].

At the level of speech production, lip articulation is indeed a complex phenomenon. Although in the case of (the respective class of) consonants it invariably means a bilabial contact, for vowels it actually involves two articulatory factors: labialization proper, producing a particular shape and size of the front resonator (atrium) depending on the degree of lip protrusion, and lip rounding, determining the shape and size of the outer orifice of the oral cavity (cf. Szende 1969, 361--2). Since our data concerning lip articulation reveal a concurrence of these two components (cf. Szende 1969, 370--4), their separation with respect to the type of reduction under discussion is unjustified (and impossible in terms of acoustic displays).

The criterion of reduction in lip articulation is a deviation from normative labiality, roundedness, and lip closure values, respectively. (A number of well-documented studies are available concerning lip articulation in Standard Hungarian, cf. Szende 1969; Molnár 1970, 51--66, 70--1; Bolla 1982: Plates 2--20). This reduction type covers segments in which the articulatory component of 'labiality/roundedness' is a (context-independent) identifying factor. In this sense, we can refer to the reduction of [o] and [b], but not to that of [s] where a secondary lip articulation feature deviates from the normative one for [s]. This is because the latter is always modified in relation to some change of another articulatory component that is primary with respect to the identification of that speech sound or the sequence that contains it.

In the case of consonants, the phenomenon exclusively concerns bilabial stops ([p b m]) since the reduction of labiodentals ([f v]) is classified as fissure loosening. For the latter, it is only the lower lip (in particular, its fortitive obstructional activity) that accomplishes the task of realization. In vowels, a lower degree of labiality/roundedness qualifies as reduction only in the case of labial vowels, e.g. in [ɑ] → [a]. But for illabial vowels, reduction consists in the change of lip articulation in the opposite direction, e.g. [i] → [ɪ] (where the degree of illabiality is decreased).

With respect to the above classification, we have to note further that

serious methodological objections can be raised against classifying (the reduction of) [p] and [b] as belonging here. The reduction of [m p b] clearly involves closure loosening as this is an absolute condition for their implementation as homorganic fricatives just as much as in the case of [k] → [x]. As for [m], we can say that in [m] → [m̃] -- with respect to the quality of the sound -- closure as an articulatory component is of a concomitant role. Despite lip closure, the vocal tract is partially open: the air can escape through the nasal cavity. Therefore, the reduction of [m] is justifiably regarded as an instance of delabialization. However, the same argument does not apply to [p b]. If [p] or [b] undergoes delabialization by closure loosening or closure loosening with delabialization, it is only practical considerations that can influence our decision on classification. The articulatory homology of [p b m] and the fact that visual information plays a more important role in the identification of [p b] than in that of [t d] or [k g] both favour the classification of the reduction of bilabial stops as cases of delabialization.

As an illustration of the concrete individual level of delabialization, consider the example of [o]. In accordance with the articulatory energy distribution of a sequence, the delabialization of [o] is conspicuously present in an unstressed open syllable preceding a stressed phrase initial position within the sequence (as in sample I/24--25, I: megoldás, de ez a kapcsolat 'odáig 'solution, but this connection as far as'). Delabialization is primarily manifested in a marked ability for accommodation. As a result of this, the formants of the vowel are shifted towards the frequency values of dominant vowels in the environment. Thus, the normally 500 Hz formant of the [o] in kapcsolat 'connection' exhibits a 100-150 Hz increase, making the vowel approach the corresponding formant value of [a]. There is also a higher frequency component characteristic of [a] -- albeit with a lower intensity -- in the range around 2800 Hz, which does not appear in the normative version of [o]. At the same time, this reduction also has an accommodational effect on its immediate environment in the sense that, on the one hand, it keeps the shape of the oral cavity in a configuration required for its own values through the articulation of the subsequent (also reduced) [l] and, on the other hand, it produces a labializational tendency pointing towards [o] in the [a] following the [l].

The above analysis of the delabializational reduction of [o] receives support from a comparison of cases like the above with others in which [o] or [o·] is reinforced (hence, escapes delabialization) by the deletion of a subsequent segment. Thus the [o] of mikor 'when' in sample I/61 (with r-deletion) and the [o·] of igazából 'in fact' in sample I/174 (with l-deletion) both fit the acoustic pattern given by Bolla (1982) for [o:].

Extreme cases of delabialization of [o], or vowels in general in casual Hungarian, are only limited by obligatory retention of the feature [+voc]. Within that range, certain variants are found to verge on normative pronunciation. This is the case where delabialization is inhibited by certain phonetic properties -- not necessarily quantitative ones -- of the sequence. Such balancing effects can be found even in the case of the [o] of kapcsolat 'connection' in sample I/24--25, discussed above. On the other hand, in extreme delabialization -- that is naturally supplemented by other effects as well -- the realization of [o] may be distorted even to a point that it becomes similar to an acoustically amorphous pattern of the burst noise of a stop; cf. the relevant segment of tartozik 'belongs' in sample II/86 (Z: nem tartozik bele a kert 'the garden is not included'). Here, the phonologically rounded vowel occurs medially in a sequence of six unstressed syllables and can only be identified in terms of two features, vocalic ([-cons]) and back.

3.4.2. Deletion

Deletion is a change of the form $(\ldots)x_i,x_j,x_k(\ldots) \rightarrow (\ldots)x_i,x_k(\ldots)$ at a given point of the sequence, under appropriate realization conditions. It is a case of elision where both primary and secondary articulatory components of the given phoneme realization are totally eliminated. Elsewhere in the sequence, however, it leaves behind some 'phonetic traces'. Such traces can be instances of one of the following types.

(i) At least one primary feature of the deleted segment spreads over to another, adjacent portion of the sequence. This is the case e.g. in sample IV/93 (M: nagyon 'jó 'very good') where the phonetic trace of the deleted (second) [n] is the nasalization of the [o] that precedes the deletion site.

(ii) Deletion may give rise to a lento-type, normative articulation of the surrounding segments. In sample III/21 (L: tantárgypedagógia 'teaching methodology'), r-deletion induces normative production of both [a:] and [ɟ],

although in the second vowel of a sequence of seven syllables one would expect shortening and some kind of reduction of the affricate before [p] would also be quite natural. (The example has been selected from the material of a speaker who uses a lot of lenition.) In the case at hand, lento articulation corresponds to the acoustic pattern of the same speech sound as uttered in an isolated word. Hence, deletion -- as a type of lenition -- gives rise to relative/partial fortition in surrounding portions of the segment. That fortition especially affects the speech sound that follows the deletion site.

Although deletion-induced fortition effects are strongest in the immediate environment, 'secondary fortition' may also occur, exceptionally, further away. This happens when the speaker deletes several identical segments occurring in partly identical contexts within a word and, in addition to the usual fortition effects on the immediate environment, the portion of the sequence between the two deletion sites undergoes some further fortition. In sample III/76 (M: Járnak, elképzelhető, hogy 'They go, it is possible that') the deletion of $[l]_1$ and $[l]_2$ entails e-lengthening; but we can also observe a schwa-like, protracted burst noise between [p] and [z]. That compensatory foregrounding effect counterbalances, as it were, the loss of information that cumulatively derives from the double lenition. The solution is totally ad hoc, and alternative explanations may also be found (for instance, a sudden halt in the articulation due to a dilemma of lexical choice). Therefore, the above account cannot be authentically verified either by the researcher or the speaker, or indeed, in this case, by the recorded material itself. Consequently, we are left with the bare acoustic facts -- and the conclusion that this is an exceptional subtype of the phonetic traces of deletion.

(iii) The word form that has undergone deletion does not exhibit any modifications that would be shown by allegro versions of another word form whose phonemic representation is different but whose lento form is made up by the same speech sounds as the form derived by deletion. This claim may be made clearer by an example taken from sample III/36 (M: nyertem, tehát végü, végül is védőnő 'I've got it, so even-, eventually a nurse'). The word tehát 'so' undergoes h-deletion and contains a non-fused sequence of the vowels [ęˌ] and [a˙]. The lento version of teát 'tea-ACC' sounds exactly the same. Now if the realization [tęa˙t] ◂— teát occurs in one of its allegro forms, the hiatus between [ęˌ] and [a˙] is resolved by j-epenthesis. The major vari-

ants of the two words are as follows:

			tehát	teát
(1)			[tęa·t]	[tę^{j}a·t]
(2)	[t^{ę}a·t]	[t^{æ}a·t]	[t^{ɛ}a·t]	[tęja·t]
(3)			[t^{æ}at]	[tęjat]
(4)			[tat]	

As can be seen, the difference between parallel forms is that the [j] hiatus filler is not inserted between the [ę] and [a·] that are made adjacent by h-deletion in any degree of allegro whereas it occurs in each allegro version of teát, including the one in (1) that is nearest to lento. (Full phonological representations of the examples cited will be given in the chapter on the relationship between speech rate and lenition processes, cf. 4.2.)

After deletion, syllable structure may remain as in the initial representation, may become different, but it may even be the case that it cannot be clearly identified. (i) It changes if deletion affects a preconsonantal vowel. (ii) It remains unaltered by intervocalic consonant deletion provided that the vowel before the deletion site receives a phonetic trace such that vowel-to-vowel transition is eliminated by the insertion of an aphonological phonetic marker that makes the first vowel end as if it were followed by a consonant and the second vowel begin as if it were preceded by one. Finally, (iii) in accordance with our second criterion, syllable structure becomes vague if deletion affects a vowel next to another vowel such that no fusion takes place between the vowels but (part of) the acoustic output is significantly different from the input vowel.

3.4.3. Loss and truncation

A lenition process of the type $(\ldots)x_i,x_j,x_k(\ldots) \rightarrow (\ldots)x_i,x_k(\ldots)$ is identified as loss, rather than deletion, on the basis of special phonetic criteria. In this type of elision (i) the realization of a phoneme contained in the phonemic representation is left out of the sequence without a surface hint at its original distinctive features. The only 'phonetic trace' of loss is that the remaining sequence may resist the application of further rules of lenition. (ii) If loss takes place, the original (phonemic) sylla-

ble structure of the sequence is necessarily modified. For instance, in mert 'because' → [mẹr] by t-loss, the actual structure of the syllable changes, whereas szóval 'so' becomes monosyllabic after v-loss in this type of lenition. The adverb szóval has a rich array of weak forms (especially as an expletive element 'so', 'well', 'I mean', 'that is', 'in other words', etc.). In v-reduction (i.e. contact loosening, as in sample I/1: I: + szóval ez + 'well, this is') it keeps the original skeleton CVCVC; by v-deletion (unlike by v-loss) we get bisyllabic outputs like [so·al], [soal], [soal] etc., due to fortition that goes with deletion (as in sample I/30: I: Igen. Z: Szóval 'Yes. Well,' where the actual realization is [soal]). Truncation also keeps the bisyllabic pattern if it occurs non-intervocalically as in [sova], cf. sample I/42 (M: Nem? Szóval + 'You don't? Well,'); but results in a monosyllabic form if it is intervocalic -- i.e., v-elision -- as in sample I/67 (L: úgy érzem, hogy + szóval, ha oda 'I feel that, well, if there') where the acoustic output is [s͡oa·] (in which l-deletion and o-reduction can also be attested). Finally, sequence size truncation may also occur in one of its numerous versions, e.g. [s͡ʔa] as in sample I/69 (L: de + szóval ezt nem tudom 'but -- well, I don't know'). (For a detailed survey of possible versions, cf. 3.4.5.) Notice at this point the extent to which semantically vacuous elements may be distorted. In samples I/1--70 szóval occurs seventeen times; of these, not more than a single sample, I/6 (M: házasságot, szóval 'marriage, that is') has the form [so·val] that can be taken to be normative, and there are only two tokens that can be considered identical: [sə] -- both derived by sequence size truncation.

Truncation may also apply iteratively to a word. In this way, omitting a number of adjacent elements, the word form may even get restricted to an articulatory structure corresponding to a single phoneme. The rule is that iterated truncation must leave behind at least one element of the total sequence that could be derived from the phonemic representation. To continue the examples of szóval, in sample IV/694 (Z: szóval 'I mean') a sequence of truncations affects elements 3--5 of the PR /so:val/; the surface representation is [so].

3.4.4. Reduction over the sequence

The lenition of a longer articulatory sequence may involve, generally

speaking, the cumulative appearance of some subtype of reduction on a number of constituents of a sequence that are similar in some respect. For example, if all voiced constituents of a sequence undergo 'devoicing' as a type of reduction, or if all segments of a sequence that involve closure undergo the same amount of closure loosening, we classify this as 'reduction over the sequence'. E.g. in sample III/50--1 (Z: szóval egy kicsit 'that is, a little') a set of closure eliminations takes place that involves, in addition to [k] and [t], the climax of the turbulence phase of [tʃ] as well.

The scope of a sequence over which such reduction applies may coincide with a full sequence pronounced in the same turn or just a single word form as in sample III/14 (I: tulajdonképpen 'in fact'), or else a structural unit that is separated within a sequence by coherence in a grammatical or pragmatic sense as in sample III/113 (I: + na most még 'well, and then').

Reduction over the sequence does not exclude that other types of lenition, e.g. deletion or loss, should apply to some elements under its scope. This happens in sample III/113 (see previous paragraph) where reduction over the sequence is supplemented by t-loss.

This type of lenition is not the same as a joint occurrence of several instances of reduction, deletion, or loss; rather, it involves a sequential repetition of a given lenition (reduction) phenomenon on a number of units in a sequence, all of which undergo the same kind of change. Accordingly, whereas in various types of elision distortion applies to a series of A components of a single segment, 'reduction over the sequence' involves the distortion of one or more A components in a series of segments.

3.4.5. Sequence size truncation

This is a type of lenition processes in which a given -- grammatically, semantically, or pragmatically closed, i.e. bounded -- sequence endures the truncation of several constituents that are semantically, grammatically, and /or pragmatically identifiable as a unit, provided that all truncations concerned take place in a unified manner. As a result of sequence size truncation, what remains of the sequence (as an identifiable acoustic unit) will necessarily be shorter than the initial PR, maximally the full number of underlying elements minus one; but it may also be supplemented by realizations that are not originally included in the phonemic representation. This obvi-

ously entails the restructuring of syllables and a decrease of the number of syllables. Partial suspension of the PR, i.e. the deletion of its constituent(s) and the introduction of some other constituent(s) into the phonetic representation to replace it/them, is the key to telling sequence size truncation from loss. Loss is interpreted as making the series of phonemic constituents incomplete by omitting one or several of them, whereas in sequence size truncation the architectonics of the phonemic representation is rebuilt in an ad hoc way such that phonetic structures that are originally not present can appear in the course of articulation. Sequence size truncation may override vowel harmony: it can freely produce forms that violate vowel harmony constraints although realizations that are compatible with those constraints may also come into being. Simply speaking, sequence size truncation makes speech production indifferent with respect to vowel harmony. In the sequence of samples IV/689--94 (Z: éppen azért, mert, mert tudtuk, hogy + szóval + egyszerűen 'just because, because we knew that, well, simply'), the pronunciation [so] of szóval is a realization of /so:val/ in which repeated loss results in the lack of three phoneme realizations. On the other hand, in sample IV/167 (Z: valami ilyesmi 'something like that') we find sequence size truncation across word boundary: /valami ijɛʃmi/ → [vɔ̃mĩjɛʃmi]. Although the phenomenon is infrequent, it is typologically quite distinct from all other categories. Notice, for example, the uniform character of the output in terms of vowel harmony, simultaneous elision of two syllable units, and the centralization of all [+high] vowels involved.

Sequence size truncation -- obviously -- excludes the occurrence of any further distortion in the sequence concerned but permits that of some other type of distortion in a later (unaffected) portion of the sequence. For instance, in sample IV/525--6 (Z: Szóval, amikor a lehetőség is + 'I mean when even the possibility'), szóval undergoes a radical sequence size truncation turning it into [sˑ]. The [a] of the subsequent amikor exhibits voice onset delay, a type of reduction. Whatever it is that we find the most important in the interpretation of this case: a possible causal relation between sequence size truncation and vowel reduction or the lack of an expected articulatory fortition in the [a] of amikor, the point of the example in a typological/taxonomic respect is that such relationship obtains between sequence size truncation and another type of lenition.

3.4.6. Coalescence or fusion

This is a lenition process involving two adjacent segments whereby the participating elements form a unified articulatory and acoustic pattern that differs from the normative realization of both input segments. In terms of this definition, fusion apparently coincides with a particular type of accommodation labelled 'total passive assimilation' (cf. Vértes 1958, 132--3): rendszer 'system' → [rẹn͡tsẹr]. The latter is a process that normally applies in lento speech as well, therefore it is preprogrammed on the concrete general level. However, fusion and total passive assimilation are not the same, even if the latter is interpreted as a bidirectional type of accommodation. (This assumption is excluded anyway by the traditional notion of accommodation that is taken to be either regressive or progressive but not bidirectional.) The differences -- thus, the specific properties of fusion -- are as follows.

(i) The phenomenon of fusion may involve two adjacent segments (or two segments made adjacent by lenition) that belong to two different word forms, i.e. that are separated by a word boundary. In sample IV/217--8 (I: szóval most tényleg, szóval azt nem lehet 'well now really, I mean you can't'), the sequence szóval azt undergoes fusion -- preceded by l-loss -- that coalesces two elements separated by word boundaries: [[so˙vɑ(˙)st]].

(ii) The output of fusion may be a segment that does not correspond -- let alone either of the input segments -- to any element or sequence of elements that is a phonemic constituent of the PR in question or indeed part of the phonological inventory of the language. For instance, in sample IV/335 (G: + Hát lehet, hogyha 'Well maybe if') [t] and [l] fuse in a [[l̥:]].

(iii) Fusion can be regularly contrasted with its counterpart in fortition, 'fission', i.e. the insertion of a pseudo-phonemic segment into the sequence: in a case like hát 'well' → [[ha:tə˙]] the burst noise of [t] gets voiced and turns into a vowel, changing the original syllable count and syllable structure of the word. The opposite character of fusion and fission is obvious and does not require any further explanation. Unlike in traditional accounts of accommodation, fusion and fission can both be extended to vowels and consonants alike, and can be classified as a unified pair of categories.

(iv) The inherent bidirectionality of fusion may involve both PR ele-

ments concerned as wholes, but again it may only cover part of the two segments or a group of their distinctive components. For example, in sample IV/228 (I: + és hogyha úgy érzem 'and if I feel like that'), fusion takes place in hogyha 'if' [hocʕa] between [c] (derived by [ɟ]-devoicing) and the [h]. In particular, the noise component of the affricate and the [ç] (from /h/) coincide both in articulation and in the acoustic output. In sample IV/347 (I: még két óra is olyan volt, hogy 'and even two hours were such that') another subtype of fusion can be observed. The slight lengthening of [k] shows that this is not simply a case of g-elision (loss); the possibility of g-deletion is excluded by the fact that the first vowel is a regular-length [e·] whereas the structure of the transient phase of the vowel ought to be shortened by g-deletion, or the voice assimilation of [g] involving the omission of its burst noise and, more importantly, subsequent friction. In addition, since there are no word-initial long consonants in Hungarian, we can by no means posit a [k] → [k·] lengthening due to g-elision. Consequently, the only valid assumption is that the closure phase of [g] has been fused with that of [k]: one component of one segment with one component of the other segment. In sample IV/719 (G: iskolai oktatáshoz 'for primary education') fusion results from the spread of distinctive featues. As [i] and [o] fuse, the tongue height of mid [o] spreads over [i] such that the latter undergoes lowering with a concomitant centralization, while the [o] gets delabialized.

The bidirectionality of fusion is supported, in addition, by the fact that the groups of features involved will merge in the same manner irrespective of the relative phonotactic position of the source segments. In sample II/63 (I: jó, és 'good, and') the vowels are in an opposite order (with respect to sample IV/719), yet they fuse in exactly the same manner.

(v) Fusion is not identical with 'run-on' (surface resyllabification). In [ɑ+'zi·rɑtlɑ̃n] for az íratlan 'the unwritten', all three units: [ɑ], [z], and ['i·] retain all their distinctive features, it is only the sequence-internal word boundary marker that is shifted.

(Note: the terminology used here is not a simple adoption of the corresponding Particle Phonology terms. Schane's [1984, 135] 'fusion' and 'fission' exclusively refer to vowels and denote the monophthongization of diphthongs and the diphthongization of monophthongs, respectively.)

3.5. The interrelationship of lenition process types and the reduction of information field

Reduction, deletion, and loss -- as projected onto a single element -- are categories of lenition characterizable as in T(xxii) below. Consider a few premises first.

(i) A type of lenition cannot be "properly included" in -- i.e. cannot be a subset of -- another type. Hence, it is unjustified to claim that deletion includes reduction (of a given direction), or that the loss of an element includes deletion, given that the definitions of these types prescribe a unique classification for each particular lenition phenomenon.

(ii) Reduction, deletion, and loss, on the other hand, are not independent of one another either in articulatory or in acoustic terms. This is because they form a finely-scaled range, in this order, with respect to both their production and acoustic output (cf. e.g. stronger vs. weaker forms of reduction or the ambivalent relation of deletion and syllable structure).

(iii) Phonetically, the three types of lenition correspond to portions of a scale. Categorial distinction among those three portions is made possible by phonological criteria. Indeed, a purely phonetic separation of reduction and deletion is not possible, for instance, in the case of an intervocalic nasal consonant: in an allegro rendering of /hɒmɑra:b:/ ◄—► hamarább 'sooner' in which both vowels adjacent to [m] are nasalized to some degree, and the closure of [m] itself is loosened to an extent that the /m/ is realized by [m̃] or [m̃̆], we are faced with a phonetically indeterminate boundary case. However, this must either be categorized as reduction or as deletion, tertium non datur. If the syllable structure of the sequence is inspected in a way that it is played backwards and listened to by informants, hamarább is found to be bisyllabic (in this allegro rendering) and its classification as reduction can be excluded on the basis of one of the criteria included in its definition.

On the other hand, one and the same element may undergo several varieties of reduction. It can also be the case that one instance of reduction eliminates a constituent of an elementary speech event while another one simultaneously applies to the whole of that elementary speech event. E.g. in sample IV/212--3 (I: + És hogy tudom-e majd nagyon jól csinálni, mert ezt 'And if I can do this very well because this') reduction applies to [ʒ] in

hogy 'whether' by the elimination of the noise component as well as, due to the subsequent [t], by devoicing.

Apart from loss, all distortion types may exhibit various degrees of strength within their own categories. The 'degree of strength', in lenition, means the extent of articulatory and acoustic deficit in the (sub)sequence concerned as compared to its lento counterpart. Obviously, in fortition, the degree of strength correlates with the relative amount of articulatory and acoustic surplus over the corresponding lento utterance. To illustrate the general issue, let us take reduction as an example, with reference to data taken from relevant samples of a short dialogue. Instances of multiple reduction of the same speech sound will be considered in particular. In sample IV/620 (G: behozott pedagógusokkal például 'with hired teachers, for example') both g's of pedagógusokkal 'with teachers' undergo intervocalic spirantization. But that of $[g]_2$ is more radical than that of $[g]_1$. In the repetitive sequence of sample IV/627 (I: meg, meg egy 'and, and one') $[g]_1$ undergoes closure loosening while $[g]_2$ is free of reduction. In sample IV/631 (G: visszaküldenéd tanítani? 'would you send them back to teach?') $[d]_1$ exhibits spirantization, but $[d]_2$ remains intact. In $[o]_{1--4}$ of sample IV/632 (I: úgy gondolom, hogy 'I think that') uniform slight delabialization shows up as an instance of reduction. In sample IV/634--6 (I: és jól csinálta azelőtt is 'and she did it well previously, too') $[l]_1$ is reduced by delateralization, $[l]_2$ is deleted with [a·]-lengthening, $[l]_3$ is normative but is preceded by an [a] + [a] fusion. In sampple IV/661 (G: gyerekemről beszéltem 'I just mentioned my child') $[l]_1$ is normative, $[l]_2$ undergoes reduction by delateralization. Both k's in sample IV/622 (G: meg nekik, hogy '[tell] them that') undergo closure loosening but that on $[k]_2$ is stronger. In sample IV/671 (Z: felkeltik az érdeklődésünket 'they arouse our interest') $[k]_1$ and $[k]_2$ spirantize but $[k]_{3--4}$ do not, as opposed to the immediately preceding sample IV/670 (Z: kihasználják az érdeklődésünket 'they take advantage of our interest') where $[k]_{1--4}$ are all reduction-free. In sample IV/673--674 (Z: utalnék itt például olyan, olyan 'I would like to refer to some, some') $[l]_1$ undergoes reduction by delateralization, $[l]_2$ is normative (due to the deletion of d), and $[l]_3$ is also normative. The attested patterns are multifarious and intriguing. The above series of samples faithfully reflects the distribution of phenomena in the total material.

To consider the issue in a more general form, the following statements can be made here concerning strength degrees.

(i) The serial order of instances of diverse degrees of the reduction of multiple (identical) targets is random if the speech sounds concerned do not belong to the same word but are separated by word boundaries.

(ii) Irrespective of whether there is some regularity or otherwise in the occurrence of diverse degrees of reduction on identical segments, this does not affect the applicability of other types of lenition (like l-deletion in samples IV/634--636) to the same type of speech sound.

(iii) Within the same word, the degrees of reduction can occur in any order (increase in IV/620 and in IV/662, decrease in IV/631 where $[d]_2$ is normative, i.e. exhibits zero-degree reduction, whereas $[d]_1$ is reduced) or indeed constitute a series of reductions of identical strength (e.g. o-delabialization in IV/632).

(iv) Within a single word/sequence the reduced realization of a speech sound does not exclude the occurrence of a normative (zero-degree reduction) instance of the same speech sound (as in IV/631 and in IV/627).

(v) Finally: the strength degree of a given reduction does not depend on the degree of reduction that may precede within the same sequence.

In conclusion, let us formulate the relationship between the total inventory of lenition process types and those of lento realizations. In lento speech, the realization of units makes use of the total capacity of speech production in that (i) all niches (the intersections of all columns and all rows) in A components of the PR matrix are filled in; (ii) the arrangement of A components exactly corresponds to the f plane of the matrix in terms of a mutual one-to-one mapping relation. Conversely, in allegro speech (as distorted by lenition processes) (i) the actualized inventory of A components is incomplete, and (ii) A components are only partially arranged according to the f plane of the matrix. Consequently, the information space -- defined by number of elements and combinations of elements -- in which allegro forms are located are more restricted with respect to both populousness and ordering relations than the information space including their lento counterparts. Hence, assuming that allegro forms are derived from the corresponding lento forms, the following holds true:

T(xxiii) The gestalts of allegro forms (derived from lento forms) are produced by information field reduction. As a result of that transformation, the entropy of an allegro form will increase (as a function of the number of operations and the number of components concerned).

In addition to its phonological import, T(xxiii) gives a general explanation of the fact that an allegro text is more difficult to comprehend than the corresponding lento text.

4. SYSTEMIC CONSEQUENCES

In this last chapter some implications of the foregoing investigations will be summarized which follow from a comparison of lenition processes with the mode of application of other devices, properties, and rules of (the system of) linguistic communication. These will be arranged along the lines of two aspects of speech communication. (i) Phonetic implications in the strict sense (4.1--3) will be related to three major areas of the classical inventory of phonetic devices, voice and voice production, stress, and the dimension of time. (ii) On the other hand, points 4.4--11 below will be devoted to some central topics of the post-SPE period of phonology that still have not lost any of their current interest albeit, as a matter of fact, that interest may not always be commensurate to their real importance.

The claims to follow are regarded to be theorems as above. However, unlike in the previous chapters, these theorems are not presented in the form of concise definitions; rather, they will be described more in detail.

4.1. F_0 and lenition. T(xxiv)

Lenition in glottal activity (the production of fundamental frequency) and that in resonators and mouth-cavity-internal articulators are not completely or closely interdependent, even though those two aspects of speech production are otherwise rather considerably intertwined, as it can be best demonstrated in terms of acoustics (cf. e.g. Tarnóczy 1978, Stevens 1987).

(i) Lack of voice production in the realization of phonemically voiced segments does not necessarily entail the suppression of further articulatory components of the elementary speech event concerned, hence any other kind of reduction of the articulation of that constituent. (This is the most clearly shown by whispered speech in which an overall fortition helps to improve intelligibility.) In natural speech situations it is systematically found that the omission of voice production -- even over an entire phrase -- leaves all other articulatory components intact, cf. the fate of fundamental frequency and the rest of articulatory components e.g. in sample IV/8 (Z: + végül is + 'after all') where the omission of F_0 production leaves all the original, normative, aspects of articulation uninfluenced.

(ii) Another, larger portion of the data, however, reveals that F_0 re-

duction and other forms of articulatory reduction may be more or less closely interrelated. The /a:/ of phrase-initial hát 'well' is realized as [ḁ] in a number of instances although this is hardly ever motivated phonologically in Hungarian. Consider the following set of samples as an illustration. In samples III/1--200, hát occurs ten times. Four of these involve phrase-initial devoicing-cum-reduction (III/6, III/60, III/116, III/160); two others have phrase-initial voiced normative articulation (III/62, III/93); regular voice production with h-loss occurs in the same position once (III/14); and phrase internally there are three regularly voiced instances, one of normative articulation (III/156), one with h-loss (III/44), and one with t-loss (III/22). (Further aspects of this problem will be discussed in 4.10 below.)

4.2. Speech rate and lenition. T(xxv)

The following overview of the major aspects of the correlation, if any, between the tempo of speech and lenition phenomena will be introduced by a brief digression on the notion of 'speech rate'.

In speech communication, the linguistic signs to be conveyed are distributed over a series of consecutive units of time. Depending on the amount of time devoted to the transmission of a message, the tempo of speech (i.e. the number of speech phenomena per time unit) may vary; 'speech rate', then, is the first derivative of speech production in time.

Speech rate is an artificial characteristic of speech, given that both the activity of speech organs and the resulting acoustic phenomena are continually modified during articulation. Modifications are unequal: one speech organ (say, the larynx) may continue to operate in the same way during the whole duration of a speech sound whereas another one (say, the tongue) may significantly alter its movement, the direction of that movement, or its own speed of articulation. However, the term 'speech rate' is ambiguous: it may be relatively rapid even under slow articulation if several consecutive phonological units are articulated simultaneously. It is generally the case in natural speech processes, especially in allegro speech, that adjacent articulatory sections covering the same duration may transmit a varying number of phonological units. (As a consequence, the determination of tempo only makes sense if the number of elements uttered per time unit is investigated over longer periods of time.) If we do not want to restrict our attention to the

velocity of individual articulatory movements but try to consider linguistic communication as a whole, the units to count per time unit should basically be linguistic constituents of the message; that is, phonological entities. In terms of larger samples, however, there is no contradiction between articulatory facts and linguistic factors given that the structure of sequential time patterns of speech corresponds to 'chance variants' of linguistic activity, as is represented in chains of events in Markovian processes (cf. Schwartz--Jaffe 1968). Accordingly, articulatory patterns involving more vs. fewer linguistic elements will be levelled over longer stretches of speech. On the whole, phonetic/phonological correspondences are rather close in this dimension, too. At the segmental level, such close correspondence is demonstrated by the fact that any error in the timing of a given phoneme tends to be compensated for, in natural (lento) speech, in that of a subsequent phoneme, at least within a syllable (cf. e.g. Huggins 1968).

With respect to absolute speed values, we have to accept the fact that speech production has its own physiological and perceptual limitations as a point of departure. Speech rate can obviously not surpass a value calculated on the basis of maximal velocity in producing a speech sound and of minimal transition time to the next. That value can be as high as 15 to 20 speech sounds or ten syllables per second. Actual average speech rate, of course, is less than that, and depends on a number of circumstances. Some of these are individual factors like sex, age, social role, speech situation, the speaker's actual intentions, his current attitude to the listener and to the topic, as well as the message itself, its contents and form. General factors on the other hand include the particular language and dialect (for tempo-related properties of these, cf. Horger 1929, 29--30 with respect to Hungarian and Malécot--Johnston--Kizziar 1972 for a general overview). It is easy to see that, given such complex dependencies of speech rate, it is by no means sufficient to cite numbers of items per minute or second if we want to characterize the speed of a given speech flow in terms of the full background to timing. Although vocal phenomena are crucial for speech rate determination, the intensity of accompanying gestures is also rather important with respect to a subjective perception of the tempo of speech. The listener is likewise influenced by whether the speaker speaks in what is called a raised voice: loudness is quite difficult to separate, in tempo perception, from measured

speech rate as derived from timing patterns. The actual circumstances, once more, are relevant since each speech situation or topic has its own inherent (possibly neutral) tempo requirement. The single phonetic factor in a strict sense that appears to be irrelevant for tempo perception is pitch. The fact that the influence of these factors or components is not restricted to timing properties of single speech sounds is demonstrated by indirect evidence as well. As historical phonological research concerning Hungarian has shown, temporal factors are largely responsible for a number of tendencies in sound change (cf. Kubínyi 1958). Nevertheless, it has to be pointed out that present-day phonetic experience suggests that the term 'speech tempo' must have been a metaphor for lenition phenomena in those historical studies.

To come back to the relationship between lenition processes and speech rate: in general we can state that in allegro, as opposed to lento, tempo is more or less related to all types of lenition.

(i) Reduction and speed are related inasmuch as the decrease of articulatory durations is part of reduction.

(ii) Deletion exhibits a more intricate pattern in this respect. By definition, the pronunciation of flanking elements on both sides of the deletion site will tend to approach lento or normative equivalents, occasionally reaching an optimal level of the latter counterparts. Accordingly, given an /f_j f_{j+1} f_{j+2}/ phonemic representation, its [f_j f_{j+2}] surface version (with phonetic traces of [f_{j+1}]) may result in a higher relative speech rate than its lento equivalent, [f_j f_{j+1} f_{j+2}], since the former takes just as long as the realization of a /f_j f_{j+2}/ phonemic form.

To illustrate the effect of deletion on speed, it will be expedient to select an example that can be immediately contrasted with the opposite case, a phonemically similar form that shows a subtype of fortition. The example is an allegro version of <u>tehát</u> 'therefore' with deletion from sample III/257 (M: <u>tehát végül is</u> 'so, after all'), as opposed to <u>teát</u> 'tea-ACC' (cf. 3.4.2 (iii)). Note that the possible phonetic representations of <u>tehát</u> in allegro clearly correspond to a narrowing of the phonemic representation -- without, however, creating surface homophony with any allegro form of <u>teát</u>. (Such homophony does occur elsewhere, e.g. in allegro [va'l:ɑt] ← <u>vállalat</u> 'company' vs. lento [va'l:ɑt] ← <u>vállat</u> 'shoulder-ACC': but these cases belong to the section on morphophonemic alternation, cf. 4.11 below.) Both the tempo-

ral narrowing due to deletion and the corresponding increase of speech rate are directly evident on the basis of the phenomenon at hand.

On the other hand, if deletion involves suppression of lenition processes on flanking segments, as it does in the example cited, it will also slow down the flow of articulation. Hence, deletion has two simultaneous and opposite effects on speech rate.

(iii) In cases of loss, as follows from the definition of this type of lenition, there are no phonetic traces involved. Thus, the speed-increasing effect of loss follows directly. It goes without saying that a mirror-image fortition process has the opposite effect. For example, the allegro versions of miért 'why', [me'r] and [mie'], both involving t-loss, yield an increase of speed of articulation over lento [mie'rt], ceteris paribus. On the other hand, a fortitive phonetic representation [me'rə] of the subderivative morphophonemic alternant of miért, /me:r/, entails a decrease of tempo in the dimension of sign transmission.

(iv) Reduction over the sequence increases speech rate without any restriction.

(v) Sequence size truncation increases speech rate without any restriction.

(vi) Fusion increases speech rate without any restriction.

Let us finally consider the effect of the second derivative of speech in time, i.e. the changes of speech rate: acceleration or retardation, on the occurrence of lenition processes in allegro speech.

The increase of speed -- under identical communicative circumstances, i.e. with all components of the speech situation held constant -- does not necessarily entail the occurrence or proliferation of various types of lenition over the speeded-up portion of the utterance.

(i) A temporary increase of speech rate and the number, intensity, or pervasiveness of lenition phenomena are not at all interrelated if, for instance, the sole purpose of speeding up is to conclude your sentence before being interrupted. In sample I/79 (M: akkor megint ott vagyunk, mint az elő-zõ 'then we are back where we were before'), it is only in the trill of [r] that slight lenition can be observed, and even that can be explained as a secondary consequence of the strictural effect of the subsequent [m]; t-loss

in megint 'again' is rather customary in natural pronunciation, even in a near-lento style. But there is no n-reduction in megint, or a perceptible degree of nasalization on [i] in the same word; the [k:] is of a normative length, and the [t] of mint 'like' is also quite regular. Similarly in sample I/352 (I: satöbbi, és hogyha 'nagyon 'and so on, and if it's very') the only extra modification in the speeded-up portion is a general shortening of the vowel durations. Increased tempo does not entail more lenition than in normal-speed utterances even where speeding up occurs outside of the content words involved in the sentence: in sample II/397 (Z: + ami nem kevés pénz, azt hiszem 'not a small sum, I think') the clause azt hiszem 'I think' does not exhibit any surplus lenition other than the illabialization of [m], in addition, of course, to the t-deletion that is quite customary in this particular sequence.

(ii) Lenition occurs under decreased tempo as well. In sample I/93--4 (G: vagy ezt kell, vagy azt kell 'you must do either this or that') there is t-deletion with [z] → [s] assimilation, showing that some lenition processes are part and parcel of Standard Hungarian pronunciation programs in that they are quite regular even in slow or deliberate speech.

4.3. Stress and lenition. T(xxvi)

The positions of stress in allegro speech strictly obey the first lento rule of stress assignment saying that "word level stress always falls on the initial syllable of an independent morpheme" (Szende 1976a, 120), such that the morpheme involved is usually a stem but may occasionally also be a formative. They do not observe, on the other hand, the second lento rule that assigns secondary stresses on non-initial odd-numbered syllables (of noncompound words of more than two syllables). The particulars of stress in allegro speech are as follows.

(i) In allegro, stress may be shifted onto the second to nth syllable of a word if the pretonic syllable can be interpreted (by the speaker) as an independent morpheme on the one hand and the word has a 'highlighted' communicative role, i.e. if it constitutes a prominence peak of the utterance on the other; cf., for example, leg'pontosabban 'most accurately' (where leg- is the superlative prefix). As opposed to the corresponding lento rule, another difference is that in allegro stress may signal any type of (communicative)

prominence from contrastive topic to corrective syllable-repetition, or even -- in a situation involving several speakers -- the signalization of a turn-taking or contribution-starting intention.

(ii) Lenition processes may significantly modify the implementation of stress. The prominence peaks of word forms are hardly influenced by lenition processes, whereas unstressed syllables usually undergo various types of lenition. Of the latter, the one that is most compatible with stress is reduction; the least compatible (in fact, mutually exclusive) type being sequence size truncation. Their primary role with respect to stress is that they have a distortive effect on the pretonic part of the sequence in a contrast-enhancing manner such that distortion will secondarily contribute to the highlighting of the subsequent stressed item. This secondary highlighting effect is not shown by initial syllables that precede a prominence peak within word boundaries. (For instance, in sample IV/11 (Z: + És ez volt a legproblematikusabb 'And this was the most problematic'), the phrase initial sequence És ez volt undergoes reduction over the sequence before the predicate legproblematikusabb (stressed on the second syllable) but word initial leg- 'most' that immediately precedes the stressed syllable remains undistorted.) A parallel device for local foregrounding is the fortition of (some constituent of) the stressed syllable. The locus cited above provides an example of that in the immediately preceding sentence. In sample IV/10 (Z: + Szóval 'nem. + Igen. 'So you don't. Yes') the realization of Szóval nem is [[s$^{\text{ə}}$? 'nɛ̨m:w̃]].

4.4. Neutralization and reduction. T(xxvii)

Due to lenition processes, neutralization eliminates a number of phonological oppositions at various levels of the sound system. Taking Davidsen-Nielsen's (1978, 162) definition of neutralization as "contextually determined loss of one distinctive dimension ... $[^{+}_{-}f] \rightarrow \emptyset$ / x ___ y" (original italics) as a point of departure, it has to be added that a large number of contexts may induce neutralization and that several dimensions may be simultaneously lost in Hungarian allegro speech. Note further that 'distinctive dimensions' actually refer to pairs of feature values in terms of Jakobsonian binarism and 'loss' suggests the invalidation of the distinctive role of such pairs of features. For instance, word final /t/ and /d/ may occasionally fail to be distinguished at the level of realization even in Hungarian;

i.e. the pair /t d/ may undergo the rule [+voice] → ∅ / __##.

The occurrence of neutralization is subject to a number of restrictions as follows. (i) Cases of neutralization are usually occasional, i.e. a given type of neutralization does not necessarily repeat itself in all relevant contexts, for all speakers. The following theoretical remark is in order at this point. Phonological treatments of neutralization (cf. Davidsen-Nielsen 1978, 22--157) take it to be an obvious criterion for neutralization that a certain dimension be lost in all appropriate contexts. However, several contextual factors may appear simultaneously in surface representation, the interference of which may destroy the uniformity of outputs. If, for instance, German /d/ is subject to both rules (a) and (b) below,

(a) [+voice] → ∅ / ___##

(b) [-voice] → [+voice] / ___#d

the net result is that Bund 'league' is realized as [bunt] in absolute word final position but as [bund] if it appears e.g. in Bund, der 'league which'. Whereas rule (a) eliminates the voiced/voiceless dimension, rule (b) invalidates t/d neutralization, the origin of which can eventually be traced back to an (a)-type rule. As a result, the voiced/voiceless neutralization of t/d is relativized at the level of concrete surface operations. We can therefore claim further that there is a s/z neutralization in Hungarian allegro speech (e.g. száz 'hundred' vs. szász 'Saxon', kéz 'hand' vs. kész 'ready') even if the rule [+voice] → ∅ / ___# only applies in part of the possible cases, due to overlapping context effects.

(ii) Neutralization may result in homonymy, as in kéz/kész, száz/szász above, where lexical interpretation cannot be based on word-internal phonetic data. It is clearly the case that the number of such lexically neutralized pairs is small. However, homonymy is not considered to be a criterion for (phonetic) neutralization, although it may come about as a by-product.

The foregoing examples were restricted to instances of neutralization involving a single distinctive dimension. With respect to allegro forms, the most striking peculiarity is that a particular segment of the utterance may simultaneously lack phonetic representation of a number of features. As was intimated in 4.1, neutralization does not exclusively concern the features of consonants but may involve vowels as well. The distortion of the labiality and (occasionally) the height feature of [a], as well as the neutraliza-

tion of the (originally) long/short opposition in it is a common phenomenon. Given that in /a:/ realizations we also often find shortening and a loss of illabiality, we are faced with a case like [ɑ] → [a̯] ← [a:], where the middle element is the "archiphonemic" result of an /ɑ a:/ neutralization. A detailed overview of neutralization of all the relevant pairs of features in terms of individual segments will not be provided here. But it is to be noted that, in extreme cases, neutralization may result in the reassignment of a whole class of segments to the set of underspecified items via a series of feature omissions. In sample IV/11 (Z: + És ez volt a leg'problematikusabb 'And this was the most problematic'), reduction over the sequence És ez volt yields [[ʳʃəzvət]] where all distinctive dimensions (except the feature 'vocalic') are eliminated.

4.5. The theorem of primary distinctivity -- 'Primary phonological discrimination' and distortion. T(xxviii)

Distortions in natural speech communication, i.e. the processes of lenition and fortition, apparently apply indiscriminately to all distinctive properties that are involved in the description of the system of elementary phonetic/phonological components. However, a detailed investigation of distortion phenomena in allegro speech reveals that some distinctive features are more frequently eliminated than others -- obviously by lenition rules in most cases. For instance, the feature of nasality in the appropriate set of consonants almost imperturbably survives lenition -- so much so that it even remains (in the context) when the segment itself is deleted. (The explanation is straightforward. In a natural physiological position the nasal cavity is not shut by the uvula and the velum in the direction of the mouth cavity; hence, such separation counts as a deviation from the neutral position; therefore it requires an extra effort. Accordingly, as lenition processes in general tend to reduce the actual amount of articulatory effort, the retention of nasality is an instance of facilitation corresponding to the general tendency of lenition. The result is that the 'lowering' of the uvula and the velum -- obviously saving energy as it goes in the direction of the force of gravity -- reinforces lenition exactly by retaining the nasal component.) On the basis of the above explanation of the persistence of nasality, we expect the opposite to hold with respect to labiality. This is what really happens:

the decrease of labiality is a rather common type of vowel reduction, sometimes going as far as a complete erasure of that feature. As has been demonstrated on another experimental material (cf. Szende 1969, esp. 369--70), the degree of labiality on stressed labials is higher than on their stressless equivalents, and the same holds true with respect to long vs. short labial vowels as well. Since stressed vowels are by definition more fortitive (tenser) than unstressed vowels -- and since the long/short opposition was also argued to be more properly characterized in terms of tense vs. lax (cf. 2.1.5.1) -- the 'laxing' of labiality is also an instance of facilitation. A putative principle of articulatory economy has a devastating effect in allegro speech: it is especially frequently the case that roundedness suffers realizational losses.

Lenition processes do not even spare articulatory components that, on the basis of both their articulatory and acoustic distinctiveness, are regarded as primary. In one type of reduction of consonants, closure loosening (and especially in the extreme case of closure elimination), the component that gets lost is one that is fundamental e.g. in Jakobson's (1956/1969, 52) universal phonetic typology involving two 'primary triangles' with vertices for /a i u/ and /p t k/, respectively.

It is quite clear that we have to maintain 'primary' vs. 'non-primary' as a classification of features (among other things, in terms of iconicity as proposed by Dressler 1980, esp. 117). But if we do, the following question suggests itself. Which phonetic components of segments can be regarded as primary or "really" primary? On the basis of its high stability, nasality is a likely candidate. However, the primacy of that feature would not stand a crucial phonological test: nasality can only perform a highly asymmetrical partitioning of the elements of sound systems. In Hungarian, for example, it does not involve the class of vowels at all, and of consonants, too, it only covers three short and three long phonemes. (This limited occurrence is reflected by distributional data as well. In terms of lexical loadedness, /m/, /n/, and /ɲ/ occur in a total of 8.64% of the cases, cf. Hell 1983, 46; even in spontaneous speech nasality appears in a mere 12.46% of all segments, cf. Szende 1973, 30--1.) If, on the other hand, we choose the opposite path and say that features of high discriminatory potential must be selected as primary, hence features that discriminate between large classes like vowels and

consonants in all languages, we unavoidably end up in a puzzling situation. First, the research of phonological universals has not yet reached a Faustian moment in which such features could be determined in a non-contradictory manner. Whether we opt for sonorant/nonsonorant, vocoid/contoid, syllabic/nonsyllabic or vocalic/consonantal as a primary opposition, the criteria for primacy remain unsatisfied if the 'universality principle' is maintained (cf. Cseresnyési 1985, 91--9). Secondly, even if we accept, with some justification, that the most important major classificatory feature in Hungarian is the one that tells vowels from consonants, adding that the definition of vowels is based on the presence of 'full harmonic voice', we are still faced with contradictory acoustic facts in allegro speech. A vowel that gets saturated with noise components from its context (e.g. when preceded by [s] or [h]) and/or is whispered (or more exactly: devoiced, since whispering is an articulatory phenomenon that cannot be interpreted except as characterizing a whole sequence, cf. Szende 1976a, 122) will preserve its vocalic character without pure voicing; this is especially the case with phrase-initial voiceless vowels that are due to delayed VOT in most cases.

There is only one distinction that remains uninfluenced by any lenition process, and even that can only be described in acoustic terms. Segments invariably keep their '(acoustically) ordered' vs. '(acoustically) unordered' structure -- defined by the requirement of (partial) ordering of the acoustic components that constitute a unit -- as opposed to other classificatory criteria in terms of which they may shift class in some varieties of reduction. The segments that belong to one of those groups prior to the application of lenition rules will be found in the same group after those processes have applied. Given that no language has a sound system in which an element or group of elements could be delimited, in a concrete manner, by the criterion referred to (in accordance with other signs/oppositions); the property of [$^{+}_{-}$ acoustically ordered] is to be taken in a phenomenological sense to be a notional delimitation of a higher level of abstraction than Trubetzkoy's (1939) oppositions or the features of Jakobsonian binarism. At the level of operations that segments may undergo, manifestations of 'ordered/unordered' may be of diverse sorts (for instance, vocalic/consonantal is one of these) but all of them can be traced back to a common basis.

It is not my purpose here to draw any paleophonological conclusion from

the foregoing. But if we wanted to postulate some protolinguistic unit in a typological or historical sense, as Gyula Décsy posited an EH/HE proto-sound continuum [Urlautkontinuum] -- a sound-product [Lautprodukt] simultaneously involving all the components, i.e. vocalicness and consonantality, voice and unvoiced character, etc., a segment may theoretically take, cf. Décsy (1977, 44--5) -- we would be forced to say that the line of demarcation must have corresponded to the acoustic distinction between 'ordered' and 'unordered'. (Such a claim would necessarily lack any direct justification, however.)

4.6. Boundary features and lenition. T(xxix)

The occurrence of lenition processes is highly dependent on the way sequences are organized by morphological, grammatical, and pragmatic/communicative boundaries. As was pointed out in the section on reduction over the sequence (cf. 3.4.4), that process by definition relates to boundary symbols inasmuch as reduction applies from boundary to boundary within the sequence (cf. sample III/50--51 as discussed in the section referred to). The correlations between sequence size truncation and boundary features -- as well as those between fusion and fission and boundary features -- are equally clear. (Note, however, that the definitions of fusion and fission actually included their dependence on morpheme boundary features, whereas loss and deletion were neutral with respect to morpheme boundaries.)

However unambiguous the correlation between the distortion processes listed and boundary features may be, this does not at all mean that the (domains or sites of the) processes should coincide with the points where boundary symbols are expected to occur as determined by phonemic representation. Temporal non-coincidence or loose overlap of domains between any phonetic representations of boundary symbols as are occasionally expected to occur in lento speech and distortion processes is clearly illustrated by devoicing. More exactly, the illustration involves devoicing as a type of reduction occurring initially in a sequence or part of a sequence. It is a rather well-known characteristic of allegro speech that in such positions voice onset is often delayed (i.e. VOT is longer than in lento speech).

Irrespective of which possible version of 'delay' is attested at the given point, i.e. whether voicing is built up slowly (protracted voice onset) or is shifted from the beginning of articulation to a later point (de-

layed voice onset in the strict sense), it adds two significant items to the peculiarities of allegro speech. (i) It is not restricted to the first phonemically voiced segment of the sequence but rather omits voicing throughout a longer portion of what is phonetically represented as voiced in lento. In sample IV/356 (I: vagy, hát, jobbik eset 'or, well, a better case') this amounts to several syllables. In samples IV/534--536 (Z: + az anyagi szempontok. + Szóval egy tanító, + 'the financial aspects. Well, a teacher'), even the vowel following the second word boundary, i.e. e, is voiceless; in the same sample, delayed voice onset is complemented by sequence size truncation on Szóval 'Well'; and the nasalized quality of egy 'a' suggests that, at the beginning of the second phrase, the physiological position of undisturbed breathing (in which the nasal cavity and the mouth are not separated) has not been changed into the arrangement characteristic of speech production (in which the velum and the uvula close the choanae, blocking the nasal cavity as a resonator). (ii) It may also happen, on the other hand, that the omission of voicing is not restricted by the boundary in the opposite direction, either, but shows up towards the end of the preceding phrase. In samples III/333--334 (I: + szóval ez idézőjelbe(n), hogy "kötelező irodalom" 'well, this in inverted commas, "set readings"'), phrase boundary is between hogy 'that' and kötelező irodalom 'set readings'. The conjunction hogy, with /ɟ/-deletion and o-reduction, is voiceless, but of the following phrase-initial sequence, it is only the [[kˑ]] -- incidentally, exhibiting a [k] ⟶ [[kˑ]] lengthening due to the /ɟ/-deletion -- that is voiceless. Of course, this is in keeping with the phonemic representation; but the [[o̥]] representing /o/ is not. So, the VOT delay that signals the boundary has shifted to the end of the previous phrase.

The foregoing facts also constitute proof of the global programming of the articulation of a sequence (cf. 2.2.2.3(iii)): in the programming of a sequence as a whole, the phonetic representation of the sequence may contain portions of various degrees of 'elaboratedness'. They may be either partially or fully specified or contain more or less articulatory information. In this way, the sequence takes a peripherial--central--peripherial (hierarchical) structure with respect to its articulatory programming. Wherever such hierarchically programmed parts of sequences are flanked by boundaries, this is a matter of producing constructions that correlate with morphophonemic,

grammatical, or pragmatic/communicative units. Their components do not form a linearly ordered set of units of equal degree of individuality but rather a set of constituents that are unequal in terms of identifiability. Differences in the depth distribution of peripherial vs. central elements show up in other aspects of communication as well: the information value of elements at morpheme boundaries is considerably higher than that of morpheme-internal ones (for Hungarian, cf. Szende 1973, 46); and the distribution of pause durations in terms of structural levels yields similar conclusions, too (cf. Sallai--Szende 1975, 11--2).

4.7. The suppression of double effects. T(xxx)

Several factors of lenition/distortion affecting the same segment (and otherwise resulting in the same modification) cannot join forces: they will give the same result together as they would one by one. Hence, there is no 'double lengthening' or 'double fortition'.

In sample I/237--8 (M: De elképzelhető, dehát ezt 'Yes, it is imaginable, but this'), two lenition processes apply in de elképzelhető (I/237): (i) either $\underline{e}_1$-loss or $\underline{e}_1$-deletion, the exact analysis is immaterial (pending further considerations); (ii) $\underline{l}_1$-deletion, with concomitant $\underline{e}_2$-lengthening. In accounting for the lenition process in (i), we have to consider the following. Via $\underline{e}_1$-loss, a higher number of components (including tongue height and illabiality) would be elided. However, the phonotactic structure of the phrase (in particular, the fact that the unit at hand is followed by three syllables containing illabial vowels of the same tongue height) provides no phonetic motivation for this. On the other hand, $\underline{e}_1$-deletion allows for the survival of some components in the form of phonetic traces. Hence, $\underline{e}_1$-deletion -- as a classification of the process -- involves operations to be performed on a smaller number of items than $\underline{e}_1$-loss does. Consequently, we will choose $\underline{e}_1$-deletion as the appropriate label. But in that case $\underline{e}_2$-fortition is expected to occur. The problem is that, in this example, the fortition of $\underline{e}_2$ follows by definition both from $\underline{e}_1$-deletion and from $\underline{l}_1$-deletion. Consequently, $\underline{e}_2$ should exhibit double fortition. However, the realization of $\underline{e}_2$ is not [[ę:]] or [[ę:·]]; it is simply [[ę·]]. This can be interpreted in two alternative manners. (i) We could say that one of the lenition processes does not in fact apply. This leaves us with a single deletion process, in which

case the surface result, the [ɛ̯ː] realization of the verbal prefix el-, can be derived neatly. (ii) The other interpretation supposes that both lenition processes actually apply but the fortitive influence of one of them does not affect e_2. Given that we have to assume both e_1-deletion and l_1-deletion because neither segment is actually represented as such in the process of articulation, the interpretation in (i) is untenable. But then we have to find out which deletion process results in the lengthening of e_2. That dilemma obviously cannot be resolved by experiment or by instrumental investigations since both interpretations yield the same acoustic output. The only way out is to note that e_2 is more closely related to l_1 (they are not separated by a word boundary and are likely to be coarticulated): /#dɛ̯#ɛ̯lke:pzɛ̯lhɛ̯tɑ̯:#/. Consequently, we will attribute $e_2 \rightarrow$ [ɛ̯ː] to l_1-deletion.

On the basis of the foregoing, the above rule can be completed as follows. Whenever two lenition processes (deletions) apply such that their secondary effect should concern the same segment, once the first process has accomplished that secondary distortion and thereby settled the relation between the given segment and the phonemic representation (once and for all), the other lenition process (deletion) will have no similar secondary effect. In addition, it is likely that the particular lenition process producing a secondary effect will be the one whose primary target is structurally more closely related to the segment in question.

4.8. Lenition and semantic neutralization (the 'discourse modifier' position). T(xxxi)

Discourse modifiers are constructions lacking any propositional content (in Hungarian: azt hiszem 'I think', tudod(?) 'you know(?)', szóval 'well', and the like) interrupting the transmission of thematically homogeneous linguistic events that describe a state of affairs and specifying the relationship between speaker and listener(s), speaker and topic, or speaker and the speech situation instead. Discourse modifiers may be monomorphemic (e.g. hm 'ahem', hát 'well') or coincide with phrases that are used in a propositional/descriptive manner elsewhere (azt hiszem 'I think', nem tudom én 'I don't know', etc.). The usual term for such items, 'discourse marker', emphasizes their delimitative function (cf. e.g. Schiffrin 1987, 36). But that term would only be appropriate if the sites where these items occur could always

be determined by independent (syntactic) criteria. It is more felicitous to use semantic/pragmatic criteria and the less specific term 'discourse modifier' that more clearly suggests the relation of these components to the adjacent descriptive portions of the utterance. In addition, 'discourse modifier' refers to the phatic function of these items as well. This change of terminology is further justified by the fact that although discourse modifiers may indeed mark off constituents -- as Schiffrin (loc.cit.) writes, they may "bracket the units of speech" --, this is not necessarily the case.

The special communicative function of discourse modifiers is reflected by their particular phonological behaviour. As opposed to descriptive Nem tudom 'I don't know', the grammatically and semantically identical discourse modifier nem tudom / Nem tudom (where the first version is a clause and the second is a sentence) cannot undergo fortition. As its referential function -- Darstellung in Bühler's (1934) Funktionsmodell -- is lost, the phrase becomes non-eligible for fortition. (This is because fortitive Nem tudom would automatically be interpreted as a predication.) Such incompatibility of discourse modifier status and fortition remains true even if the expression of emotions may modify neutral intensity or pitch patterns (cf. mit tudom én 'how should I know' → [ˈmit:ᵘdomˈe:ˈn]). The emotional component does not imply the fortition of phoneme realizations, it merely changes suprasegmental structure. That change may then, as a sign of suprasegmental overstrain, coincide with fortition of single segments (e.g. their lengthening). Lenition is a different matter. Descriptive equivalents may obviously be lenited as well -- but the occurrence of lenition in the two sets exhibits a difference of magnitude.

If reduction, deletion, and loss, compared to one another and to other types of lenition, constitute "adjacent portions of a single strength scale" (cf. 3.5); then discourse modifiers in general

(i) undergo lenition more often and to a larger extent;

(ii) tend to attract more intensive types of lenition than their equivalents in a semantically strong position. For example, the case-marked noun szóval 'with (a) word' as an instrumental constituent will undergo reduction at most, whereas the adverb szóval 'so; that is; in a word' as a discourse modifier will typically undergo deletion or loss.

4.9. Conclusions concerning the unity of morphophonemic code. T(xxxii)

It is evident that the various dialects of a language (using that term in a purely phonological sense) systematically differ (i) in their segmental and morphophonological systems in terms of the number of elements as well as the arrangement of the inventory of elements; and, simultaneously, (ii) phonetically in the way allophones/surface variants are distributed. An example of such variation is found within the vowel inventory of Standard Hungarian that is organized into two systems; the full inventory is subdivided into a subsystem containing /e ɛ/ and one containig /ę/ (cf. Imre 1971, 58); a similar subdivision of the consonant inventory into a (regional) subsystem containing /l l̇/ and one containing just /l/ (cf. Benkő 1953) exhibits differences both in the number of elements and in terms of articulatory variants. We take it to be a general truth that dialects -- Bernstein's (1964) 'codes' or Labov's (1972) 'sociolinguistic patterns', to use some of the wide-spread terms -- have their own sound systems (independently describable in a sociolinguistic sense), although exhibiting significant overlap with one another. Accordingly, Imre (1971, 57ff, esp. 58 and 1980, esp. 22--3) recognizes phoneme system types (or sound system types, where a sound system contains phonemes and poliphonemic sounds alike) as codes that define dialects including both identical and different elements. In set theoretical terms: the inventories of the systems are not in the relation of 'proper inclusion' with one another. For instance, the larger inventory (like the vowel subsystem containing /e ɛ/) does not simply include the smaller inventory; this is motivated by the fact that the phonological correspondence (/e ɛ/ ◄—► /ę/ in the example) is not supported by a parallel phonetic correspondence. (The latter would either have to be [ę ɛ] ◄—► [ę] or [e ɛ] ◄—► [ɛ]; but neither of these correspondences actually holds.) Needless to say, a mono-dialectal speaker will normalize data into his own dialect via some simple or complex (set of) transformation(s). On the other hand, we might think that a speaker who can use both dialects actually possesses two systems between which (or between subsystems or elements or alternants of which) he perpetually performs 'code switches'. This latter view is present in the current literature of phonology, represented in a pure form by Dressler--Wodak (1982), a detailed study written in the framework of Natural Phonology and contrasting Viennese German with Standard Austrian German (and Literary German). In what follows, I

will show another way of accounting for the facts in terms of the theorem of 'global programming' (cf. T(xix), 2.2.2.3). The conventional approach -- as presented by Dressler and Wodak (1982, esp. 342--9) -- is as follows.

As regards phonemic (underlying/input) representations of realizations ('phonetic' or 'output forms' in the original) of an identical grammatical/syntactic role, Dressler and Wodak (1982, 346ff) posit different patterns in the respective dialects. Thus, for Viennese German (/iç/) [gi:p] 'I give', they posit /gi:b/, as opposed to Standard Austrian /ge:bɛ/ 'id.', and point out that this verb -- as well as a number of other verbs and nouns, including Baum/Bäume 'tree/trees', Haut/Häute 'skin/skins' -- is based on structurally different verbal paradigms in the dialects involved, those paradigms being structural units of distinct linguistic systems (thus /gi:b/ for (ich) gebe 'I give' is that of the independent system of Viennese, /ge:bɛ/ that of Austrian, and /ge:bə/ that of Bühnendeutsch). Note that Dressler and Wodak (1982, 348) unambiguously refer to the differences among those paradigms as independent morphological units in the three dialects. Thus, they assume an inherent full homonymy between Viennese /gi:b/ (1sgInd) and /gi:b/ (2sgImp). This assumption is hardly convincing. It is simply due to the fact that the authors insist on an undivided individuality of phonological representation and restrict their account to a single dimension.

First of all, notice that the putative homonymy -- like all homonymy -- is resolved. The identification of Viennese /gi:b/ as (ich) gebe 'I give' is immediately possible within the phrase if it occurs as /i: gi:b/. Disambiguation may in some cases be postponed to a rather far-away point in the context. The authentic interpretation of the first word form in an abbreviated (i.e. pronounless) representation of (Ich) gebe ([gi:p] ← /gi:b/ in Viennese pronunciation) 'ne Karte und damit ist es fertig 'I will give [him] a card and that's all' may require reliance on a previous sentence uttered by the same speaker or his interlocutor.

The realizations of Viennese /gi:b/$_1$ and /gi:b/$_2$ are non-distinct: both surface as [gi:p]. On the other hand, /gi:b/$_1$ and /gi:b/$_2$ are historically non-homotypical (i.e. they go back to two different historical antecedents). It is also clear that Standard Austrian has two different phonemic representations corresponding to Viennese /gi:b/$_1$ and /gi:b/$_2$. Finally, any speaker of Viennese will also be familiar with the standard equivalents and use them

unproblematically both as a speaker and as a hearer when he changes over to Standard Austrian. To describe this situation, the authors refer to 'input switches', i.e. acts of switching between linguistic systems (or rather between paradigms taken from distinct linguistic systems) by applying what the authors call 'bidirectional input switch rules' (Dressler--Wodak 1982, 348). To put it simply, the speaker establishes correspondences between segments or full word forms of the two dialects, using one or the other as required. For instance, Standard Austrian /y/ as in hübsch 'pretty' is represented by [i] in Viennese and ist 'is' as a full word form is represented by /i:z/. Thus, the speaker would do the following on this account. (i) He would keep two dialects simultaneously in mind, actually using one as the sociological conditions require and relying on the other in producing certain word forms either as a source or as a point of reference. Also, (ii) he would perform a 'switch' during the realization of almost every word, applying the appropriate input switch rule to the whole or some part of the given form. However, the fact that the speaker is able to produce speech obeying the norms of one dialect in a "pure" form (i.e. consistently, without errors) is by itself an indication that he uses one, rather than two, system. If this is so, another account is called for.

The point of departure for that alternative explanation will be our observations concerning Hungarian allegro speech. Lenition processes appearing mostly in unstressed positions (especially those of reduction, deletion, and sequence size truncation) assign a realization of a different hierarchical order to some phonemes of the sequence as opposed to positions that are left uninfluenced by lenition rules.

In our typology of lenition processes (cf. 3.4) we saw that in reduction it is only some of the appropriate articulatory components that realize the phoneme at hand, in deletion there are merely some hints at it, whereas in sequence size truncation the realization of (part of) a sequence will be a unitary, homogeneous articulatory process covering a number of phonemes. Thus, depending on the exact position within the sequence and other factors, a phoneme will be represented by realizations of diverse degrees of individuality. The differences between phonemes of non-identical individuality will show up in the distribution of their realizations. Units of the first (highest) grade of individuality reach a full degree of self-identity both artic-

ulatorily and acoustically. Returning to German for illustration, this means that /m/ is uniformly represented by [m] in all dialects; that is, we find a fully valid /m/ ⟷ [m] correspondence. (This claim is not undermined by the fact that, outside the purview of that correspondence, [m] will spread its nasality in some non-standard dialects onto adjacent segments, for instance to both [ʃ] and [i] of geschmissen 'thrown'.)

No such one-to-one mapping is applicable to units of the second to nth degree of individuality. If /k/ is pronounced in two dialects as [k] and as [kˀ], resp., this correspondence is of the 2nd degree: /k/ ⟷ [{k; kˀ}]. The index of individuality grows with variability. Word-final /e/ will be of the 3rd degree in the three German dialects discussed by Dressler and Wodak (op.cit.): /e/ ⟷ [{ɛ; ɔ; ø}], and so forth. Individual sequences can also be described in these terms. Thus, gebe 'I give' in Viennese, Standard Austrian, and Literary German will be represented by

(a) $g \begin{Bmatrix} i: \\ e: \end{Bmatrix} \begin{Bmatrix} p \\ b \end{Bmatrix} \begin{Bmatrix} ø \\ ɛ \\ ɔ \end{Bmatrix}$

or

(b) g {i:;e:} {p;b} {ø;ɛ;ɔ}

Units of the first degree of individuality will have few surface variants as opposed to those of the 2nd to nth degree. The former are more stable both in terms of articulatory mechanisms and identifiability; that is, the latter allow a larger variety of articulatory mechanisms and they can be identified in themselves with a lower success rate. Furthermore, the former correspond to strictly programmed points of the sequence, whereas the latter correspond to (more) loosely programmed portions.

As can be seen in the expanded phonemic representation written as (a) above, each row of the representation contains realizations belonging to the same dialect. In the top row we have Viennese /i:/, /p/, and /ø/ after the first-degree (or constant) /g/. The next row reflects the Standard Austrian form whose second-degree elements are /e:/ and /b/. The Bühnendeutsch equivalent can be read off the display as follows. /e:/ and /b/ are found in the second row since they are identical with the corresponding components of the Austrian form, whereas the word final unit, being of the third degree of individuality, occupies all three rows, of which the lowest stands for Lit-

erary German. This graphic arrangement suggests the redundancy rule saying that e.g. in Viennese only the first row of alternants is in force. The full three-dialect phonemic representation will be restricted in each dialect to one in which a single item occurs in each phonemic position of the sequence. Which of the possible alternants actually occupies the given position will be determined by a rule of selection that characterizes/identifies the dialect being currently used.

The theorem of "one language -- one phonological code" proposed here, like probably all scientific explanations, has to face two general queries. These do not directly concern the internal coherence of the given account -- but rather its value or authenticity. If we think that, given two possible explanations, it is always the simpler that is the better, we can see that to posit a single segmental phonological code is more economical. In Dressler and Wodak's version three independent codes are postulated, and the elements that are common to all three have to be counted three times, involving an unwarranted increase of the number of items in the phonological inventory. (For instance, /m/ figures three times, /e:/ twice, and so forth; once in each code: those for Viennese, Austrian, and Literary German.) It should therefore be tacitly assumed that in the system of the speaker and the listener the same item, say an /m/, is encoded three times. This is counter-intuitive, especially if we note that the mental storage of linguistic items usually follows the opposite principle: a number of partly overlapping items (like variants) tend to be stored under a single heading (in this case, the phoneme). On the other hand, the idea of "one language--several codes" entails the necessity of performing a very large number of (superfluous) operations that the other theorem does not have to permit. (Let me note here with respect to the principle of economy that, although it has limited validity in the analysis of linguistic processes and changes, in the evaluation of competing descriptions of a phenomenon it can be taken to be crucial.)

It is somewhat more difficult to find an answer to the second problem: Are matters really the way we said they are? In other words, is it a single, suitably organized code that is actually employed, or rather a set of codes as is claimed by the other, indubitably more complicated description quoted above? (Economy in itself is by no means a decisive factor as far as the

authenticity of the competing accounts is concerned, therefore the question is justified.)

Incontrovertible evidence obviously cannot be supplied -- except by a physiological investigation of the cerebral nerves that would unambiguously demonstrate how the brain stores the units of the linguistic system and how it handles them in producing linguistic utterances. No direct brain physiological data of this sort are available. (How little chance there is at the moment to obtain such data was indicated in 2.2.3. This situation is further demonstrated by what is going on in the investigation of aphasia. This disease produces quite striking morphophonological distortions; but as far as its neurological background is concerned, scholars tend to hold diametrically opposed views even with respect to the localization of aphasia symptoms, as testified by A Grand Dictionary of Phonetics, a compilation that presents recent knowledge taken from all disciplines concerned and submits them to a thorough "cross-examination", cf. Onishi 1981, 34--7.) As a consequence, we have to rely on linguistic evidence. Although some of that evidence, exactly because certain details have not been sufficiently explored, is not totally free of obscurities, on the whole it supports the theorem of a single code.

(i) During language acquisition, the child uses a restricted segmental phonological system whose processing (perceptual) and productive (articulatory) sides are not completely congruent (cf. 2.2.2.2(ii)). Components that are distinct in the former may still coincide in the latter. Since the relevant, acoustically documented investigations are not numerous, let me refer to the Hungarian example once more (cf. Asztalos--Szende 1975). /l/, /r/, and /j/ were invariably realized in the case at hand, as they are in numerous other cases, by [j]; it is important to note that the acoustic pattern of realizations of those phonemes unambiguously revealed the same elementary speech event in each case. At the stage of development we studied, the child had a segmental phonological system that was more differentiated than what her speech production directly revealed; that system contained three units where the surface representations only had one. Thus, the adequate phonemic transcriptions for some of the word forms taken from that study are the following:

[pa:jna:ja] ← /pa:rna:{r;j}a/ (párnára 'onto the pillow'; párnája 'his pillow')

[jo:] ⟵ /{l;j;?r}o:/ (ló 'horse'; jó 'good'; ró 'carve')

(The question mark before r indicates that it is only in principle that ró can be assumed to exist for the child.)

There is no doubt that the child had that phonemic alternation within a single code: the subject had no second dialect at his disposal. Accordingly, the full segmental system of his speech had to be part of the same code. (The process of development of a child's inventory into the adult/normative segmental phonological system follows, within each class of phonemes, a path fundamentally similar to that of /l;r;j/ ⟶ [j]; let us just refer here to two analyses out of a number of unanimous statements: cf. Vértes O. 1955, 15 and Gósy 1984, esp. 9--12.) From our point of view, the relevant conclusion is that it is possible, indeed it does happen, that a single system includes an alternation of segmental elements that are fixed, always "self-identical" and yet variable.

(ii) The correspondence 'phoneme' ⟷ 'elementary speech event' is by definition such that the element appearing on the left covers a set of (free or combinatorial) variants on the right (cf. Szende 1978). In the course of speech, the right-hand side is filled up by a series of units characterized by necessarily diverse distributional values, obviously even if the speaker uses a single dialect. If the unique system of a single dialect is of that kind of arrangement, i.e. it contains strictly and loosely programmed parts and consists of units of non-identical degrees of individuality, consequently a unified system can be stratified from a segmental phonological point of view, we have less reason to postulate that in a multidialectal case several systems are simultaneously at work with doubly-encoded identical elements. Rather, we should assume, by analogy, a single system for non-identical dialects as well, with programming points of a higher variability in the appropriate cases. In the columns of realizational patterns for elements of the second to nth degree of individuality, all units belonging to one particular dialect will obviously occupy the same row. The arrangement referred to here offers a simpler description.

(iii) Spelling inconsistencies in texts that antedate the codification of a unified orthographic system (or in present-day texts of poor spelling) reveal that the degree of inconsistency varies across elements. For histor-

ical data, e.g. variation in indicating short vs. long vowels in early Hungarian texts, cf. Benkő 1960, 116--20; for spelling mistakes, cf. Fónagy and Fónagy 1971).

(iv) In the course of the disease, aphasiacs lose elements in a particular order (rather than all at once) as their linguistic abilities disintegrate (for a fairly detailed description of that order see, e.g., Dressler 1982). This fact suggests that there are firmer (more strictly programmed) and more contingent (loosely programmed) elements in a given system. If such differences can be spotted among elements of a unified basic system, universally determining their gradual loss in a particular order, it follows that the articulatory stability of the units is non-uniform. Lower stability corresponds to looser or less high-resolution programming, whereas higher stability implies a stricter or more fine-grained one. Elements of looser vs. stricter programming differ in their degree of individuality as well as that of their (self-)identity.

With respect to the foregoing, a crucial theoretical problem arises. Is it not the case that the above explanation reintroduces an archiphonemic component into the phonological representation of the cases discussed? Have we not reproduced a situation that we have sharply criticized with respect to Natural Generative Phonology (cf. 1.2)? The formulae in (a) and (b) above appear to suggest this. The claim made here is tenable only by assuming that the offending units appearing in realized non-standard forms are allophones of the corresponding units in the standard representation. In this case, the $\underline{f}$ components of the matrix will remain constant across dialects and only $\underline{A}$ components will be represented by modified articulatory/acoustic parameters in the lower parts of phonemic matrices. The realizations of /r/ in Viennese or the labialized articulation of /a:/ in some positions in the same dialect support this interpretation. Via a partial but systematic shift of the set of articulatory components $\underline{A}_{1--n}$, the speaker sets out from, and returns to, the same phonological representation.

4.10. Domination and ordering in lenition. T(xxxiii)

Lenition processes may be simultaneous and sequential (synchronic and asynchronic). The only criterion for simultaneity, in principle, is that the rules of modification concerned are not causally related to one another. In

other words, the rules can apply in diverse articulatory processes without a necessary application of any other rule that is in a relation of simultaneity with them. Such relation holds e.g. between phrase-initial devoicing and sequence size truncation. In sample IV/175 (Z: + Szóval én a gimnázium után 'Well, having completed my secondary school studies'), phrase-initial szóval 'so' is not devoiced, even though it appears as [sʌ] by truncation. On the other hand, in sample IV/191 (Z: Meg, szóval én azért 'And, well, I still') -- spoken by the same subject, and also in phrase-initial position -- szóval occurs truncated but with a voiceless vowel as [s̥ə̥], by delayed voice onset (lengthened VOT). Similarly, a phrase-initial devoiced [ḁ:] in hát cooccurs with h-loss (cf. sample IV/189: Z: + Hát 'Then, well'), even though a realized [h] would be compatible with devoicing; indeed, the reduced [ḁ:] could be made more perceptible by a compensatory fortitive h-initial articulation.

On the other hand, reduction does not necessarily cooccur with phrase-initial devoicing, either: hogy 'so that' is not devoiced in sample IV/198 (an interpolation, Z: hogy úgy mondjam 'so to say') but its [ɟ] is realized in a reduced form by the omission of its turbulence noise. The explanation is straightforward. The operation of the glottis is physiologically independent of the innervation of the organs in the supraglottal resonators; that is, if both undergo fortition, it is a mere coincidence: they do not mutually imply tension in one another.

As long as lenition rules are sequential, some ordering must naturaly be imposed on them. Ordering, however, does not involve temporal succession. First of all, in general, whatever the speaker utters, no matter what rules of modifications have produced that phonetic output, "leaves his lips in one go" or constitutes a single acoustic event that the listener perceives as a unified acoustic experience. Secondly, on a practical level, the order of application of lenition rules simply cannot coincide with the temporal order of the elements concerned. In sample II/376 (M: + elképzelhető, de + 'it may be supposed but') we have two lenition processes. (i) Phrase-initial devoicing up to the [ɛ̥·] of the second syllable (obviously due to delayed VOT). (ii) There is also l_1-deletion in the same acoustic portion with lengthening of the initial vowel as a phonetic trace. Thus, l_1-deletion results in [ɛ̥:]. Devoicing undoubtedly coincides with the first step in the articulatory program, otherwise there ought to be, within the vowel, some voicing that would

later disappear as devoicing applies. But since the domain of devoicing is a subsequence (rather than a single segment) extending from the beginning of the sequence, across l_1-deletion, up to onset of [ɾ], no temporal order can be established between the two lenition processes. In general, any temporal ordering of lenition rules would be speculative: all relevant lenition processes must apply in articulation in the same period of time.

Temporal succession as an ordering principle of lenition rules applied in an articulatory portion is therefore discarded; but this does not imply that (exclusively) random ordering must be permitted in some other respects.

In modificational programs of lenition, individual rules are generally ordered on a condition/consequence basis. The "later" rule uses the output of the "earlier" rule as input. Thus, the modification specified in the rule does not apply to the initial phonemic representation but rather to an intermediate representation that has been modified in some way by the "previous" rule. Consider the example szóval 'so' again. Whether it occurs phrase-initially or phrase-medially, szóval has a large variety of phonetic forms. In sample IV/510 (Z: + szóval egy óriási 'well, a huge') we find a truncated and devoiced version: [s̥ʔ]. In samples IV/513 and IV/518, spoken by the same subject, it occurs in two different -- but to some extent also delabialized -- forms with v-deletion and l-deletion as [soa̯l] and [sovɑ], respectively. These forms retain the original backness quality of the word; this is unmotivated in sample IV/513 (Z: de szóval ő is 'but, well, he too') where it is surrounded by front vowels. On the other hand, in sample IV/510 ([s̥ʔ]) the context is front and szóval undergoes backness assimilation making the vowel [-back]. Within the material of the same speaker, in sample IV/544 (Z: Szóval 'ez az, ami miatt 'So this is why') the word occurs with a [-back] vowel again, this time with truncation: [sʌl], in a front-vowel context. In the last two cases (in samples IV/510 and IV/544) we are clearly faced with two lenition rules: (i) truncation that involves syllable elision by definition, and (ii) reduction, made up by delabialization, fronting, and raising. (Delabialization strips the vowel of its roundedness, while fronting-cum-raising eliminates an aperture component and practically results in bringing the tongue forward and higher by at least one degree.) The order of the lenition rules as indicated by the serial numbers above is supported by the fact that (prior to truncation) the word has two back vowels that would be expected to

motivate the retention of the [+back] component. This explanation is further supported by another example where the same word occurs with reduction but without truncation (IV/513: de szóval ő is 'but I mean he also': [soɑl]) between front-vowel words and retains the backness quality of its vowels even after v-loss. It is clearly the case, then, that truncation is a hierarchically dominant step in the articulatory program. Such hierarchical dominance cannot be taken to be absolute, however. In the miért 'why' of sample IV/797 (Z: Szóval miért nem 'So why not'), we have truncation: (i) syllable elision and (ii) r- and t-loss, the acoustic result being [me:]. As other instances of the same word show, however, these two lenition types can occur on their own as well: if there is only i-loss (syllable elision), we get [me:rt], and if it is only [r] and [t] that are lost, we get [mie:]. The unequal frequency of occurrence of these two versions suggests that syllable elision has a more dominant hierarchical position than r-deletion (cf. compensatory lengthening in [e:] and the loss of t) in the form [me:], but this conclusion is uncertain as a function of the quotient of the frequency values.

But this is still not the whole story. In an example like [ɑsmind] (for azt mind 'all of it + ACC') -- for a number of other similar instances, see also Kerek 1977 -- we have two lenition types: t-elision and voice assimilation. But whether [z] → [s] happens "before" the elision of [t], in which case the latter is t-loss or "after" that (in which case the elision of [t] is t-deletion that leaves the component of voicelessness behind as a phonetic trace), i.e. which rule dominates the other, is impossible to tell. The question, in fact, is not worth asking. If the application of one lenition rule does not make that of another one more likely than the other way round, all we should say is that the two -- in the sequence at hand -- are of equal rank, that they are at the same hierarchical (dominance) level. (The example is taken from Siptár 1991a, 36. In his view, this example is a clear case of counterbleeding rule interaction; that conclusion, however, can hardly be found evidence for in what is called the 'direct reality domain' of realization processes.)

Throughout the preceding discussion of the order of application of lenition rules, our attention was focussed on how the individual lenition operations can be hierarchically ordered in terms of the global programming of a whole articulatory unit. In other words, articulatory units were consid-

ered (for lenition) in their paradigmatic aspect. The ordering of lenition rules along the syntagmatic axis seems to be a simpler matter. Although it could be taken to be speculatively more probable that lenition types within a sequence follow one another in their order of strength, as it were, in one or the other direction, in actual articulation there is no principle stating that if an element of the sequence has undergone a lenition rule of a given strength, subsequent segments are supposed to undergo increasingly weaker or increasingly stronger types. Even lenition rules of the same type (e.g. reduction) but of diverse degrees of strength do not exhibit any such order; not even if we compare identical lenition processes applied to realizations of the same phoneme within a single sequence. For instance, in sample IV/671 (Z: felkeltik az érdeklődésünket 'they arouse our interest') we find closure loosening in the second and third [k] realizations but not in the other two where closure is perfect. An even more telling example is sample IV/736--738 (Z: Gyerekeknek írt könyveket elemzünk. + 'We analyse books for children'), in which the first, second, third, and sixth (last) k of the sequence undergo lenition. The first and second k undergo reduction by closure loosening, the third is also affected by reduction but only a milder one. On the other hand, there is k-deletion in elemzünk, a stronger type of lenition. In this case we could in principle assume a dominance relation in terms of strength, at least for the first word form of the sequence, but for that assumption to be borne out, either the first or the second k should be more radically reduced than the other. In addition, we could assume that the final k of gyerekeknek 'for children' undergoes 'refortition' that partly rescues it from stronger types of reduction. It is more appropriate, however, to argue here in the spirit of Ohala (1974). The final k is followed by a higher vowel, i, than the previous ones are and as the oral cavity is narrowed for the oncoming i, the configuration in question facilitates the tendency to retain full closure. Another way of looking at things according to which the third k in fact undergoes closure loosening but compensatory phenomena partly neutralize that effect, is by no means a mere play of fancy. But we have no sufficient insight into articulatory programming to support this idea by concrete arguments. Our conscience is therefore clearer if we conclude that the immediately conceivable effect of phonetic context is a better explanation.

With respect to the mutual relationship of diverse types of lenition -- in the syntagmatic aspect -- a similar conclusion can be reached.

The truncation of one element does not exclude the occurrence of another type of lenition at the immediately following point of the sequence. In sample IV/525--6 (Z: Szóval, amikor a lehetőség is 'In short, when even the chance'), szóval is extremely radically truncated into [s'], yet the reduction of the first vowel of amikor is not part of the truncation process that affects szóval. This is not the case even if lenition as a global programming factor of this sequence is obviously common to both the truncation of szóval and the reduction of the [a] of amikor. (It is immaterial in this respect that amikor 'when' and mikor 'id.' are optional lexical variants in the given context; once the realization program has it that the speaker has selected the fuller version, either phonemic representation will induce the appropriate, equally full phonetic representation in articulation, irrespective of whether the word has two morphophonemic alternants or otherwise.)

4.11. Morphophonemic alternation. T(xxxiv)

In Hungarian a particular group of homologous morphophonemic alternants (where 'homologous' means 'of equal value and of similar or in a sense identical position') like csepp/csöpp '(a) drop (of), tiny', fent/fenn/fönt/fönn 'above, up (there)', -ban/-ben 'in', -hoz/-hez/-höz 'to', or (originally) család 'family' / cseléd 'servant' (cf. Grétsy 1962, G. Varga 1968) consists of instances whose origin is not due to vowel harmony (backness harmony as in -ban/-ben and/or labial harmony as in -tok/-tek/-tök 'you-pl.' [verbal/possessive personal suffix]) or lexical split (as in magyar 'Hungarian'/ Megyer 'name of an ancient Hungarian tribe; geographical name', cf. Lotz 1956/1963) or any other type of bifurcating development like addition or subtraction of an (originally) independent morphological element to/from the phonemic representation (nő 'woman' / -né 'wife of') or presumable onomatopoeic effects (kavar/kever 'stir'), and so forth. The homology of a pair like aztán 'then' vs. azután 'id.' cannot be traced back to any of the above types of morphophonemic alternation; nor can it be attributed, obviously, to any (sub)type of normative accomodation phenomena. As no other explanation appears to be feasible for this type of variation, it will be expedient to interpret it, on the basis of a logical parallel with lento/allegro pairs of

forms, in terms of the allegro processes of everyday speech. To begin with: a causal relationship can be assumed between allegro processes and the way a particular group of (homologous) morphophonemic alternations comes into being. It can be demonstrated by recorded articulatory/acoustic data that the latter are produced by the same types of distortion processes as those regularly occurring in allegro speech. (Both the general phenomenon and the case discussed below that reflects it in statu nascendi are paradigmatic in that the mechanism involved may considerably increase the lexical stock of a language, cf. English hussy ← housewife; Hungarian examples involving shifts of lexical categories are, for example, hiszen 'since, after all' ← hiszem 'I believe (it)', bár 'although' ← bátor 'daring', etc.) The details are as follows.

Lenition rules (may) produce new morphophonemic alternations. Pairs of forms like azután 'then, after that' and aztán /ɑsta:n/ 'id.', ezután 'after this, from now on' and eztán /ęsta:n/ 'id.', miért 'why' and mért /me:rt/, mér /me:r/ or mié /mie:/ 'id.', odaad 'hand over' and odad /odɑd/ 'id.', and so forth, were produced -- or are being produced -- by some lenition rules of everyday speech. (In particular, aztán and eztán by the devoicing and deletion of [u], followed by a [z] → [s] voice assimilation that is observable in normative speech as well; odad by fusion across internal word boundary; for morphophonemic alternants of miért cf. 4.10.) With respect to forms produced by lenition rules, the most important theoretical problem -- in the border region between phonology and morphology -- is the following. How long do frequently occurring pairs of forms pass as occasional variants? Where is the point beyond which they have to be assigned the status of independent morphophonemic alternants? Given that the etymology of such words (for example, azután 'then' ← az 'that' + után 'after') suggests that the longer forms are the original ones, these will be taken as the primary variants and the more recent versions as secondary (via derivations like azután + devoicing, u-deletion, voice assimilation → aztán /ɑsta:n/). These secondary or subderivative forms will then behave in one of two possible ways in spontaneous allegro or allegrissimo speech.

(i) Having undergone the appropriate lenition rules, they assume a form that differs from the original version as it appears in the phonemic representation but is definitive as far as articulation is concerned. E.g. azután

may undergo the following set of lenition rules:

phonemic representation:	/ɑzuta:n/		
lento pronunciation:	[ɑzutɑ̃˙n]	or [ɑzutɑ̃:n]	
allegro pronunciations:			
(i) by [a:] → [a] reduction:	[ɑzutɑ̃n]		(attested form)
(ii) by u-devoicing:	[ɑzu̥tɑ̃n]	or [ɑz̥tɑ̃n]	
		(non-attested but acceptable)	
(iii) by u-deletion:	[ɑztɑ̃n]	(sic)	(attested form)
(iv) by n-deletion:	[ɑztɑ̃]	(sic)	(attested form)
(v) by regular regressive voice assimilation:	[ɑstɑ̃n]	or [ɑstɑ̃]	(attested forms)
(vi) by F_0 reduction:	[ɑ̥stɑ̃]		(attested form)
(vii) by t-reduction:	[ɑs˙ɑ̃]	(non-attested but acceptable)	

Notes: further possible and attested forms have been omitted, e.g. [ɑstɑ̃˙], a form that resists further shortening compared to one of the lento realizations; the small Roman numerals do not indicate rule ordering but are merely meant to separate individual steps of lenition from one another (notice that several lenition processes may show up in the same form, e.g. both forms in (ii) have [a:]-reduction, that in (iv) shows u-deletion and [a:]-reduction, one of the forms in (v) has n-deletion and both have u-deletion and [a:]-reduction, and so on); all versions actually correspond to diverse levels of a multilevel phonetic representation, reflecting diverse grades of distortion according to the degree of spontaneity and casualness [reduction coefficient] (cf. e.g. Kohler 1991, 105); versions (vi--vii) illustrate distortions of a new phonological representation, /ɑsta:n/.

(ii) In the other case lenition rules are not the end of the story: the articulatory program is completed by a fortition process. For instance, the pronunciations of miért 'why' are as follows:

phonemic representation:	/mie:rt/	
lento pronunciation:	[mie:rt], ..., [mi^{j}e:rt]	
allegro pronunciations:		
(i) by i-reduction:	[m^{i}e˙rt]	(attested form)
(ii) by i-deletion:	[me˙rt]	(attested form)
(iii) by t-loss:	[me˙r]	(attested form)
(iv) by fortition:	[me˙rˀ]	(attested form)

After step (iv), morphophonological homonymy is produced between *miért* 'why' and the 3sgPresInd verb form *mér* '(he) measures' since in a realization like *mér* —► [me˙rˀ] fortition gives the same articulatory/acoustic result as in *miért*. Now, if the ultimate motivation for fortition is higher iconicity or the increase of (morphological) naturalness and discriminatory potential, we have to find incongruity between the simultaneous presence of fortition and lenition rules and those expectations of increased intelligibility. Hence, the pre-fortition morphophonological representation of [me˙rˀ] (◄— *miért*), at least in a large majority of cases, must have been /me:r/. This amounts to saying that, along with *miért*, there must be a (lexical) alternant *mér* as well. As a brief digression, consider [ɑze:rˀ] (◄— *azért* 'therefore/still') in sample II/202 (I: *+ Szóval ami olyan, + hát a főiskolán azért* 'Well, what is kind of, so in the college still'). The fortitive character of *azért* is indicated, apart from final [ˀ], by the retention of full length in [e:], leaving even less room for doubt as to what the phonemic representation must have been. So, comparing the cases of *miért* and *azért*, we have to conclude that, in addition to (morpho)lexical alternations, what is actually observed here is the morphophonemic alternation of a bound morpheme, the case suffix *-ért* 'for'. (However, the morphological implications of this issue will not be explored here.)

The foregoing points provide us with the following theorem. The phonological criterion for a new phonemic representation, i.e. a secondary (subderivative) input form, is that it undergoes further phonetic modifications similar to inputs that are phonemically original or primary. It is to be emphasized, however, that this is only a phonological criterion. In reality, other (e.g. semantic) considerations also come into play in deciding whether a particular form qualifies as secondary phonological representation. Among

other things, scholarly conventions are also relevant: in ÉrtSz (pp. 79, 80, 1027) azután and aztán 'then' are both granted independent status, whereas azért and azér 'therefore' or odaad and odad 'hand over' are not.

No matter how much latitude morphophonemic alternation enjoys, subderivation, i.e. the introduction of secondary morphophonemic representations, is not unlimited. In reduction over the sequence, two or even more words or word forms can be amalgamated. The clipped word form may fuse with the next item (which can itself be a form produced by some lenition process, e.g. reduction), and the two may even constitute a single phonetic unit of articulation. The two fused elements will nevertheless both retain their original lexemic status. In sample IV/173 (Z: + Szóval ez + 'Well, this is'), szóval undergoes truncation with double desyllabification followed by fusion, eventually giving [[s$^{o}_{\frown}$ęz·]]. However, even though truncation yields a single output syllable for the whole sequence, the emerging form does not constitute a single domain of front--back harmony, an absolute criterion of monosyllabicity in Hungarian. (Similarly, the geographical name Szöul 'Seoul' is necessarily bisyllabic phonologically, among other reasons, because its vowels belong to two opposite, mutually exclusive vowel harmony classes.) It might be noted that it is a back-dominant acoustic output, rather than the actually occurring version, that one would expect on the basis of the initial phonemic representations in their pure form. But in truncated instances of szóval we may get a reduced [-back] vowel in a back-vowel environment, showing that lenition rules do not respect vowel harmony in allegro speech; rather, they exhibit a tendency of neutralizing the front--back vocalic dimension in the sequence. Consequently, the reduced form of szóval ez in sample IV/173 might have easily taken a consistent [-back] realization. But it did not. On the other hand, wherever a word boundary blocks the application of vowel assimilation, it does not make much sense to talk about morphophonemic alternation across a word boundary or the appearance of a new morpheme at all.

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The abbreviations used in the citations of Hungarian periodicals:

Acta Univ. Szeged. = Acta Universitatis de Attila József nominatae Szeged.

ALinguH = Acta Linguistica Academiae Scientiarum Hungaricae.

ÁNyT = Általános Nyelvészeti Tanulmányok (Studies in General Linguistics).

MFF and MFF-HPP = Magyar Fonetikai Füzetek--Hungarian Papers in Phonetics.

MNy = Magyar Nyelv (The Hungarian Language)

MNyTK = A Magyar Nyelvtudományi Társaság Kiadványai (Publications of the Hungarian Linguistic Society).

MNyjok = Magyar Nyelvjárások (Hungarian Dialects).

Műhelymunkák = Working Papers of the Linguistics Institute of the Hungarian Academy of Sciences.

Nyelvészeti Füzetek = Papers in Linguistics.

NyIOK = Az MTA Nyelv- és Irodalomtudományi Osztályának Közleményei (Publications of the Department of Literature and Linguistics of the Hungarian Academy of Sciences).

NyK = Nyelvtudományi Közlemények (Studies in Linguistics).

Nyr = Magyar Nyelvőr (Hungarian Language Guard).

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